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THEME 1 :

INDUSTRY REVOLUTION 4.0

THE CHALLENGES OF IR 4.0: A STUDY ON STUDENTS' PERSPECTIVES AT TEMERLOH COMMUNITY COLLEGE

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ABSTRACT

The recent world is increasingly developing. Alongside with the development, the Fourth Industrial Revolution (IR 4.0) has been introduced. It is the continuation of the first Industrial Revolution. To overcome the IR 4.0, there are many challenges that could hinder the development. Therefore, this research is aimed to assess how far the students of Temerloh Community College could overcome the challenges in IR 4.0 according to their perspectives. Hence, the objective of the study is to examine the students' awareness in terms of their knowledge, creativity and innovation, individual skills, and the facilities at the college. This is quantitative-based research which uses questionnaires with Likert scale that has 37 close ended questions and is distributed to 84 respondents. The findings show that the students at Temerloh Community College have moderate knowledge about IR 4.0 with a mean value of 2.93. However, in terms of the other challenges like creativity and innovation, individual skills, and the facilities at the college, the mean value is at a high level, which is 3.57, 3.80, and 3.86. Therefore, it is suggested that the college could help the students in terms of knowledge and provide enough space and opportunity for them to overcome the IR 4.0 successfully. Lastly, it is hoped that the students are ready to face the IR 4.0 to become a knowledgeable and successful person in the future.

Keywords: Challenges of IR 4.0, perspectives, students, Temerloh Community College

INTRODUCTION

Industrial revolution development is a shift in the industrial sector. It starts from the first industrial revolution until now which is at the fourth level (IR 4.0). According to the second edition of Students' Dictionary, the industry means large-scale enterprises. The industry is one segment of the economy that produces goods. The word "industry" is derived from the Latin word, which is industries that carries the meaning of diligent and hardworking. The industry is the production of goods or services and economic activity that processes raw materials into finished goods or provide services. There are four sectors in the industry, namely the first, collecting industrial raw materials on a large scale such as mining and agriculture; the second comprises the construction and production; the third is related to the service industry (law and medicine) and distribution of the finished product; and the fourth sector is industry knowledge that focuses on research in the areas of technology, design and development such as computer programming and biochemistry. According to Davies (2015), the industrial revolution took place four times. Revolution is when the first steam engine and mechanical replace human labour. It happened in the 18th century. After that, at the end of the 19th century, there was a second industrial revolution which is based on electricity. Then, starting in 1970, the use of computer technology marks the beginning of the third industrial revolution. Finally, at the present time, the industrial revolution is on the fourth level. Ilyana Yahya (2018) states that IR 4.0 is a continuation of the third industrial revolution. It uses new technology which applies automation, analytics and big data, simulation, integration of information systems, robotics technology, cloud technology, Internet of Things, which present new challenges in line with the digital transformation. Darth & Hortch (2014) states that the exact date is not announced by IR 4.0 because the events have not been expressly defined and it is still in concept form.

The industrial revolution is to facilitate human life. The industrial revolution is also a manifestation of man's success in improving the quality of their lives. It influences social, economic or political aspects. Despite the enthusiasm arising from the outburst of IR 4.0, we should not forget the various obstacles and challenges that we must face before achieving success.

Duricin (2018) emphasizes that, IR 4.0 is the technology of cyberspace that depends a lot on the internet and technology. It greatly reduces the dependence on human power. Hence, the revolution is to provide a variety of effects on human life. The onset of the first industrial revolution until the fourth industrial revolution; the pattern of human energy consumption is reduced little by little. Therefore, we should be ready to face these changes.

IR 4.0 This is very different from our expectations and imagination. This is because the world's population will live, communicate, work, business in a different environment, including in terms of governance and human movement. One-third of the world's population uses social media to learn, share and communicate information and this will change the way and quantity of use of technology, processing and storage of information (Ruslin Amir, Hamidun Bunawan & Mohd Firdaus Yahaya, 2018). Hence, this will inevitably lead to the development challenges regardless of the younger generation and the older generation.

According to Sharita et. al (2018), among the challenges faced by students in the era of the IR 4.0 is the knowledge of IR 4.0 itself, knowledge of their soft skills as well as their readiness to deal with this IR 4.0. In addition, among other challenges to be faced by students is a matter of creativity and innovation, as well as individual skills and facilities used by them (Kamarudin Ilias & Che Aleha Ladin, 2018; Mimi Azrina Jaafar, Husniza Husni & Yuhanis Yusof, 2018; Maziahtusima Ishak, Hazlina Abdullah, Sakinah Ahmad & Yuslina Mohamed, 2018; Mohd Azidan Ramli, Ramlee Mustafa & Roszelina Abd Rahman, 2018; Ruslin Amir, Hamidun Bunawan & Mohd Firdaus Yahaya, 2018; Krejcie & Morgan, 1970).

IR 4.0 has changed people's lives. It changed the way we work, business, buy daily necessities, communicate, perform daily tasks, and many more. These changes are driven by three technology domains, namely the physical, digital and biological spanning nine pillars of industry 4.0. This includes simulation and virtual reality, system integration, vertical and horizontal, industrial Internet of Things (IoT), cyber security, cloud computing, additive manufacturing, supply chain, analysis of election data and robot automation (Schwab, 2016). Therefore, a thorough and effective preparation should be taken in order to stimulate and develop students who are able to adapt to the era of IR 4.0 and managed to become an outstanding student.

These reasons have initiated this study and lead to the objectives of this research which is to investigate the students' level of awareness towards the challenges of IR 4.0.

The challenges comprise of the:
   i.   Knowledge about IR 4.0
   ii. Students' creativity and innovation to overcome IR 4.0
   iii. Students' readiness to overcome IR 4.0 with the skills that they have
   iv. Facilities that can help the students to overcome the era of IR 4.0

2. METHODOLOGY

This study employs quantitative survey methods, which is close- ended questionnaires and 5- point Likert scale, adapted from Kamaruddin Ilias & Che Aleha Ladin (2018), Mimi Azrina Jaafar, Husniza Husni & Yuhanis Yusof (2018), Ilyana Yahya (2018), and Sharita Abd Ghani, Norfidah Abdul Hamid & Asmah Othman (2018). This questionnaire has the reliability value, which is 0.901 and the validity value is more than 0.3. A total of 37 questions have been documented including demographics and research questions. The questionnaires are distributed to students in Temerloh Community College. The samples used in this study were 84 people out of 106 students from the Temerloh Community College. The numbers of students selected are based on the table adopted from Krejcie & Morgan (1970). Finally, the data were analyzed descriptively using Statistical Package for Social Sciences (SPSS) version 22.0. The data was analyzed with regard to frequency, percentage, mean and standard deviation. The mean value interpretation is as follows:

Table 1: Mean value interpretation

Mean value	Mean interpretation
1.00 – 1.80	Very low
1.81 – 2.60	Low
2.61 – 3.40	Average
3.41 – 4.20	High
4.21 – 5.00	Very high

(Jainabee & Jamil, 2009)

DATA ANALYSIS AND FINDINGS

The demographic data of the study were divided into few categories which is gender, programs, and semesters. The total number of respondents are 33; (39.3%) were male and 51 (60.7%) were female. There are 15 students (17.9%) from Certificate in Information Technology (STM), 43 students (51.2%) from Certificate of Fashion and Apparel (SFP), 22 students (26.2%) from Certificate of Building Maintenance (SPB) and 4 students (4.8%) from Certificate of Furniture Design (SRP). There are also 7 students (8.3%) from semester one, 61 students (72.6%) from semester two, one student (1.2%) from semester three and finally 15 students (17.9%) for semester four. Meanwhile, to respond to the objectives of the study, the findings are presented in the tables below by following the order of the research questions:

Table 2: Students' knowledge about IR 4.0

NO	ITEMS	SD	D	U	A	SA	Mean	Std. dev.
1	I know the meaning of IR 4.0	13 (15.5%)	16 (19%)	37 (44%)	15 (17.9%)	3 (3.6%)	2.75	1.04
2	I have heard of IR 4.0	13 (15.5%)	17 (20.2%)	32 (38.1%)	19 (22.6%)	3 (3.6%)	2.19	1.08
3	I have read about IR 4.0 through magazines/ newspapers/ books and other sources	14 (16.6%)	22 (26.5%)	33 (39.3%)	9 (10.8%)	5 (6.0%)	2.63	1.08
4	I have the skills in IT	4 (4.8%)	14 (16.7%)	28 (33.3%)	29 (34.5%)	9 (10.7%)	3.30	1.03
5	I understand the use of technology in IR 4.0	11 (13.3%))	15 (18.1%)	34 (41.0%)	16 (19.3%)	7 (8.4%)	2.92	1.12
6	The lecturer emphasizes about IR 4.0 in teaching and learning (by using the notes via internet/ QR code/virtual learning etc)	9 (10/7%)	10 (11.9%)	25 (29.8%)	34 (40.5%)	6 (7.1%)	3.21	1.10
7	I understand the transformation towards IR 4.0	11 **(13.1%)**	16 **(19.0%)**	35 (41.7%)	19 (22.6%)	3 (3.6%)	2.85	1.04
8	I understand the things involved in (IR 4.0)	**12** (14.3%)	17 (20.2%)	29 (34.5%)	20 (23.8%)	6 (7.1%)	2.89	1.14
9	I am ready to face IR 4.0	9 (10.7%)	13 (15.5%)	33 (39.3%)	23 (27.4%)	6 (7.1%)	3.05	1.07
							2.93	0.86

Table 2 shows the level of students' knowledge about IR 4.0. The results of this study shows that majority of students which is 75.5% are disagreed and are unsure about the purpose of IR 4.0, 73.8% had never heard of IR 4.0; 82.4%, had never read about IR 4.0, 72.4%, do not understand about the use of technology in IR 4.0; 73.8% did not understand about the transformation towards the era of IR 4.0, 69% do not understand the things that are involved with IR 4.0 and lastly 65.5%. are not ready to face the IR 4.0. This study has a mean value of 2.93 which is at the average level.

Table 3: Students' Creativity and Innovation

NO	ITEMS	SD	D	U	A	SA	Mean	Std. dev.
1	I have high imagination	1 (1.2%)	2 (2.4%)	32 (38.1%)	39 (46.4%)	10 (11.9%)	3.65	0.77
2	I can produce new product	0 (0%)	9 (10.7%)	41 (48.8%)	30 (35.7%)	4 (4.8%)	3.35	0.74
3	I can improvise the product	0 (0%)	6 (7.1%)	33 (39.8%)	37 (44.6%)	7 (8.4%)	3.54	0.75
4	I always think of upgrading the product	0 (0%)	0 (0%)	5 (6.0%)	29 (34.5%)	42 (50.0%)	3.63	0.74
5	I am interested in creating product to help others	0 (0%)	10 (12%)	23 (27.7%)	38 (45.8%)	12 (14.5%)	3.63	0.88
6	I am interested to create new product that is unavailable in the market	1 (1.2%)	10 (11.9%)	28 (33.3%)	33 (39.3%)	12 (14.3%)	3.54	0.92
7	The college supports me to produce an innovation product	2 (2.4%)	5 (6.0%)	26 (31.0%)	40 (47.6%)	11 (13.1%)	3.63	0.88
							3.57	0.58

Table 3 shows the students' creativity and innovation. Most of them have 53% ability to improve a product, 85% always think about upgrading the product, 60.3% are interested in creating products that can help others, 53.6% are interested in creating a product which is unavailable at the market and 60.7% of the students agreed that the college always encourages them to produce innovative products. In addition, there are 59.5% of the students think that they are unable to produce new products. However, overall, students in Temerloh Community College has the characteristics of creativity and innovation in themselves. This is evidenced by the mean value which is 3:57, at a high level.

Table 4: Students' Individual Skills

NO	ITEMS	SD	D	U	A	SA	Mean	Std. dev.
1	I can handle ICT tools (computer/gadget) properly	3 (3.6%)	5 (6.0%)	32 (38.1%)	32 (38.1%)	12 (14.3%)	3.54	0.94
2	I can use computer/ gadget without assistance from lecturer and friends	0 (0%)	2 (2.4%)	29 (34.5%)	46 (54.8%)	7 (8.3%)	3.69	0.66
3	I always practice higher level thinking (evaluation/analysis/ thinking out of the box etc)	0 (0%)	3 (3.6%)	39 (46.4%)	38 (45.2%)	4 (4.8%)	3.51	0.65
4	I can solve problems without the help of others	3 (3.6%)	5 (5.0%)	46 (54.8%)	25 (29.8%)	5 (6.0%)	3.29	0.82
5	I can cooperate in a team	0 (0%)	1 (1.2%)	7 (8.3%)	52 (61.9%)	24 (28.6%)	4.18	0.62
6	I can listen to the instruction properly	0 (0%)	1 (1.2%)	10 (11.9%)	50 (59.5%)	23 (27.4%)	4.13	0.65
7	I have good communication skills	0 (0%)	0 (0%)	18 (21.4%)	45 (53.6%)	21 (25.0%)	4.04	0.68
8	I can manage time properly	1 (1.2%)	0 (0%)	31 (36.9%)	36 (42.9%)	16 (19.0%)	3.79	0.79
9	I have a good manner	0 (0%)	1 (1.2%)	14 (16.7%)	50 (59.5%)	19 (22.6%)	4.04	0.67
							3.80	0.44

Table 4 shows the soft skills among students. A total of 52.4% of the students are able to handle the ICT equipment very well, 63.1% are able using computers/gadgets without the need for assistance, 50% always have high level thinking, 90.5% are able to work cooperatively in a team, 86.9 can listen to the instructions very well, 78.6% have good communication skills, 61.9% know how to manage their time properly and 82.1% has good manners. However, there are still 63.4% of the students who could not solve the problem on its own. However, the students have the necessary skills to cope with the era of IR 4.0 with the mean value of 3.80, which is at a high level

Table 5: Students' Facilities

NO	ITEMS	SD	D	U	A	SA	Mean	Std. dev.
1	The reading materials in the library that relates with IR 4.0 are sufficient	6 (7.3%)	9 (11.0%)	29 (35.4%)	29 (35.4%)	9 (11.0%)	3.32	1.05
2	I have the internet access at all places in the college	4 (4.8%)	3 (3.6%)	22 (26.5%)	38 (45.8%)	16 (19.3%)	3.71	0.98
3	The teaching and learning facilities are sufficient	3 (3.6%)	4 (4.8%)	20 (24.1%)	41 (49.4%)	15 (18.1%)	3.73	0.94
4	The computer facilities provided by the college is sufficient for all students	3 (3.6%)	11 (13.3%)	14 (16.9%)	37 (44.6%)	18 (21.7%)	3.67	1.07
5	I have my own smart phone	0 (0%)	2 (2.4%)	5 (6.0%)	42 (50.6%)	34 (41.0%)	4.30	0.69
6	I always use computer/smart phone to do my assignment	0 (0%)	2 (2.4%)	7 (8.4%)	45 (54.2%)	29 (34.9%)	4.22	0.70
7	The college provides sufficient learning area for all students	0 (0%)	2 (2.4%)	19 (22.9%)	33 (39.8%)	29 (34.9%)	4.07	0.82
							3.86	0.57

Table 5 shows the students' facilities. A total of 65.1% agreed that they have access to all places in college, 67.5% agreed that the equipment for teaching and learning are sufficient, 62.7% of students agreed that the computer provided by the college are enough, 91.6% have their own smartphone, 89.1% always use computers / smartphone to do the assignment and lastly 74.7% agreed that the college has provided adequate learning area for all students. In addition, 53.7% thought that the reading material in the library that are related to IR 4.0 is not enough. However, the facilities enjoyed by students is sufficient with a high mean value which is 3.86.

3. RESULTS AND DISCUSSIONS

Students' knowledge about IR 4.0
Referring to Table 2, the students' knowledge about IR 4.0 is moderate, with a mean value of 2.93. They seem unprepared to face a new era, whether in terms of knowledge or readiness. This study is supported by Sharita Abd. Ghani et. al (2018) who claimed that the student is still not ready with their knowledge and readiness to face the era of IR 4.0. Sabri Mohamad Sharif (2017) states that, IR 4.0 has led to a paradigm towards humans to become more open, dynamic and specific for the coming generations. Therefore, all parties including educators and students should be together so that IR 4.0 will be the priority that needs to be known and studied and they will not be left behind by the modernization. This knowledge should be emphasized in teaching and learning so that the students are better equipped to face the IR 4.0.

Creativity and Students' Innovation
Referring to Table 3, students' creativity and innovation are at a high level with the mean value of 3.57. The students at community colleges are exposed to the innovation competition every year whether at the institutional level, department, state, national or international level. Thus, this exposure is able to educate the students to become more creative and innovative. It is important that every student should have the creativity and innovation so that they are able to adapt to the era of IR 4.0. Kamarul Azmi Jasmi et. al (2017) claimed that innovative and creative individuals are often held in high esteem. The element of creative and innovative are natural advantages that actually exists within each individual. If it is not developed it will remain idle and unable to be developed. It is argued that creativity is owned by the luckiest person. In fact, creativity could be learned, developed and owned by every human being. Being creative and innovative youth is the key to a fun environment. Thus, educators and students should cooperate in order to produce creative and innovative teens for the future.

Students' Individual Skills

Referring to Table 4, the students' individual skills are at high level with the mean value of 3.80. The skills that they have including the ability to operate ICT tools, the ability to use the gadgets without assistance, higher-order thinking skills, ability to solve the problem, ability to listen to the instructions well, having good communication skills, good time management, and good manners. The competent teenagers are the person who has a variety of skills in various fields. According to Boyatzis and Kolb (1995), competence is a combination of capabilities, knowledge and experience that allows people to do things perfectly. Thus, in the era of IR 4.0, each student should be equipped with a variety of skills, abilities, knowledge and experience so that their knowledge will be more meaningful. Zaipah Ismail et. Al. (2014) suggested that the learning of technical and vocational education should be based on competency because it can produce a workforce that contributes to the development of the country.

Students' Facilities

For students' facilities, they mentioned that the facilities around them are good and sufficient. This is evidenced by the mean value which is 3.86. The facilities are Internet access, adequate teaching and learning facilities, adequate computer facilities, having their own smartphone and ample learning space around the college. Sufficient facilities can add to the quality of students' learning. This is supported by Roslinawati Ibrahim (2016) who stated that there is a significant relationship between the quality of students and the quality of facilities which can lead to the effectiveness of teaching and learning.

4. CONCLUSIONS

IR 4.0 has many challenges to succeed. The results from this study show that the obvious challenges in IR 4.0 are in terms of knowledge as it is at the average level. However, other challenges such as creativity and innovation of students, individual skills and the facilities are at a high level. Therefore, students from Temerloh Community College should be ready from the beginning to be able to overcome the challenges. Ilyana Yahya (2018) argued that students need to get out of their comfort zone and learned a variety of skills and knowledge in life, volunteer activities, entrepreneurship and so forth. Therefore, several suggestions are made to face the obstacles in IR 4.0:

1. Students should strive in their studies so as not to be left behind by the modernity
2. The lecturers or educators must explain and relate their learning sessions with IR 4.0 so that students are more aware of the changes in their surroundings
3. The lecturers should educate students with a variety of skills and soft skills in either science or morality
4. Vary the activities to foster the creativity and innovation among the students such as in competition and so forth
5. the libraries should be equipped with various reading materials that related with IR 4.0
6. The college must ensure that the facilities available to students are in complete and good condition.

Finally, we hope that all parties can play their respective roles in shaping and preparing the students for the challenges in facing the IR 4.0. Thus, continuous efforts should be done from the beginning in order to face the IR 4.0 successfully.

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CONSUMER INTENTION OF USING E-WALLET SYSTEM AMONG STUDENTS IN PUBLIC HIGHER INSTITUTION

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ABSTRACT

The cashless technology known as e-Wallet or electronic wallet is new and increasingly popular among consumers in Malaysia especially among the student. They are heavy smartphones users and always like to adopt new technology and system. Through e-wallet system, user just need to have the application in their smartphones and it help them to spend without having to carry any credit card and cash in hand. Therefore, this study aims to determine the factors that influence consumer intentions of using e-wallet system among public higher institution student in Shah Alam, Malaysia by applying Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT model consists of performance expectancy, effort expectancy, social influence, culture and perceived risk. Data were collected from 380 respondents from Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA) and Universiti Teknologi MARA (UiTM) and quantitative research was conducted by means of a structured questionnaire. Simple random sampling technique as chosen in collecting data of this study. Pearson correlation analysis showed that performance expectancy, efford expectancy, social influence, culture and perceived risk were positively influential with the consumer intention towards e-wallet. For future researches, a proposition of sampling in other areas is advised for expansion of e-wallet user and gaining a more in-depth view in the significance of factors affecting consumer behavior to use e-wallet system in Malaysia.

Keywords: Consumer intention, e-wallet, UTAUT Model, performance expectancy, effort expectancy, social influence, culture and perceived risk

INTRODUCTION

The evolution of the industry towards digital technology is now leading to a paradigm shift in the technology world including the global payments service industry. While cash is the payment method of choice among consumers in the world, shifting dynamics have opened up opportunities for digital payment adoption (John, 2017). A rise in smartphone penetration, increased internet access, and government fraud prevention efforts have all played a role in streamlining digital payments. Base on Bank Negara Malaysia report, Malaysia nowadays are in three waves of reform measures for payment system since 2018 which focus on mobile payment rather to cash and cheque (Li, 2018). Its mean that Malaysia still needs to jump further to achieve cashless society status. The cashless society is a situation where cash flow in society is minimal and all transactions are performed through electronic media channels such as direct debit, credit and debit cards, and electronic wallets (John, 2017). According to YAB Prime Minister, Tun Dr. Mahathir Mohamad ,being a cashless society, its reduces the risk of carrying hard cash, reduce instances of tax evasion, reduce corruption and keeps the record of all transactions which will help to reduce illegal monetary transaction (Commission, 2018).

E-wallet is one of the technologies through smart phones to enable users to perform safe and secured payment transaction. It's like a physical wallet which used to store many customer information such as owner identity, telephone number, credit card number, debit card number including customers address and etc. However, e-wallet adoption within the Malaysian consumers are still at the beginning stage. The adoption rate in Malaysia is comparatively lower compared with other countries such as China, India and Singapore (Li, 2018). Mobile payment services or e-wallet represents a tremendously interesting paradox in the telecommunication world. Although, they are convenient, quick and easy but there is not still enough evidence on how successful this practice is. Based on research by Malaysian Communications and Multimedia Commission (Commission, 2018), the percentage of online shoppers among Internet users in Malaysia increased, from 48.8% in 2016 to 53.3% in 2018. The e-commerce market in Malaysia is showing a positive trend, with e-commerce gross value added contributed 6.3% to nation's gross domestic product (GDP) in 2017 compare with 4.6% in 2010. The adoption of electronic and mobile wallet has also contributed to the increasing number of online shoppers and banking users.

In European Journal of Scientific Research (Soomro, 2013), state that many university students use smartphones widely whether for business, education, health and social life. (Teh, 2014) in his research also said that growth of smartphones also gives positive impact to the university student and have transformed people's lifestyles by allowing them to digitally connect with their digital live. The traditional ways of making and receiving payments, doing shopping, paying bills etc. were already changing especially through mobile wallets. Students belong to Generation-F has grown up in a world with technology, connected with social media networks using their smart phones and tablets (Rana S. S., 2017). Hence, this study aims at narrowing the gap in prior literature and providing a perspective on increasing knowledge and understanding the factors that influencing consumer intention to use e-wallet system in Malaysia. This study applies The Unified Theory of Acceptance and Use of Technology (UTAUT) (Viswanath Venkatesh, 2003) to determine the factors influencing consumer intention of using E-Wallet among students in public higher institution in Shah Alam, Selangor.

3. METHODOLOGY

3.1 Data Collection

This was a correlation study (S.Sekaran, 2016) which attempted to investigate the statistical relationship between the consumer intention to use e-wallet system with few independent variables such as performance expectancy, effort expectancy, social influence, culture and perceived risk. According to (Stephanie, 2017), sampling frame is a list of all target in the selected population. It is a complete list of everyone or everything wanted to be studied. The main difference of population and sampling frame is population is more general which include every single person in the population while sampling frame is more specific. 380 samples of students were attained from the student population. Based on (John T. Roscoe. Holt, 1975), the following rules of thumb for determining sample size is that the sample sizes must be larger than 30 and less than 500 which are appropriate for most research. The sample size also determine based on the Krejcie and Morgan's sample size calculation using the Krejcie and Morgan's sample size determination table (Krejcie, 1970). As for this study, the respondents were used survey online and distributed questionnaires. The questionnaires survey were posted randomly using Google Form or distributed manually and respondents were encouraged to complete the form. The reliability test was conducted to ensure that each of the scales employed are being assessed to establish the internal consistency of the present study. Cronbach's alpha for the scales are presented in Table 2.

Table 2 : Reliability Analysis

NO	CONSTRUCTS	CRONBACH'S ALPHA	NO OF ITEMS
1	Performance Expectancy	0.903	5
2	Effort Expectancy	0.907	6
3	Social Influence	0.904	5
4	Culture	0.842	4
5	Perceived risk	0.864	4

According to (Nunnally, 1978), the reliability coefficient of not less than 0.7 is usually acceptable. As shown in Table 2, the reliability coefficient of the study variables exceeded the minimum acceptable level of 0.70.

3.2 Data Analysis

Statistical Package for Social Sciences (SPSS) was used for descriptive analysis in order to identify the level of mean for each variable and Pearson Correlation analysis was tested in order to examine the five variables in relation to the consumer intention to use e-wallet among students in public higher institutions in Shah Alam, Selangor. A Pearson Correlation (r) will indicate the direction, strength and significance of the bivariate relationship. The (r) between 1.0 which indicate positive relationship and (r) -1 indicate negative correlation.

4. RESULTS AND DISCUSSION

Table 1 shows 55% of the respondents were male whereas 45% of the respondents were female. Other than that, table 1 also show 51% of the respondents were at 21 years old to 23 years old, 28% between 18 years old to 20 years old and 21% between 24 years old to 26 years old. In education level, 54% were diploma holder, 36% were degree holder and 10% were master holder. 60% of them were student from Politeknik Sultan Salahudddin Abdul Aziz Shah (PSA) and 40% were from University Teknologi MARA (UiTM), Shah Alam Selangor. In level of respondent income, 64% were had RM500 and below, 28% were RM501 to RM999 and 8% were RM1000 and above.

Table 1: Summary of Respondents' Demographics

Response		Frequency	Percentage (%)
Gender	Male	208	55
	Female	172	45
Age Group	18-20	108	28
	21-23	194	51
	24-26	78	21
Education Level	Diploma	136	36
	Degree	206	54
	Master	38	10
Institution	PSA	229	60
	UiTM Shah Alam	151	40
Income	RM500 and below	244	64
	RM501-RM999	106	28
	RM1000 and above	29	8

Table 3 shows the level of mean interpretation according to Landell, (Landell, 2007). Factors that influencing respondents intention either strongly agree, agree, neutral, disagree or strongly disagree are based on the table.

Table 3 : Level of Mean Interpretation

Interpretation	Low	Moderate	High
Mean	100-2.33	2.34-3.67	3.68-5.00

Table 4 perform that the performance expectancy of e-wallet. Most respondent felt satisfied high that performance expectancy by e-wallet with mean score 4.18. Meanwhile, the achievement relatively low mean score 3.89 is I believe e-wallet services are useful for buying products. The average on mean for performance expectancy is 4.07.

Table 4 : Mean Analysis: Level of Consumer Intention of Performance Expectancy

Item	N	Mean	Level
I believe e-wallet services are useful for buying products.	380	3.89	High
Using e-wallet services would make me better customers	380	4.04	High
Using e - wallet service improves my efficiency as a customers.	380	4.11	High
It would be easy to purchase products using e - wallet service	380	4.18	High
E-wallet service would help me to save time while shopping.	380	4.15	High
Average Mean		4.07	

Table 5 perform that the effort expectancy of e-wallet. Most respondent felt satisfied high that effort expectancy by e-wallet with mean score 4.27. Meanwhile, the achievement relatively low mean score 4.10 is use of e - wallet would not require a lot of mental effort. The average on mean for performance expectancy is 4.19.

Table 5 : Mean Analysis: Level of Consumer Intention of Effort Expectancy

Item	N	Mean	Level
Use of e - wallet would not require a lot of mental effort.	380	4.10	High
E - wallet would be easy to use.	380	4.16	High
I would find it easy to use e - wallet service in buying what I want.	380	4.24	High
I think that I am able to use e - wallet service without the help of an expert.	380	4.17	High
It would be easy for me to become skilful at using e - wallet services.	380	4.18	High
E - wallet service gives me cash back/rebate/points.	380	4.27	High
Average Mean		4.19	

Table 6 perform that the social influence of e-wallet. Most respondent felt satisfied moderate that effort expectancy by e-wallet with mean score 4.08. Meanwhile, the achievement relatively low mean score 3.97 is I would use e - wallet service because my friends do so. The average on mean for performance expectancy is 4.04

Table 6 : Mean Analysis: Level of Consumer Intention of Social Influence

Item	N	Mean	Level
People important to me think I should use e - wallet services.	380	4.02	High
People who influence my behaviour think I should use e - wallet services.	380	4.08	High
Using e - wallet service would reflect my personality to others.	380	3.92	High
I would use e - wallet service because my friends do so.	380	3.97	High
I will use e - wallet services if the service is widely used by people in society.	380	4.20	High
Average Mean		4.04	

Table 7 perform that the culture of e-wallet. Most respondent felt satisfied high that culture by e-wallet with mean score 4.17. Meanwhile, the achievement relatively low mean score 3.95 is use of e - wallet would not require a lot of mental effort. The average on mean for performance expectancy is 4.06.

Table 7 : Mean Analysis: Level of Consumer Intention of Culture

Item	N	Mean	Level
I believed that I am able to use E-wallet without having any experience in using computer.	380	3.95	High
The government encouragements make me think the best way to make payment is through using e-wallet payment service.	380	4.06	High
Social media make me aware of the concept of e-wallet payment.	380	4.17	High
People who are important to me would recommend using e - wallet payment service.	380	4.16	High
Average Mean		4.06	

Table 8 perform that the perceived risk of e-wallet. Most respondent felt satisfied high that perceived risk by e-wallet with mean score 4.17. Meanwhile, the achievement relatively low mean score 4,02 is the risk of an unauthorized third parties overseeing the payment process low. The average on mean for perceived risk is 4.08.

Table 8 : Mean Analysis: Level of Consumer Intention of Perceived Risk

Item	N	Mean	Level
The risk of abuse of confidential information is low when using e - wallet payment service.	380	4.05	High
The risk of an unauthorized third parties overseeing the payment process low.	380	4.02	High
I would find e - wallet payment service secure in conducting my payment transaction.	380	4.13	High
I believed the risk when making payment using e-wallet is low.	380	4.13	High
Average Mean		4.08	

4.2 Pearson Correlation Analysis

Pearson's correlation analysis was used to examine the bivariate relationships among the variables

Table 9 : Pearson Correlation Analysis

		PE	EE	SI	CL	PR
PE	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	380				
EE	Pearson Correlation	.639**	1			
	Sig. (2-tailed)	.000				
	N	380	380			
SI	Pearson Correlation	.531**	.637**	1		
	Sig. (2-tailed)	.000	.000			
	N	380	380	380		
CL	Pearson Correlation	.521**	.602**	.680**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	380	380	380	380	
PR	Pearson Correlation	.487**	.504**	.501**	.571**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	380	380	380	380	380
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 3 shows the correlation between independent variables which include performance expectancy, effort expectancy, social influence, culture and perceived risk with dependent variable which was consumer intention toward using e –wallet in purchasing. Overall all the variables above had positive linear relationship whereby all the values were less than 0.9 which indicates that there is no multicollinearity problem. The correlation between independent variables is less than 0.9 which was between 0.487 and 0.639. According to Cohen (Cohen, 1988) an absolute value of r of 0.1 is classified as small, an absolute value of 0.3 is classified as medium and of 0.5 is classified as large.

5. CONCLUSIONS

This study was conducted with the purpose of measuring consumer intention in using e-wallet system. The objective was to examine the relationship between consumer intention in using e-wallet system and performance expectancy, effort expectancy, social influence, culture and perceive risk aspects. As the result, all the independent variables have significant relationship with the consumer intention in using e-wallet among the public higher institution's student in Shah Alam Selangor. Thus, it is suggested that researchers to do research more on other relevant factors that might affects consumer intention in using e-wallet among all the Malaysian

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FACTORS INFLUENCING CUSTOMER SATISFACTION TOWARDS ONLINE PURCHASING IN KLANG VALLEY

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ABSTRACT

Online shopping has to gain popularity significantly worldwide in the last few years. Malaysia is no exception, but although Malaysian consumer has embraced online commerce and e-shopping, it seems to lag behind the rest of the world where this development is concerned. This study aims to look into predominant factors which influence customer online purchasing satisfaction and to assist Malaysian retailers in developing the correct strategies for online sales. With the finding from this study, Malaysian retailers can convert potential customers into real customers and retain them. This study specifically examines the five key factors that influence customer satisfaction in online purchasing in Klang Valley Area, Malaysia. A sample of 250 respondents who were online purchasers was used, and quantitative research was conducted using a structured questionnaire. Simple random sampling technique was chosen in collecting data of this study. Regression analysis showed that physical product aspect, marketing aspect, logistic aspect, and customer service aspect were positively influential on customer satisfaction towards online purchasing. For future researches, a proposition of sampling in other areas is advised for expansion of retailers and gaining a more in-depth view of the significant factors affecting the success of online shopping business in Malaysia.

Keywords: Customer Satisfaction, Physical Product Aspect, Marketing Aspect, Logistic Aspect, Payment & Security Aspect, Customer Service Aspect, Online Purchasing

INTRODUCTION

Online shopping has revealed a remarkable growing in the previous centuries in spite of the vagueness of the world business today (Lucking RD, 2004). Malaysia is expected to increase to over RM1.9bil by the year 2016 only for the online shopping market (Ueno, 2012). The scenario encourages an extreme rivalry in the market and to continue competitive; online traders need to identify effective ways in order to satisfy their customers' needs and wants (Guo, 2012). Nevertheless, online shopping in Malaysia is considered as approximately different; hence, the dealings are not widely used and boundless. Besides, the online transactions are still not safe and secured in terms of protection to its method of payment and the risk of unauthorized disclosure of information (Khatibi, 2007).

An ultimate considerate towards factors affecting online customer satisfaction is of infinite importance to e-commerce (Philip T. Kotler, 2006). Customers generally, when they are satisfied with a company or service, they will tend to share their experience with others (Nelson, 2012). Hence, businesses also are essential to consider their customers' gratification because this will earn a positive review of their products, recall customer's trustworthiness, as well as attract possible customer (Guo, 2012). Previous research has shown that few crucial influences control customers' satisfaction and thus, online trades should be well versed with these factors to ensure customer's satisfaction in the industry. Physical product quality aspect is the main key factors to determine the excellence performance of each good or service (John C. Mowen, 1997). The internet has currently become truly global phenomena due to virtual reality displays that test new products to online virtual stores that sell them, and the technology explosion is affecting every aspect of marketing (Srisuwan, 2008). Furthermore, logistic factors mean the technique of delivery of the products and services, and it is the link between customers and providers in order for them to fulfill several of logistic needs. Logistic also refer to delivery performance and service which refer to aspects such as speed of delivery, tracking and tracing, accuracy of delivery and communication with customers regarding possible delays in delivery (Rudansky-Kloppers S. , 2014) .

Besides, payment and security aspect is also considered as one of the critical issues that are being taken indeed by the online customers (Mustafa, 2011). The online transaction needs to have the full measure of security which is defined to include the capability of the website to protect the personal information of the customers from any illegal use of information revelation during the electronic deal (Guo, 2012). Finally, customer service plays a significant part in online customer satisfaction. Prompt responses need to be provided in order to address customer concerns and inquiries on an immediate basis (Liu, 2008). The customer representatives should be able to assist the customer in solving problems as soon as they occur. This is important because the ignorance/neglect of customer inquiries may cause customer dissatisfaction. The customers seem to be highly satisfied when the quality of customer service is exceptional (Dharmesti, 2012). Once all these influences are adeptly agreed, customers' satisfaction will increase and subsequently recover the commercial performance or the demands.

The goal of this research is to examine the relationship between physical product aspect, marketing aspect, logistic aspect, payment, and security aspect and finally, customer service aspect with customer satisfaction. Five hypotheses have been developed for this study, which is given below: -

H1: There is a relationship between physical product aspect and customer satisfaction toward online purchasing.

H2: There is a relationship between the marketing aspect and customer satisfaction toward online purchasing

H3: There is a relationship between the logistic aspect and customer satisfaction toward online purchasing

H4: There is a relationship between payment and security aspect and customer satisfaction toward online purchasing

H5: There is a relationship between customer service aspect and customer satisfaction toward online purchasing

2. METHODOLOGY

2.1 Data Collection

Researchers considered it as a correlation study (Uma S. Sekaran, 2016) which tried to study the arithmetical connection among the online customer satisfaction with few factors like physical product aspect, marketing aspect, logistic aspect, payment and security aspect and customer service aspect. According to (Stephanie, 2017,), a list of all target in the selected population is considered as the sampling frame. Population differs than sampling frame whereby population it includes every single person in the population, whereas the sampling frame is more specific. 250 samples of customers were attained from the Facebook App. This is for the reason that Facebook App is the most well-known and more users in Malaysia. There are around 97.3% (23.83 million) of Malaysian having a Facebook account (Malaysia, 2017). Based on (John T. Roscoe. Holt, 1975), the following rules of thumb for appropriate research is that the sample sizes must be larger than 30 and less than 500.

As for this study, 250 respondents in Klang valley area were used to participate in this survey online. The questionnaires survey was posted randomly using Google Form to Facebook, and respondents were encouraged to fill the form.

The reliability test was conducted to ensure that each of the scales employed are being assessed to establish the internal consistency of the present study. Cronbach's alpha for the scales are presented in Table 1. The values indicate a high level of reliability. According to (Nunnally, 1978), the reliability coefficient of not less than 0.7 is usually acceptable. As shown in Table 1, the result of the reliability test for this study shows more than 0.70.

Table 1 : Reliability Analysis

NO	CONSTRUCTS	CRONBACH'S ALPHA	NO OF ITEMS
1	Customer's Satisfaction	0.956	6
2	Physical product aspect	0.817	6
3	Marketing aspect	0.800	6
4	Logistic aspect	0.770	6
5	Payment & security aspect	0.768	6
6	Customer service aspect	0.794	6

2.3 Data Analysis

In order to know whether all the five variables have a connection to the customer satisfaction towards online purchasing in Malaysia, the researchers used Statistical Package for Social Sciences (SPSS).

3. RESULTS AND DISCUSSION

3.1 Descriptive Analysis

Table 3 displays the demographic profiles of respondents which were divided into gender, age, educational level and occupation. Results shows that most of the respondents were from female at the age of 21-35 years old and most of them, their education level were Degree.

Table 3: Summary of Respondents' Demographics

	Response	Frequency	Percentage (%)
Gender	Male	118	47
	Female	132	53
Age Group	Below 20 years' old	78	31
	21-35	119	48
	36-50	46	18
	51 and above	7	3
Education Level	Diploma	80	32
	Degree	101	40
	Master	34	14
	PhD	7	3
	Others	28	11
Occupation	Students	66	26
	Government sector	115	46
	Own business	27	11
	Private sector	42	17

Whereas, Table 4 displays the respondent's general questions which were divided into type of good that respondents prefer to buy, prefer to do through online and frequency respondents did online. Results shows that most of the respondents prefer to buy clothes through online and services that they prefer to do through online were banking service. Moreover, most of the respondents prefer to buy online twice per month.

Table 4 : Summary of Respondents' General Questions

	Response	Frequency	Percentage (%)
online	Grocery	16	6
	Books	25	10
	Clothes	89	36
	Food & Beverages	17	7
	Stationery	29	12
	Home product	26	10
	Electrical appliances	18	7
	Fashion accessories	27	11
	Others	3	1
Type of service you prefer to do through online	Tourism	62	25
	Banking	93	37
	Insurance	24	10
	Transportation & logistic	62	25
	Const. & maintenance	6	2
	Others	3	1
How often/frequently you buy online?	Once a week	45	18
	Twice a week	47	19
	Twice a month	89	36
	Once in 6 months	69	27

3.2 Correlation Analysis

To examine the bivariate relationships among the variables, the researchers used Pearson Analysis. Table 5 shows the connection between independent variables which comprise physical product aspect, marketing aspect, logistic aspect, payment, and security aspect and customer services with a dependent variable which was customer satisfaction toward online purchasing. All values in this likely is a smaller amount than 0.9, which specifies that there is no multicollinearity problem. The relationship results between is among 0.271 and 0.793.

Table 5 : Correlation

		CS	PPA	MA	LA	P&SA	CSA
CS	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	250					
PPA	Pearson Correlation	.793**	1				
	Sig. (2-tailed)	.000					
	N	250	250				
MA	Pearson Correlation	.608**	.551**	1			
	Sig. (2-tailed)	.000	.000				
	N	250	250	250			
LA	Pearson Correlation	.666**	.684**	.576**	1		
	Sig. (2-tailed)	.000	.000	.000			
	N	250	250	250	250		
P&SA	Pearson Correlation	.271**	.261**	.234**	.202**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
	N	250	250	250	250	250	
CSA	Pearson Correlation	.723**	.760**	.616**	.621**	.261**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	250	250	250	250	250	250
**. Correlation is significant at the 0.01 level (2-tailed).							

3.3 Regression Analysis

Results from Table 6, point out that the R Square=0.695, and adjusted R Square=0.689. The R Square displays that 69.5 percent of the customer's satisfaction can be explained by physical product, marketing, logistic, payment & security, and customer service aspects. Four variables namely physical product (β=0.470), marketing (β=0.151), logistic (β=0.140) and customer service aspects (β=0.176) showed significant influence to the customer satisfaction towards online purchasing whereby it indicated that the significant p-value of each connection was less than 0.05. However, only the payment & security aspect (β=0.039) was found did not have any significant influence on customer satisfaction towards online purchasing. Therefore, hypothesis H4 is rejected, while hypothesis H1, H2, H3, and H5 are accepted.

Table 6 : Regression Analysis

	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	Beta	t	Sig.
	0.845	0.100		8.411	0.000
PPA	0.351	0.045	0.470	7.813	0.000*
MA	0.100	0.031	0.150	3.175	0.002*
LA	0.111	0.041	0.140	2.715	0.007*
P&SA	0.025	0.024	0.039	1.043	0.298
CSA	0.119	0.040	0.176	2.986	0.003*

Based on Table 6, it was found that four out of the five predictor variables influenced customer satisfaction towards online purchasing. The influence of predictor variables on customer satisfaction can be explained by the adjusted R2 value of 0.689, which means the predictor variables can inform 68.9% of customer satisfaction.

Among all five hypotheses, only H4 has been rejected, and this has been agreed by (Mustafa, 2011) whereby in his research, it is stated that service and privacy features would only donate to the customers' trust towards that respective online retailer. Trust could not be used as an indication towards satisfaction, thus, resulting to the insignificance of the result. This result also similar to (Schaupp, 2005) who have found security to be irrelevance with satisfaction.

Table 7 : Review of the Hypotheses Finding

No	Hypotheses	Finding
1	H1: There is a relationship between physical product aspect and customer satisfaction toward online purchasing.	Accepted
2	H2: There is a relationship between the marketing aspect and customer satisfaction toward online purchasing	Accepted
3	H3: There is a relationship between the logistic aspect and customer satisfaction toward online purchasing	Accepted
4	H4: There is a relationship between payment and security aspect and customer satisfaction toward online purchasing	Rejected
5	H5: There is a relationship between customer service aspect and customer satisfaction toward online purchasing	Accepted

Furthermore, (Rudansky-Kloppers S. , 2014) believed that product factor and logistic factor could influence customer satisfaction towards online shopping. While (Shankar, 2003), stated that customer service was definite as the overall assessment and decision of the performance for the quality of e-service that been offered in the virtual marketplace. Moreover, many marketing activities are currently technology-enabled owing to the growing extension of online marketing via the Internet (John O'Connor, 2001).

4. CONCLUSIONS

This study was lead with the reason to evaluate customer satisfaction. The objective was to study the connection between online customer satisfaction and physical product, marketing, logistic, payment & security, and customer service aspects. Prior researches have shown that four variables are closely related to customer satisfaction, thereby excluding payment & security aspect. This study formerly tried to find out whether all these factors do show significant part in satisfying online purchasers in Malaysia. Thus, it is suggested that researchers to do more research on other pertinent factors which might touch customer satisfaction on online purchasing.

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RFID QUEUE NUMBERING SYSTEM TO SOLVE QUEUING ISSUE AT PRIVATE CLINIC

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ABSTRACT

RFID Queue Numbering System was developed for Clinic and Surgery SedhuRam to manage queuing system and patient's records and at this clinic. Current patients must queue in front the clinic even before the operating hours. Congestion of patients queuing in front of the clinic offers inconvenient environment to the nearest shops and occasionally pressure the elderly patients. Later queuing number might lead to late treatment session which sometime occurs during midnight. Since the treatment time is too late, patients tend to skip their treatment. Therefore, patients prefer to queue hours before the operation times to get earlier treatment session. Hence, this system was proposed to improve existing queuing system at the clinic and to help them organize their patients' records and treatment sessions. This project scope is divided into three user categories including patient at the clinic, doctor, and staff. The Incremental Model methodology was selected to assist the project development. This methodology particularly is an evolution of the Waterfall Model that attempts to address the processes in more prominent and flexible ways that require less extensive planning up-front. Functionalities of this project are to generate queuing number using patient's RFID card, to manage patient's information (register, update, delete), to display treatment queue using television, and to notify the patients using SMS when their treatment session is almost near. Advantages of the project are it able to reduce the number of patients queuing outside the clinic and provide more pleasurable environment toward patients. Besides, patients can also monitor their queue number through television and also received SMS notification from the clinic if their treatment session is just around the corner. As for the doctor and clinic's staffs, they are able to manage patient records efficiently and systematically as all the information are recorded in the database.

Keywords: Bus monitoring apps,Transportation in Malaysia

1. INTRODUCTION

Medical field is one of the crucial areas in many developing countries. Researches have been conducted to produce solutions for many types of diseases. Hospitals and clinics mostly visited by residents for their consultation, treatment, and rehabilitation process. Hence, accompany these hospitals and clinics with a conducive environment would stimulate patient's positive emotions and motivations to support their rehabilitees. Nowadays, the growth of private clinic is not an exception. These private clinics used to act as alternative options for patients to receive their treatments. Yet, in comparison with government hospitals and clinics, some of the private clinics, especially on the rural area might neglect latest technology facilities and more focus on their treatment services.

Clinic and Surgery SedhuRam is a well-known private clinic which is located in Pauh, Perlis. This clinic received numbers of patients every day and sometime its treatment time might surpass their operational hours. Thus, to avert late treatment time, some patients or their family members are willing to queue in front of the clinic even before the operational hours. They have to cope with the lengthy queue for so many hours in front of the clinic to wait for their treatment number from the clinic staff. Improper management of queue will triggered tension and stress [1] for the patients. Furthermore, wastage of time due to lengthy queue is non-negotiable [2]. As for elderly, disability and sick people, this is a hectic route and uncomfortable situation. For late coming patients, they have to wait for their treatment time which sometime might exceed midnight. Mostly, after the patients received their treatment number, usually they will return home or wait somewhere else until they are notified by the clinic staff. Currently, the clinic staff will call patients to remind them when their treatment session is almost close by. If they missed their number, they have to wait for new treatment time and make them so frustrated. Hence, a Radio Frequency Identification (RFID) Queue Numbering System was proposed to assist the clinic in managing these problems.

2. LITERATURE REVIEW

Queue numbering system is a technology for organizing queues of people [1] which is widely being implemented in many sectors and departments. No doubt, time is an important element that should be managed efficiently [2]. Hence, this system allows the system's owner to manage queue and minimize their customer queuing time and furthermore, it is proven to be useful by [3]. Previous researches have shown that there are various applications of queue numbering system.

2.1 Automated Queue Numbering System
Automated Queue Numbering system by [1] was developed using First Come First Serve (FCFS) and Shortest Process First (SPF) algorithms for banking sector to analyze queue status and then decide on which customer to serve first. This queuing system was designed for organisation with multiple service counters where each counter will only focuses on one service. However, for this clinic, it only serves one counter for all services including registration, generating queuing number, and dispensary which is vary from system [1].

2.2 Smart Queue Numbering System
Indifferent with [1], [2] introduced a Smart Queue Numbering System using Global System for Mobile (GSM) and Short Message System (SMS) for clinic. In this system, the patient must send an SMS to the server number in fixed format to receive their token number which also represent as queue number. Once the clinic doctor notifies his/her arrival time via SMS, the system will notify the first three patients. Patient can track their token number using display system. The limitation of this system is it only notifies the first three patients and not all the patients.

2.3 Queue Numbering System using SMS Notification
[3] also proposed a Queue Numbering System using SMS notification. This developed system is mainly trying to solve issue faced by banking customers where they need to stand in line while waiting. By using this system, bank customers can maintain in their position while they are seated comfortably or engaged in constructive activity. They just need to send SMS to the bank system based on the category and the system will process and reply with their queue number and the estimated time. As a result, customers do not have to wait at the crowded bank and they can also plan their journey wisely. Similar with [2], this system also does not provide any mechanism to notify the user when their turn is almost arriving.

2.4 Automated Queue Management System
Automated Queue Management System has been suggested by [4] to cater the need of queuing system that is suitable for many sectors. This system is embedded in kiosks where user can choose to receive text message or pick a puck from the dispenser. Beside text message, a buzzing device will be provided for customer who refuses to disclose their contact info or do not have working phone with them. This system will alert customers as soon as it is their turn. Since the alert is given at the exact time of the customers turn, they might be unable to prepare or plan their journey or miss their turn.

2.5 QCracker | Smart Token Display System
QCracker [5] and Smart Token Display System [6] are other examples of queue numbering systems. The ideologies behind these systems are to generate a numbering ticket or token number for customers. For QCraker, user will choose required service from the touch screen menu and a ticket will be printed from thermal printer ticket. But for Smart Token Display System, user will be given a token number in the form of a piece of paper or plastic chip that has been engraved with specific numbered. A LED light numbering systems will be provided at the counters to display customer's number and the serving counter. Yet, customer must always be present at the location to wait for their turn as no alert system provided in this system.

2.6 Patient Queue Management System
Latest system by [7] developed a system named Patient Queue Management System for hospital to predict estimated waiting time for patient for their treatment based on their personal data. Then, an appointment detail and their waiting time for their treatment session will be sent via message. Medicine alert also will be received periodically by the patient to monitor their medicine course until it gets completed. In practice basis, the system is more towards managing patient's treatment details and to monitor patient's medicine course. Purpose of the alert generated by the system is to inform patient the estimated waiting time and not for their queuing number. Once patient consults with the doctor and gets medicine prescription, he will receive medicine alerts periodically until his medicine course gets completed. Based on this study, a new queue numbering system which only focuses on single counter is in demand. Small private clinics in rural area might not afford to buy an expensive queue numbering system. Thus, this RFID Queue Numbering System is essential to help them manage their patient queue more effective and efficient as the RFID is a low-cost technology [8].

3. METHODOLOGY

An Incremental Model [9] as shown in Figure 1 below has been adopted to assist the project development. This model is a particular evolution of the waterfall model that attempts to address its more prominent shortcoming. It also aims at outlining a more

flexible process that requires less extensive planning up-front. Besides, the whole process can instead be designed, tested and implemented one fraction at a time, in successive stages there can be at least some feedback from the client. This feedback will provide valuable assistance in the next increment of the process and so forth.

Figure 1 : Incremental Model [9]
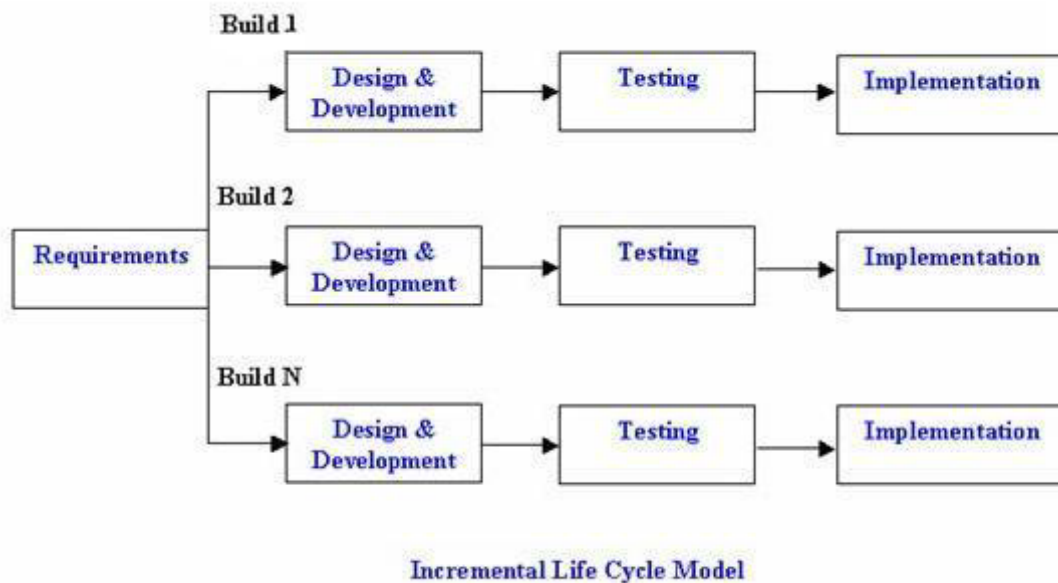
3.1 Design & Development
In this design and development phase, interfaces of the RFID Queue Numbering System will be created. The interfaces for doctor and staff are started by log in. Then after log in, doctor and staff can access the homepage of the system where information of the Clinic and Surgery SedhuRam will be displayed. There is a menu bar for the staff and doctor to choose their action. The RFID Reader will recognize the patient's I.D from the RFID card once patient scan their patient's card and then, the I.D will be transferred to the server to generate patient's treatment number (queue number) automatically. This data will also be presented on the application which has been installed in the server. At the clinic, a television is provided to inform patients incoming queue numbers which are ready to receive treatment from the doctor. Thus, when the patient turn is coming, an automatic SMS message will be sent to the patients to notify them.

3.2 Testing
The second phase of Incremental Model is testing. After all the interfaces have been developed, the system is ready for testing. The system has been tested thoroughly to make sure all interfaces are connected to each other and well function. On this phase, this system and device will be testing together using Unit Testing and Integration Testing.
In Unit Testing Plan, user will start by Login and they are required to enter their username and password to access the system. Next, the staff can register the patient by filling in all compulsory information in the provided form. To generate number, patients have to touch their RFID Card to the RFID reader and only card that has been registered will generate the queue number. In this process, all functions were tested individually. All errors were corrected and tested again until all test cases success.
As for Integration Testing Plan, all navigations were tested to prevent corrupted hyperlink. System was tested as a complete system before it being delivered to the customer.

3.3 Implementation

After the system has been tested, the system was implemented at the clinic. User training was provided to the user to help them managing the system. User feedback was collected. Some amendment was made on the system based on user feedback. This system can be updated, rebuild and change, after all the phase is done. This system and device can be improved based in the future. For example like upgrading functionalities, database spaces and others.

4. RESULTS AND DISCUSSIONS

4.1 Login

In the login page as shown in Figure 2, at the top of interface is the clinic's operation hours and days and their phone number to contact. Both doctor and staff can log on the same page by entering their own username and password. Then, the user must click on the login button to go to another page. An error message will be displayed if the user entered an incorrect username and password or accidently pressed login button.

Figure 2 : Login Interface
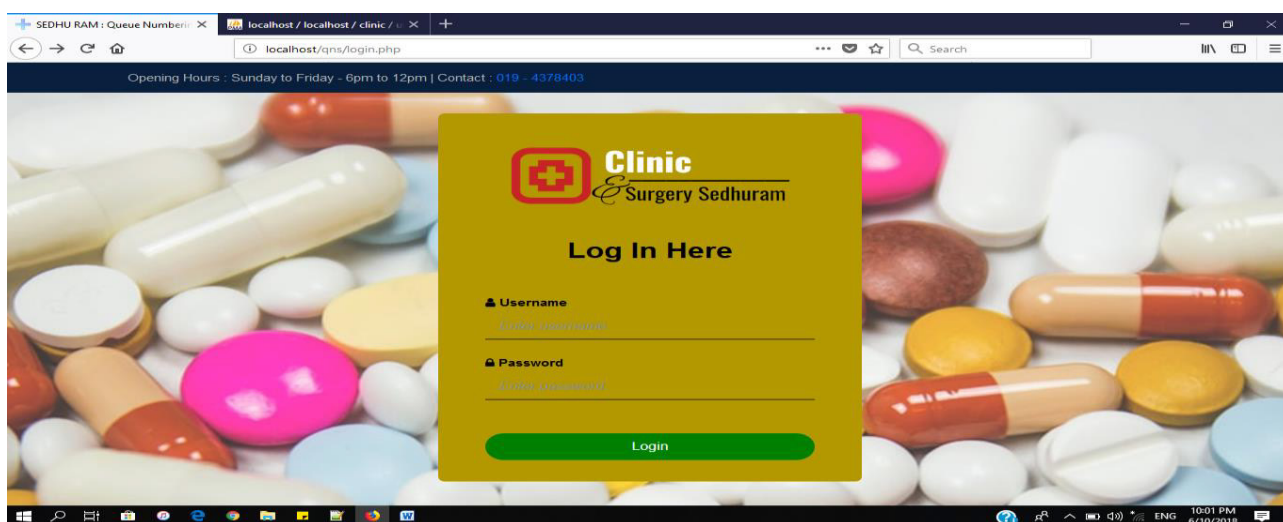
4.2 Register Patient

Figure 3 shows the interface for staff to register patients. Staff must fill in patient's name, IC number, ID card, address, phone number, gender, allergies, race, date of birth and type of blood before clicks the Register button. If staff clicks the Register button without fill up all compulsory text fields, the border of the empty text fields will be highlighted red to notify user. Once the staff register the patient information, patient's RFID card can be automatically used to generate their queue number.

Figure 3 : Register Patient Interface
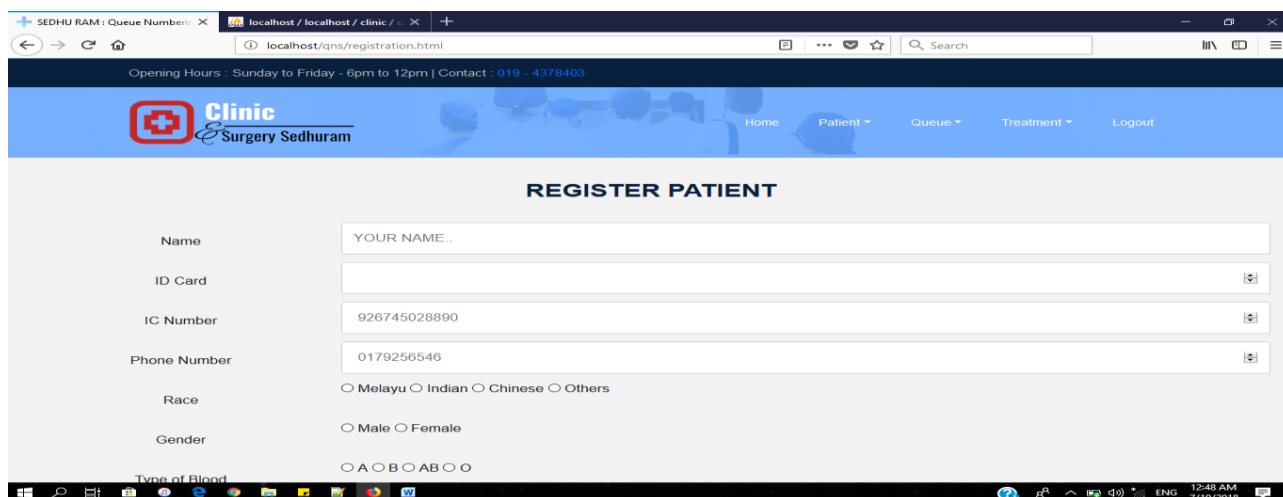
4.2 Register Patient

Figure 3 shows the interface for staff to register patients. Staff must fill in patient's name, IC number, ID card, address, phone number, gender, allergies, race, date of birth and type of blood before clicks the Register button. If staff clicks the Register button without fill up all compulsory text fields, the border of the empty text fields will be highlighted red to notify user. Once the staff register the patient information, patient's RFID card can be automatically used to generate their queue number.

4.3 Manage Patient

Staff and doctor have also been provided with manage patient function which allows them to update patient information including their card details. Manage patient will display a list of patients that has been registered. In this page, user can view, update and delete patient's data. View is used to display detailed information about the patient while update is used to modify patient's data, and delete to remove patient's data from the system. The search box is used to filter patients' records using their Card Id. Staff and doctor should enter patient's card id number, then click search icon button next to the search box and the respective patients' records will be displayed. Under the search box, there are pagination numbers. In every page, only five patients' records will be displayed. User needs to click the number and next button to view more records. Figure 4 shows manage patient interface.

Figure 4 : Manage Patient Interface
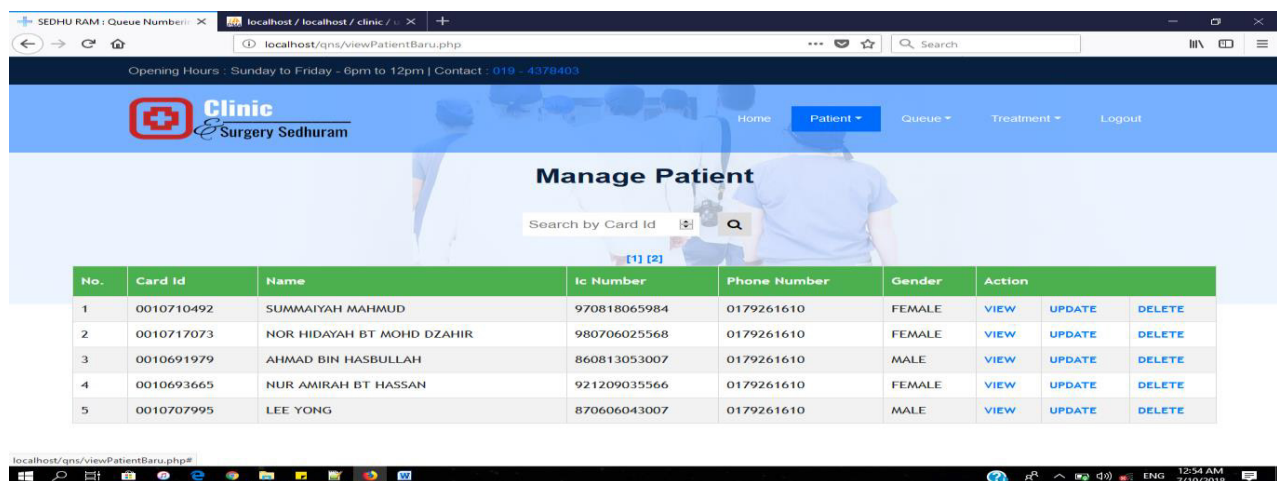
4.4 Generate Queue Number

Interface shown in Figure 5 is the main component to generate queue number. Patients need to touch their RFID card ID provided by the clinic at the RFID Reader that is located in front of the clinic. The patient's card ID number will be automatically filled in the text field and the system will verify the ID number. Only valid card ID will generate the queue number.

Figure 5 : Generate Queue Number Interface
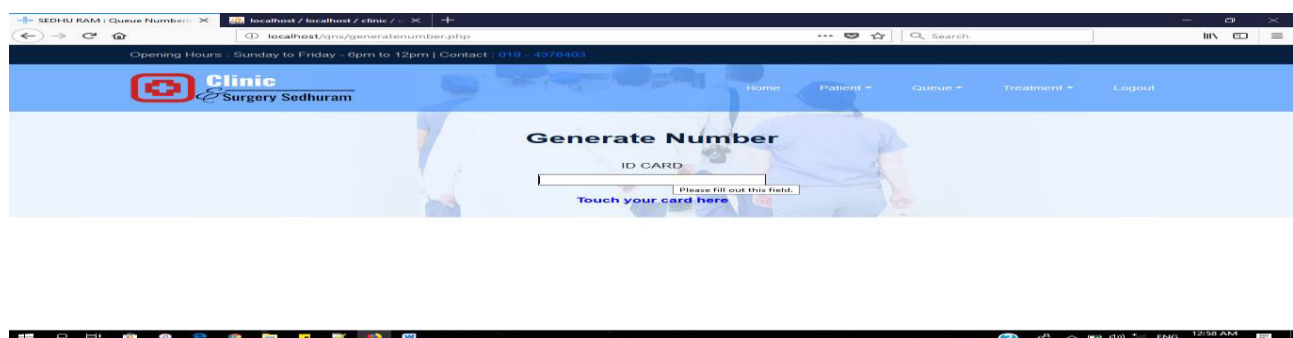
After patient touches their Card ID on the RFID reader, this page will reload automatically to print the number of queue. Figure 6 is an example of queue number generated for the patient. On this queue number, important information like address of the clinic, patient's IC number, date and their queue number will be presented.

Figure 6 : Queue Number Example

KLINIK & SURGERI SEDURAM
255, Taman Muda Asas,
Pekan Pauh, 02600 Arau, Perlis
Tel No : 019-4378403

IC No : 980706025568
Date : 06/10/2018

NO: 23

A text message will be automatically sent using Short Messaging System (SMS) technology to the patients to notify them as their queue number is in position five in the queue list. Patient can estimate time and plan their ways to the clinic. An example of the text message received by the patients is shown in Figure 7.

Figure 7 : Queue Number Example

63001

SMS/MMS

Tuesday, 2 October 2018

RM0 Hello! We're from SEDHU RAM Clinic. Your queue is just near. Please be here as soon as possible to make sure that your queue is not terminated! 4:20 pm

Enter message   SEND

Aside from these functions, this system also complimented with other important functions like adding patient's treatment information by the doctor, view treatment histories, display queue list and manage user profile.

5. CONCLUSION

The system has received positive feedback from the Sedhuram's doctor and staffs. It is very effective in managing queue and reduces the number of patients queuing outside the clinic before operation hours. The patient also can generate queuing number automatically using their RFID card. Patients also can monitor their queue number through television. An SMS will also be sent to the patients when their turn is almost near. Meanwhile, this clinic can also manage their patients' information in more efficient and faster ways. Moreover, the doctor is permitted to view their patient's history treatment. This system is more competent in saving data because this system records all important data in a database. For the future, this system should be introduced to various clinics and retail companies to provide better queue management system especially for small and medium industries

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ZAKAT ONTOLOGY DEVELOPMENT USING TERM FREQUENCY INVERSE DOCUMENT FREQUENCY (TF-IDF) METHOD

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ABSTRACT

Term Frequency – Inverse Document Frequency (TF-IDF) is used widely in a lot of researches due to its importance in categorizing and classifying words in any resources. In this paper, TF-IDF is being implemented in text classification of unstructured data focusing on Zakat to produce only important concept words. The main source being used in this research is from a collection of authentic Hadiths (Hadis Sahih) which is Hadith Sahih Bukhari and Hadith Sahih Muslim. Hadith Sahih Bukhari and Muslim are the most authentic collection of the Sunnah of the Prophet. Since the chapters existed in Hadith Sahih Bukhari and Muslim Muslim covers huge information, we focus on only one chapters which is the Book of Zakat, which is in chapter 12. Under the Book of Zakat, there are about 56 sub-chapters that covers all the information related to Zakat. For this paper, only 108 Hadiths sentences used since the scope is limited to only Zakat Al-Fitr and Zakat on Gold. To calculate TF-IDF, there are several processes that are needed which is data collection, lower case replacement, stop word removal, stemming, normalization, TF-IDF calculation and lastly ontology construction. The result generated from this process is an ontology of Zakat concept words. The result generated from this process is simply remarkable. By constructing ontology, Hadith data can help users understand the information of Zakat easily.

Keywords: Ontology, Term Frequency – Inverse Document Frequency, TF-IDF, Hadith

1. INTRODUCTION

TF-IDF is useful in retrieving relevant data from a collection of documents using a ranking algorithm [1]. There are several methods that can be used to classify important text in any text or document however Term Frequency – Inverse Document Frequency (TF-IDF) is one of the method that can retrieve information using weighted values between 0 to 1 statistically [2]. TF-IDF is simple and effective method. That is why TF-IDF is always chosen in most research as compared to other recent methods [3]. TF-IDF is one of the vector space model existed currently [1] where the TF-IDF values can be used to give relevancy of information.

The process of TF-IDF calculation is by calculating values for each words in a document using an inverse proportion of the frequency of the word in that particular document to the percentage of documents the words existed in ([2], [3]). [4] stated that TF-IDF is used widely in text similarity calculation. TF-IDF formula is defined below:

$$\text{TF-IDF}(t) = \text{TF}(t,d) \times \text{IDF}(t)$$

$$t = \text{terms and } d = \text{documents}$$

The process of calculating TF-IDF are divided into 3 steps as follows:
a) First, calculate the term frequency (TF) of words in the same document or sentences using the formula below:

$$\text{TF}(t,d) = \frac{\text{(Number of times term } t \text{ appears in a document)}}{\text{(Total number of terms in the document)}}$$

The process of calculating TF-IDF are divided into 3 steps as follows:
b) First, calculate the term frequency (TF) of words in the same document or sentences using the formula below:

$$\text{IDF}(t) = \log_e \frac{\text{(Total number of documents)}}{\text{(Number of documents with term } t \text{ in it)}}$$

c) The last step is to multiple the value of TF with IDF as in step (1) and step (2). The TF-IDF value increases proportionally to the number of occurrences of word appears in the document, but is offset by the frequency of the word in the corpus [3].

The result generated from the TF-IDF calculation is modeled as a word frequency vector based on the Vector Space Model (VSM) ([3], [4]). It is the most common weighting method to describe documents [3]. Due to the fact that TF-IDF is beneficial in terms of its simplicity and easiness, the next section will discuss on the process of TF-IDF calculation and its related topics.

2. METHODOLOGY

This paper will focus on analyzing Zakat chapter from Hadith Sahih Bukhari and Hadith Sahih Muslim focusing on only two types of Zakat which is Zakat Al-Fitr and Zakat on Gold. "The Book of Zakat" is selected to be the main data used in this paper. Before TF-IDF is being calculated, based on the data collection only 108 Hadiths sentences will be selected. In order to calculate TF-IDF, the data must go thru several pre-processing method that covers lowercase replacement, tokenization, stop word removal and stemming. The main methodology used for this study is shown in Figure 1.

Figure 1: Research Methodology
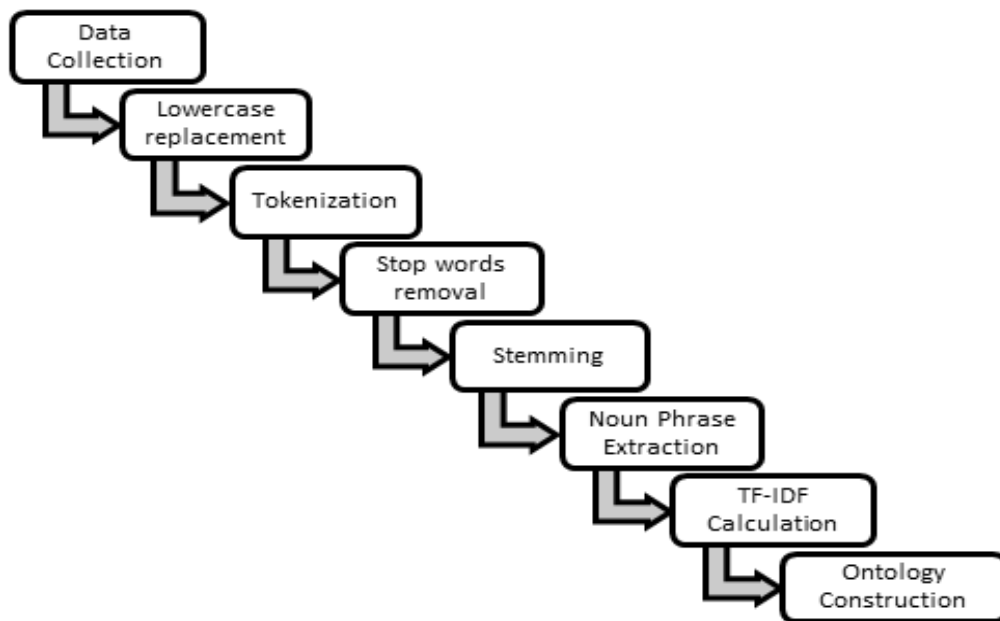
To construct Zakat Hadith ontology, the data collected must go thru a process called pre-processing phase. Pre-processing phase consists of five steps which starts with lowercase replacement, tokenization, stop words removal, stemming, and noun phrase extraction. The following section will discuss on the pre-processing phase in detail.

3.0 PRE-PROCESSING

Pre-processing method starts from lowercase replacement until stemming. The first step in pre-processing phase is lowercase replacement.

3.1 LOWERCASE REPLACEMENT

The 108 Hadith sentences that were collected in the data collection phase will go to a process called lowercase replacement. Lowercase replacement is a process that will convert all the uppercase alphabets into lowercase alphabet. This process is useful because it will avoid the data being biased. The comparison of the original text and the lowercase replacement output are shown in Figure 2 and Figure 3. Figure 2 show the original word while Figure 3 shows the result once lowercase replacement is being implemented. Python version 2.7.9 with natural language toolkit (NLTK) is used throughout the process.

Figure 2: Original words

Chapter 1. On What One-Tenth Or Half Of One-Tenth Is Due

[2272] 7 — (981) Jabir bin 'Abdullah narrated that he heard the Prophet say: "On that which is irrigated by rivers and rain, one—tenth is due, and on that which is artificially irrigated, half of one-tenth."

Figure 3: Words after lowercase replacement

chapter 1. on what one-tenth or half of one-tenth is due

[2272] 7 - (981) jabir bin 'abdullah narrated that he heard the prophet say: "on that which is irrigated by rivers and rain, one-tenth is due, and on that which is artificially irrigated, half of one-tenth."

According to Figure 3, lowercase replacement is used to standardize all the words into one single capitalization. This is useful in the coming step whereby in a case-sensitive situation, if we did not convert all the uppercase into lowercase, the analysis will recognize the same words as two alphabets. If the result generated two types of alphabets, the TF-IDF calculation will produce different result which will make it inaccurate and imprecise. Once the lowercase is being replaced in this step, the output (lowercase statement) will go to the second step called non-standard word replacement.

3.2 TOKENIZATION

In this phase, tokenization will divide the data from sentences into words called token. Tokenization is the process of breaking a sentence into words, phrases or meaningful elements called tokens. In this process, the sentences in the Holy Al-Quran will be changed to word level. The major issues in tokenization is how to differentiate between contiguous strings of alphabetic characters, the symbols and whitespaces. However, since this research focuses on English translated version, all these problems will not arise since there are a lot techniques that can be referred.

Figure 4 shows the results once tokenization is done on the same data as in Figure 2 above.

Figure 4: Tokenization

['chapter', '1.', 'on', 'what', 'one-tenth', 'or', 'half', 'of', 'one-tenth', 'is', 'due', '[', '2272', ']', , 'jabir', 'bin', 'abdullah', 'narrated', 'that', 'he', 'heard', 'the', 'prophet', 'say', ':', '``', 'on', 'that', 'which', 'is', 'irrigated', 'by', 'rivers', 'and', 'rain', ',', 'one-tenth', 'is', 'due', ',', 'and', 'on', 'that', 'which', 'is', 'artificially', 'irrigated', ',', 'half', 'of', 'one-tenth', '.', '"''"]

Tokenization allow the sentences to be represented by its words. By implementing tokenization, other word related process such as Part-of-speech (POS) tag can be inserted. Not only that, simple statistical calculation can also be done such as frequency, and conditional frequency which will calculate the occurrence of the words and produce the percentage of words in the whole data. However, in this paper, tokenization will allow the process of stop word removal and POS tag to be happen in the next process.

3.3 STOP WORD REMOVAL

The next process is stop word removal. Stop word removal will remove all the stop words in the data. Normally, these stop words did not contribute a lot to the meaning of the data. In NLTK, there are 2400 stop word in the stop word function in 11 languages. Listed in Figure 5 are some of the examples of stop word in natural language toolkit.

Figure 5: Example of stop words in Natural Language Toolkit, Python

```
>>> from nltk.corpus import stopwords
>>> stopwords.words('english')
['i', 'me', 'my', 'myself', 'we', 'our', 'ours', 'ourselves', 'you', 'your', 'yours',
'yourself', 'yourselves', 'he', 'him', 'his', 'himself', 'she', 'her', 'hers',
'herself', 'it', 'its', 'itself', 'they', 'them', 'their', 'theirs', 'themselves',
'what', 'which', 'who', 'whom', 'this', 'that', 'these', 'those', 'am', 'is', 'are',
'was', 'were', 'be', 'been', 'being', 'have', 'has', 'had', 'having', 'do', 'does',
'did', 'doing', 'a', 'an', 'the', 'and', 'but', 'if', 'or', 'because', 'as', 'until',
'while', 'of', 'at', 'by', 'for', 'with', 'about', 'against', 'between', 'into',
'through', 'during', 'before', 'after', 'above', 'below', 'to', 'from', 'up', 'down',
'in', 'out', 'on', 'off', 'over', 'under', 'again', 'further', 'then', 'once', 'here',
'there', 'when', 'where', 'why', 'how', 'all', 'any', 'both', 'each', 'few', 'more',
'most', 'other', 'some', 'such', 'no', 'nor', 'not', 'only', 'own', 'same', 'so',
'than', 'too', 'very', 's', 't', 'can', 'will', 'just', 'don', 'should', 'now']
```

Once the codes being implemented, the result of stop words removal will be displayed in Figure 6.

Figure 6: Stop Word Removal on the Data

['chapter', '1.', 'one-tenth', 'half', 'one-tenth', 'due', '[', '2272', ']', 'jabir', 'bin', 'abdullah', 'narrated', 'heard', 'prophet', 'say', ':', '``', 'irrigated', 'rivers', 'rain', ',', 'one-tenth', 'due', ',', 'artificially', 'irrigated', ',', 'half', 'one-tenth', '.', '"""']

The output of the data will be used in the next steps which is called stemming. Stemming is the process of converting the original tokens into its own root words. The next section will discuss on the process of stemming.

3.4 STEMMING

In stemming, all the words listed in Figure 5 will be converted into its root word called stem. In this research, Porter stemmer is used compared to other stemmer such as Lancester, Snowball and Wordnet Lemmatizer. This is because Porter stemmer is widely being used in a lot research. A comparison on the stemmers and lemmatizer in a chapter of Hadith Sahih Bukhari and Hadith Sahih Muslim had proven that Porter stemmer provides complete and better stemmed words that the other stemmers and lemmatizer. The result from pre-processing method will be stem words which will be used to calculate TF-IDF. By implementing the pre-processing steps listed above, the tokens generated are in its own stem and consistent.

3.5 TERM FREQUENCY - INVERSE DOCUMENT FREQUENCY (TF-IDF) CALCULATION

The calculation of TF-IDF from the tokens generated in stemming process had produced a total of 473 concept words for Zakat on Gold and 87 concepts words for Zakat Al-Fitr.

These data are still rather large than what had been expected. Due to that, this research implemented 0.4 as its threshold and confident threshold of 0.6 as adapted from Zainol et al, (2016). By implementing this threshold values, the words are reduced to 87 for Zakat on Gold and 74 for Zakat Al-Fitr. For Zakat Al-Fitr, only 18% of concept words are selected from the total of 473 concept words and 41% of concept words for Zakat on Gold after implementing the threshold. Although the concept words being reduced a lot, but there are still redundant concept words existed. Therefore, this data will go through another process of redundancy removal. In this process, all the redundant data is removed which will only produce 38 concept words for Zakat on Gold and 58 concept words for Zakat Al-Fitr.

Table 1: Distribution Of Concept Words

Type of Zakat	Total number of words generated from TF-IDF calculation	Total number of concept words after being implemented threshold	Total number of concept words after redundancy removal
Gold	*473*	*87*	*38*
Zakat Al-Fitr	*180*	*74*	*58*

After the redundant data being removed, these concepts words will go to the last process which is called ontology construction. Ontology construction is a process of constructing a Zakat Hadith ontology based on the concept words generated by the previous step. In order to construct this ontology, PHP language is selected as its programming language and MySQL is selected as its database used to store all the concept words in a structured manner. Rather than using OWL or RDF to generate the ontology, developing an ontology based system is more useful since the concept words and its related data will be stored in a database which is more systematic and easier to share and reuse.

4. RESULTS AND DISCUSSIONS

This section will discuss on the Zakat Hadith ontology based model which had been constructed using PHP and MySQL. As stated in Figure 7, the ontology is being constructed successfully. User will only need to click on the required concept words to display detail information on that particular Zakat Hadiths.

Figure 7: Example Of Ontology Screen Shot
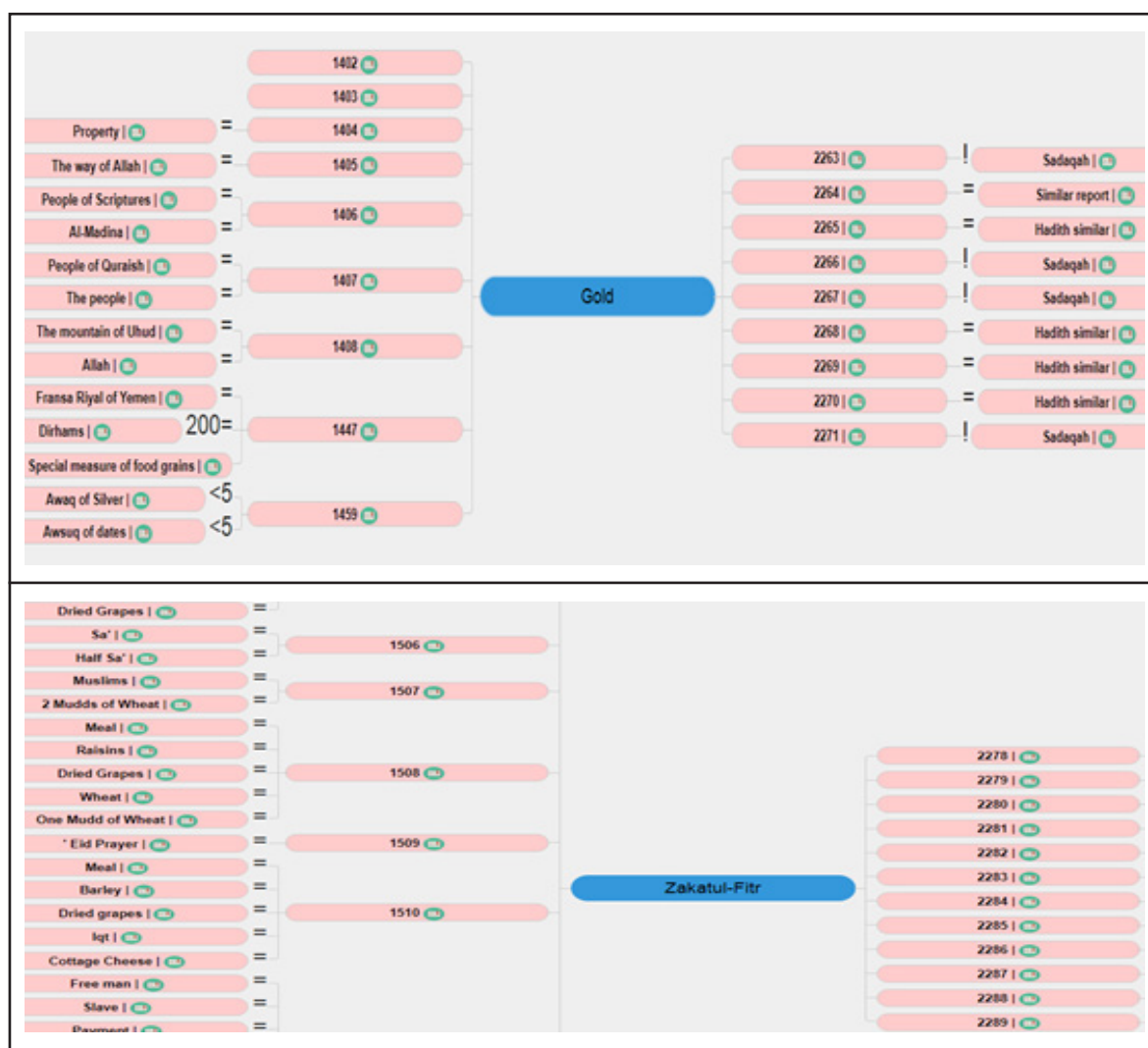
5. CONCLUSION

This study discusses on the process on TF-IDF calculation to generate important concept words focussing on Zakat Hadiths. From the 108 Hadith sentences selected, only 38 concepts words are generated for Zakat on Gold and 58 concept words on Zakat Al-Fitr. Using these concepts words, an ontology based model is constructed using PHP language and the concept words are stored in a systematic structures in MySQL. As a conclusion, the process involved in this study shows that TF-IDF calculation can help generate important terms based on the occurrences of the words in the documents. An evaluation on Zakat Hadith ontology based model is needed in future works so that the accuracy and precision of the results is evaluated.

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ANALYSIS OF IOT BASED MONITORING DEVICE FOR ARRHYTHMIA

Thanusha Mohan, Zunuwanas Bin Mohamad
Politeknik Sultan Salahuddin Abdul Aziz Shah

ABSTRACT

Medical devices have been improved with rapid growth of technologies. Arrhythmias are defined as abnormal heart rhythm experience by millions of people. Arrhythmias are caused by an abnormality in that electrical conduction system and can make the heart beat too slowly, too quickly, or in an irregular way. Electrocardiogram (ECG) is one of the best ways to obtained the heart condition information. An ECG can provide and analysed data such as heart beats, heart rhythm and type of heart disease. Lack of awareness among the public on heart rhythm disease which is one of the main causes of sudden death or weaken a heart condition. In addition, the patients need to spend few hours in order to check the heart condition frequently. This paperwork describes on the Android mobile application receiving the data from heart rate sensor in form of electrical signal via Bluetooth module and Wi-Fi. The electrical signal received will be converted into heart rate by NodeMCU. Finally, the types of Arrhythmia will be identified based on heart rate calculated. Moreover, the heart rhythm, heart rate and types of Arrhythmia will be displayed on Android Application. The device with ability of monitoring heart patients and alert the caregiver via Email with GPS location information. The android application is providing the data to the user and caregiver so that the caregiver able to monitor the patient from long and short distance. The device has been tested to get the accurate results and it is compared with standard results of heart rhythm. In addition, this device will help the society to taking a good care of their body system especially heart in good condition. Lastly, device may use as educational purpose to learn on how the heart is functioning with several types of arrhythmia that may happened to human heart. Indirectly, it creates awareness to all stage of ages.

Keywords: Electrocardiogram (ECG), heart rhythm, Arrhythmia, Heart rate sensor, IoT.

1. INTRODUCTION

Arrhythmias are defined as abnormal heart rhythm experienced by millions of people. Our heart has an electrical conduction system that makes the heart pump blood around the body. An abnormality in that electrical conduction system and can make the heartbeat too slowly, too quickly, or in an irregular way [1].

According to European heart disease and heart failure Congress millions of people across the world are affected by cardiac disorders. Some are categorized as minor others critical [3]. As per World Health Organization (W.H.O.) research, more than 17.5 million people have CVDs, an estimated 31% of all deaths worldwide and 80% of all CVD deaths are due to heart attacks and strokes. In addition, according to the market study, the expectation of Cardiovascular disease in 2019 may grow from $13.7 billion to 18.2 billion [4]. Arrhythmia disease can be prevented by monitoring in the early stage with the symptoms. Creating awareness to the public about the heart rhythm disease can save a person from death due to irregularities of heart rhythm.

ECG devices are the vital medical equipment used by medical experts to detect arrhythmia [9]. Heart condition is categorized as one of the important parameters to be monitored for normal human and especially heart disease patients. Continuous monitoring while doing daily life activity and condition of heart for bedridden patients can be observed to determine the condition of the heart.

In this paper, a device with alerting and monitoring function are developed to help the arrhythmias patients. The device functioning as real-time ECG signal processing system based on the Android platform and Heart Rate sensor. It can be used to monitor the working status of the heart rate and heart rhythm classification. The Android application will acquire the ECG data continuously and analyses it within the mobile phone itself in real-time. The system is able to store the diagnostic information of heart rate via Blynk application that can be downloaded from the android play store. Moreover, this device system able to detect danger signal and immediately the guardian will get the alert via Email. Lastly, the patients and guardians can use their smartphone as mini patient monitor to view the heart rhythm in real-time.

2. METHODOLOGY

2.1 Hardware

2.1.1 Heart rate sensor (AD8232)

The AD8232 is a chip mainly used to measure the electrical activity of the heart. This electrical activity is normally displayed as an ECG or Electrocardiogram waveform [6].

This sensor is used in this project to capture the heart rhythm of the heart and convert it into a heart rate. The sensor converts the analogue data into digital by using 5V as the input voltage. The data will be processed by the Node MCU in order to get the expected output.

2.1.2 Electrodes

Simple three electrode monitoring using two electrodes at a time for lively monitoring and one as a ground electrode. But the electrodes can be used in special configurations to get lead I, II or III, one at a time. The signal acquisition is bipolar, between the chosen two electrodes for the given lead. Three electrode system was once quite frequent with telemetry video display units [7].

In this project, 3 lead ECG electrode was used to capture the data from the heart of the patient. Einthoven triangle concept is applied to place the electrode on the patient.

2.1.3 Node MCU V3

The Node MCU (Node Micro Controller Unit) is an open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266.

Node MCU has been used in order to process data captured from the sensor. This microcontroller is integrated with the WIFI shield which helps as a medium to transfer data and location information to the guardian during an emergency.

2.1.4 Bluetooth module

The Bluetooth HC-05 module is integrated with this device to transmit the data in a short distance to send the ECG wave with less interruption of other signals. Bluetooth is proven as a good transmitting data medium. There are numerous numbers of devices that's has been used Bluetooth as transmitting medium of health data.

HC-05 had been used in order to transfer the data to the mobile application. To make it easy to transfer heart rhythm (ECG signal), Bluetooth is one of the good ways to send the data in real-time with least of noise and inference.

2.2 Software

Mobile gadgets like smartphones and tablets computer systems consistently develop in processing energy and come to be a fundamental part of each day life, even in improving countries. Recently, such mobile units are additionally used for biomedical signal processing and ECG analysis. The drastic adjustments in technology, the inventors are motivated to strengthen the gadgets with the collaboration of smartphone application both Android or IOS application.

2.2.1 Arduino IDE

The open-source Arduino Software (IDE) makes it handy to write code and add it to the board. Normally this software is runs on Windows, Mac OS X, and Linux. The surroundings are written in Java and based totally on Processing and another open-source software. Arduino IDE has been used to write the coding and bring together earlier than importing to the Node MCU barring any error [9].

2.2.2 Blynk

Blynk was designed for the Internet of Things. It has multiple functions such as can control the hardware, able to displayed sensor data, ability to store data and visualize it. Blynk using Wi-Fi as a medium of transferring data from users to the guidance. An easy application where all the users can install and use it regularly. Moreover, the guidance also may help the user during an emergency by connecting to this application.

2.2.3 Bluetooth Electronic

Control your electronic project with an Android device. This app communicates using Bluetooth to an HC-06 or HC-05 Bluetooth module in the project. It can also be used with Raspberry Pi. It is one of the android applications. This application used mainly to view the heart rhythm of the heart patient. It helps the user to reduce the weight of the device by add on screen in this device to view the signal. This makes easy for the user and guidance to view the heart rhythm of the patient just connected via Bluetooth.

2.3 Functional system

Mobile gadgets like smartphones and tablets computer systems consistently develop in processing energy and come to be a fundamental part of each day life, even in improving countries. Recently, such mobile units are additionally used for biomedical signal processing and ECG analysis. The drastic adjustments in technology, the inventors are motivated to strengthen the gadgets with the collaboration of smartphone application both Android or IOS application.

Figure 1: Block diagram of device.
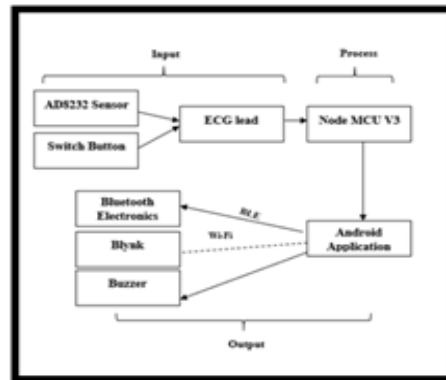
Figure 1 describes the block diagram of the device process. As the main input the heart rate sensor working to capture the electrical signal via ECG lead. The electrical signal will be transferred to the microcontroller from ECG lead which attached to the user body using Einthoven Triangle concept. The ECG lead is connected to the heart rate sensor. The data will be processed by microcontroller and send the output via Bluetooth and WIFI to the android application. The user just needs their mobile phone to view the output from the device. As an additional function, the manual switch button added to this device in order to help the user during an emergency. It produces an alarm once the button was pressed. It creates alert to the short as well as long distance caregiver.

2.3 Functional system

Figure 2: Flowchart of product functioning
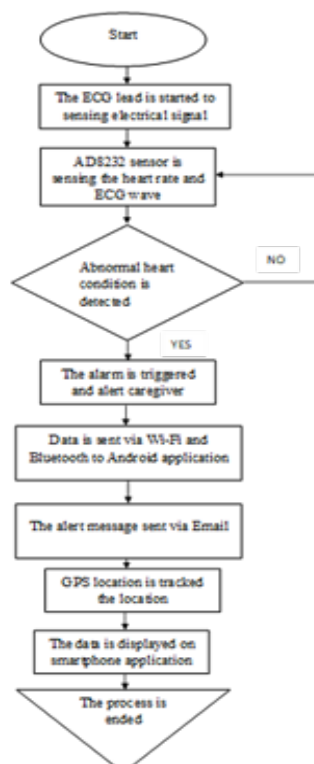
The flowchart in figure 2 describes the device functioning in detecting the abnormal heart condition. Additional safety features were added in this device and it also included on how it will be working. This device is using 2 different medium which is WIFI and Bluetooth. WIFI medium mainly functions to send alert to the long-distance caregiver and stored the heart rate data up to months in Blynk application. Next, the Bluetooth medium mainly functions to transfer heart rhythm from the device to the Bluetooth Electronic application. Followed by, the heart rate will be calculated based on the heart rhythm received and the status of the heart will be detected based on the heart rate calculated. This 3 information will be displayed on the smartphone by using Bluetooth Electronic application. There is buzzer which acts as safety features. It will be triggered during an emergency to alert the surroundings.

3. RESULTS AND DISCUSSIONS

In this part, it mainly discussed the analysis of results with 3 different methods. At first (Fig.3), technical test or calibration was done using ECG simulator. This testing was done to calibrate and identify the output from the device is accurate. All the medical are need to undergo a calibration process to ensure the output from the devices are reliable and detect the health condition of the user correctly.

Secondly, several subjects were chosen to test by using the patient monitor and this device. Each of the results received from the patient monitor and device of each subject was compared (Fig.4). This testing performed to verify the results received from the device and patient monitor is similar. It also ensured the data from the device can be used by the professionals to get some basic information on the patient's health condition. This device has the ability to produce similar output compare with real equipment.

Additionally, the testing continued with testing the stability of the heart rate received from a device for 1 minute (Fig.5). This testing mainly focusing on the stability of sensor producing output. 3 subjects were chosen to proceed with this testing. Stability tested was performed and the data was presented in the graph below. It shows the sensor able to produce data with good stability for 1 minute for 3 different subjects.

Figure 3: Calibration of device with ECG simulator
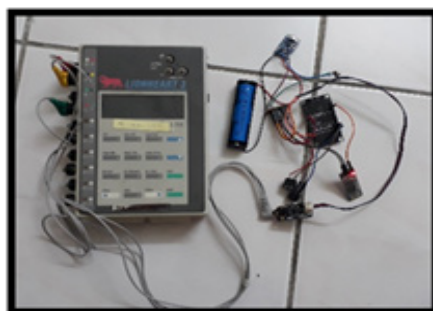
Figure 4: Comparing the results with patient monitor

Figure 5: Testing of stability of heart rate with different subject
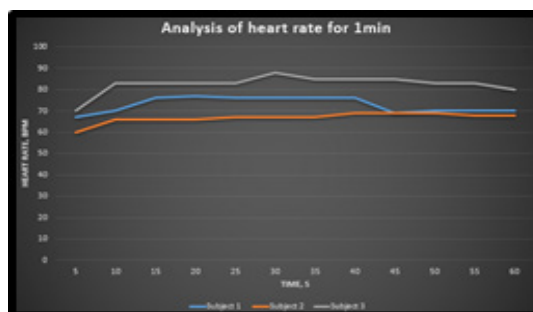
4. CONCLUSIONS

The heart has been proven an important internal part of the body. It needs excellent care in order to live a healthy life. Recently, many inventors have invented a device to diagnose and monitor the body system by applying the latest technology. This device will help the society to take good care of their body system especially heart in good condition. Moreover, the application with the latest technology with an easy method of using has been applied in this device. The device may use as an educational purpose to learn on how the heart is functioning with several types of arrhythmia that may happen to a human heart. Indirectly, it creates awareness for all stages of ages to take care of the heart at an early stage. It can reduce the number of heart disease death by using this device anywhere in this world as a precautioning device.

ACKNOWLEDGEMENT

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SIMULATION OF WATER DEBIT MEASUREMENT WITH IoT-BASED FOR CLEAN WATER CUSTOMERS USING RASPBERRY

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ABSTRACT

Remote and digital water debit measurements need to be done to facilitate measurements without coming to the site. There is also a need for viewing water usage data that can be accessed by both providers and users of water services. The purpose of this research is to conduct the measurement of water debit and display it in the web page. With the technology of the Internet of Things allows the recording of meters automatically recorded on the web directly. An IoT-based water measurement simulation is made with IoT raspberry pi3 module, sensor flow meter, and arduino nano. The tool simulates the measurement of water debit to know the water usage by using internet service. In the design, the tool used two sensors, it is done to find out if there is a leak in the distribution channel on the branch of the main pipe to the customer's home. From this research indicated that the measurement data of water debit can be showed on the web with IoT can be done.

Keywords:
water flow measurement, IoT, Raspberry Pi, Arduino, Arduino Nano

1. INTRODUCTION

Clean water supply companies for example PDAM are currently using conventional or analog water meters, to find out the measurement value of the water meter, the company must record each water meter installed in each customer. This is certainly less efficient also time and energy consuming. It certainly requires a lot of operational costs, not to mention if an error occurs or when not recording or forgetting to recorded. It also causes losses on the company and customers side.

Therefore, to overcome this problem, a system of measuring water or water meters was made, where the results of the measurement of these devices can be read online so that there is no need to record one by one the customer's water meter. In addition, in order to protect and reduce losses due to water leakage or theft, this system will be able to detect leaks or lose water volume. Leakage that will be detected by this tool is on the customer pipe that is the branch pipe from the main pipe to the customer's home.

Jain S, et al [2] conveyed that the basic automation application for home with Raspberry Pi through the subject of email as an algorithm in Python programming as the basic language in Raspberry programming could be done and showed efficient results. Also, Natharyan S., et al [3} showed that it is possible to control and monitor water flow using Raspberry Pi.

In this research, water discharge is measured using a flow meter that works with the Hall effect principle. The output is converted to a digital signal by Arduino Nano and sent to the Raspberry Pi which then processes it and sends it via wifi to the server for display on the web.

WATER FLOW

Water discharge is the volume of liquid that flows at each time unit, usually expressed in units of litters / second or in units of cubic meters (m3) per second. The formula for calculating water discharge

$$\text{Debit} = \frac{\text{Volume}}{\text{Time}} = \frac{m3}{\text{Second}}$$

FLOW METER SENSOR

Water flow meter sensor functions to calculate the flow of water flowing. Inside the sensor there are rotor and hall effect sensors. The rotation of the rotor will follow the magnitude of the flow of water, the greater the flow of water, the faster the rotor rotates. At the end of the rotor there is a fixed magnet, this magnetic rotation will be read by the hall effect sensor.

Figure 1 shows the physical shape of the water flow meter sensor. The working principle of this flow meter is to calculate the rotation of a waterwheel in a flow meter that automatically rotates if there is a flow of water through it. In the waterwheel there is a fixed magnet and when it rotates it will produce a magnetic field. Magnetic construction in the rotor is not completely intact, so the hall effect sensor will read there and no magnetic field, this incident will repeatedly follow the rotation of the waterwheel so as to produce a pulse signal. This signal will be calculated to determine how much water is passing through

Fig.1. Flow meter sensor

RASPBERRY PI3

Raspberry is a single board mini computer module with input and output. Raspberry pi was made by Ebun Upton and his work team from the Canbridge computer lab. Figure 2. is a model of the Raspberry Pi

Fig. 2. Raspberry Pi model
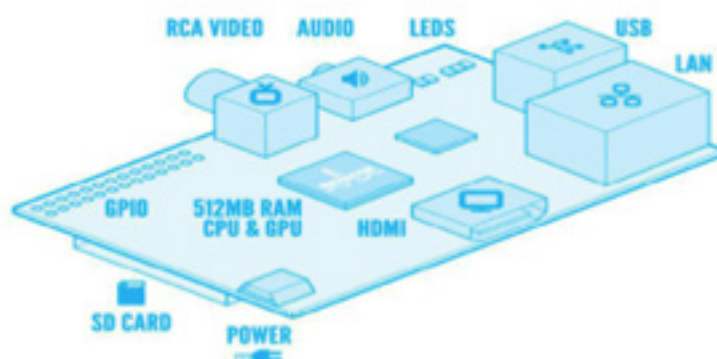
Like a computer, raspberry can run office programs or other programs. The raspberry pi is equipped with input and output pins to support the performance of this mini computer which we can use for interfacing with other sensors or modules. Figure 3 is an explanation of i / o in raspberry pi3. In addition, the raspberry input and output pins it is also equipped with an antenna to receive wifi signals, so there is no need to add wifi module anymore to connect to the internet network. The main Raspberry Pi operating system uses Debian GNU / Linux and the programming language is Python

Fig. 3. I/O Raspberry Pi
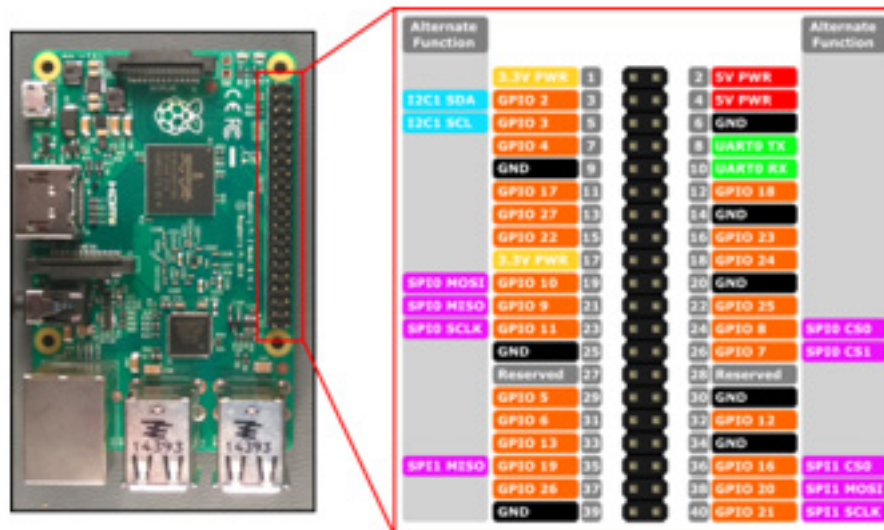
ARDUINO NANO

Arduino is a single board micro controller that is intended to make applications that are interactive with objects and environments and are more accessible. There are many Arduino variants. The Arduino Nano is used in this research. Arduino Nano is a small, complete, and breadboard board based on ATmega328P (Arduino Nano 3.x). Each of the 14 digital pins on Nano can be used as input or output, using the pinMode (), digitalWrite (), and digitalRead () functions. They operate at 5 volts. Each pin can give or receive a maximum of 40 mA and has an internal pull-up resistor (interrupted by default) of 20-50 kOhms. In addition, some pins have special functions.

Arduino Nano has 8 analog inputs, each with a resolution of 10 bits (ie 1024 different values). By default, the voltage range 5 volt of the ground, although it is possible to increase the voltage range by using the analogReference () function. Analog pins 6 and 7 cannot be used as digital pins.

IoT

Internet of Things is a system where goods or equipments used by humans can be connected to the internet, so that with this system users of these devices can monitor or control the equipment remotely. With this system, it certainly will be able to facilitate the work done by humans

Fig. 4. IoT System

In the current era, the existence of the IoT system will become a necessity for every individual or company where ease in every activity is desired. The basic concept of IoT is to combine three elements namely physical goods, IoT modules and internet connections. Figure 4 is an illustration of the system of the Internet of Things.

WiFi

Wi-Fi, which stands for wireless fidelity, is a wireless network technology that is used throughout the world. Wi-Fi refers to a system that uses the 802.11 standard, which was developed by the Institute of Electrical and Electronics Engineers (IEEE) and released in 1997.

Wi-Fi was originally intended for the use of wireless devices and Local Area Network (LAN), but now more widely used to access the Internet. The way WiFi works is the same as mobile phones, WiFi networks also use radio waves to send information over the network. The computer must include a wireless adapter that will translate the data sent into radio signals. This same signal will be sent through an antenna to a decoder known as a router. Once translated, the data will be sent to the Internet through a wired Ethernet connection

For internet use, wifi requires an access point commonly called a hotspot to connect and control between wifi users and the central internet network. A hotspot is generally equipped with a password that can minimize anyone who can use the facility. This is often used by home users, restaurants, supermarkets, cafes and hotels. But there are also hotspots that are not given a password, so anyone can use the facility. For example amusement parks and stadiums

2. METHODOLOGY

The methodology used in this research is to understand the system that will be examined with literature studies. Learned about how water flow measurement works with a flow meter sensor that uses the Hall effect.

Then learning and designing the measurement system by understanding all its components, namely Arduino Nano, Raspberry Pi3 with its programming. Then integrate all parts into a complete system. In analysing, a comparison is also carried out with similar research. The system diagram is shown in Figure 5

Measurement of water discharge is done using a flow meter sensor mounted on both sides. This tool illustrates the measurement of water discharge on water customers

Fig. 5. Designed System Flowchart
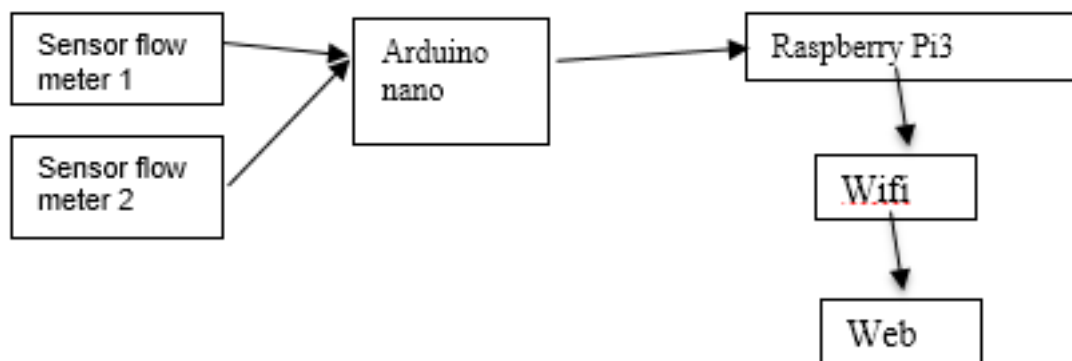
The two sensors are placed on the customer's distribution pipe, the branch pipe from the main pipe that goes to the customer's home. The two sensors are used to measure the flow of water entering and leaving the pipe, then the results of the reading of the two sensors will be read through the website. The use of two sensors here is to determine the amount of water consumption by the customer and to find out if there is a leak in the pipe.

Fig. 6. Simulation of water flow meter tools
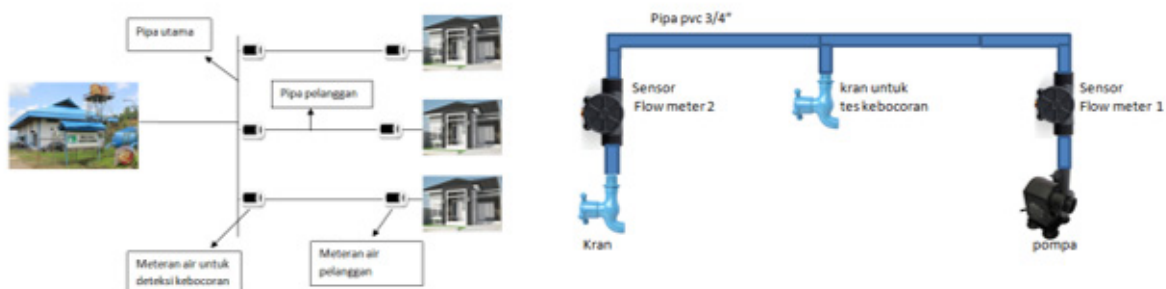
The sensor used is FS300A G3 / 4 while the pipe diameter is 3/4 ". Flow meter sensor 1 is used to measure the flow of water entering the installation while flow meter 2 is used to measure the flow of water that exits the installation. Between the two sensors a faucet is installed which aims to simulate if there is a leak in the pipe installation, by comparing the measurement results of the two sensors.

Fig. 7. System wiring diagram

If the value of the sensor readings displayed on the website differs from the values of sensors one and sensors two, and the difference is far different, then it can be assumed that a problem has occurred. The problem can originate from the sensor or from the installation of a leaky pipe so that some water does not pass through the second sensor and only through the first sensor. The wiring diagram of the device hardware can be seen in Figure 7

1. Water flow sensor and Arduino Nano connection

The two water flow sensors are connected to the arduino pin on pin 5v (red cable ¬) and GND (black wire) to supply voltage to the sensor and the output of the two sensors (yellow cable) connected to pin 2 and arduino. For more details can be seen in Figure 8.

Fig. 8. Sensor Connection to Arduino Nano
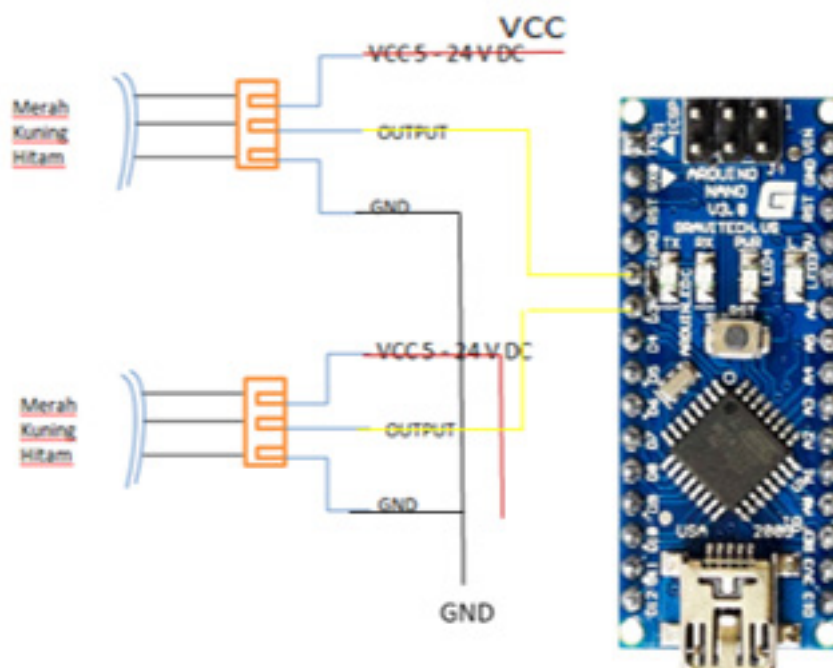
2. Arduino connection with Raspberry pi 3

Communication between Arduino and Raspberry uses UART serial communication. In UART communication only need 3 cables to connect, namely between the TX Arduino TX with the Raspberry TX, the Arduino RX with the Raspberry RX, then the Arduino ground with the Rapsberry ground. In this communication using a cable called a USB cable so that no need to connect the TX and Rx Arduino pins with TX and RX Rapsberry. For more details can be seen in Figure 9.

Fig. 9. Connection between Raspberry Pi 3 and Arduino

SOFTWARE DESIGN

Flow chart of the tool working system designed on the IoT-Based Water Discharge Measurement Simulation System Using Raspberry Pi3 shown in Figure 10.

Fig. 10. System Flowchart
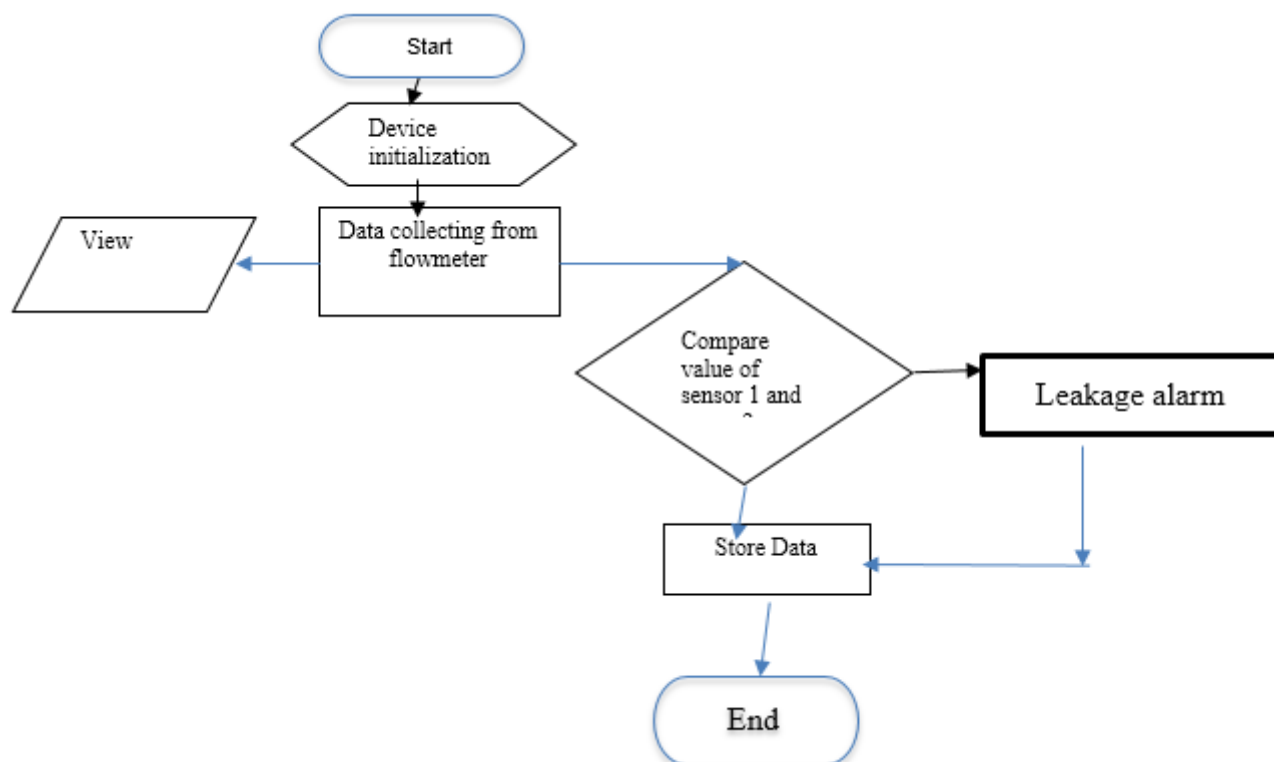
ARDUINO NANO PROGRAMMING

Arduino Nano is programmed using the Arduino IDE software. The Arduino Program processes the output of the water flow meter sensor, which is a pulse signal in the form of a voltage into digital data that is ready to be received by raspberry pi3

An example of Arduino Nano programming is shown in Figure 11.

Fig. 11. Example of Arduino Nano Programming


```
percobaan_5

/* . . . http://www.nyebarilmu.com . . . */

int TURBINE;        //pengukuran SINYAL data yang bersifat incremental
int HSensor = 2; //nama alias pada pin 2
int Calc;
unsigned long totalMilliLitres;
volatile byte pulseCount;
unsigned int flowMilliLitres;

void speedrpm ()     //fungsi penghitungan dan interrupt
{
TURBINE++; //bersifat incrementing (dengan mode falling edge)
}

void setup()
{
pinMode(HSensor, INPUT); //inisialisasi sebagai input
Serial.begin(9600);
attachInterrupt(0, speedrpm, RISING); //cara penulisan perintah interrupt
totalMilliLitres = 0;
pulseCount       = 0;
}

void loop ()
{
TURBINE = 0; //data awal = 0
sei(); //perintah aktifnya mode interrupt
delay (1000); //nilai delay 1 detik
```

RASPBERRY PI 3 PROGRAMMING

Raspberry Pi3 functions as a webserver, Raspberry Pi3 is programmed to be able to receive and display data sent by Arduino Nano to the internet. To be able to display data to internet programming on Raspberry Pi3 is done using the website software Apache, MySQL, and PHP.

3. RESULTS AND DISCUSSIONS

3.1 Simulation of the system

The simulation picture of water flow measurement for clean water customers shown Figure 12.

From this simulation the measurement is done by measuring the flow of water flowing through sensor 1 and sensor 2. The data is captured by Arduino Nano and then converted into a digital signal.

Fig. 12. Simulation of water discharge and leakage measurements

The signal is then processed by Raspberry Pi 3 and then sent to the server to be displayed as a measurement result on the web.

To be able to monitor water meters or access the IoT interface website on a browser page, an internet network system is needed using wifi.

The following figure 13 is a usecase diagram illustrating the interaction between the user and the system.

Usecase diagram aims to describe the interactions that occur between the user and the system. The figure shows user and system activities. In the diagram to be able to monitor the water meter, the user first logs in to the web page by entering the website address or IP address on the browser page. After logging in successfully the user can monitor or view the current amount of water usage and can also view or check the water meter last month. In this monitoring the user can see two water meter displays namely water meter input and output. Then the system will send a leaked message via email if the difference between the amount of water meter output and the water meter input is 50%, and the last is logout or exit the websiteThis section discusses the results obtained from the surface pressure measurement study.

Fig.13. The use case diagram of customer interaction with the system
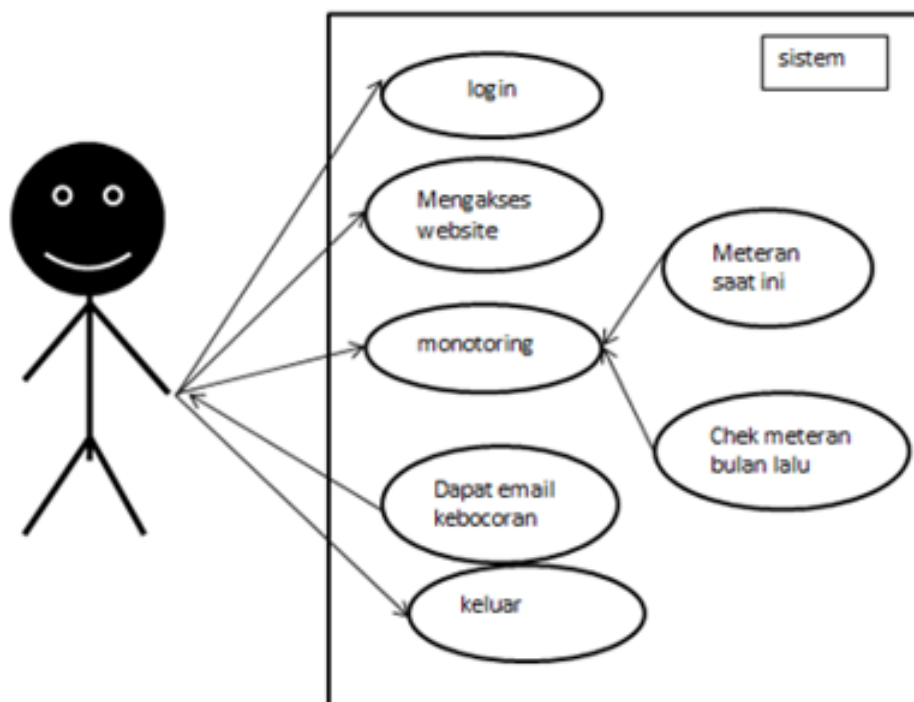
3.2. Monitoring Web Page

On the monitoring page the information obtained is the total volume and discharge per second. On this monitoring page on the report menu if we open the menu we can see the latest water meter data that is displayed every second. This data is data from sensors that are captured and processed by Arduino and Raspberry Pi3 which are then sent to the web via wifi by Raspberry Pi3.

Fig. 14. Monitoring page

Fig. 15. Data base page

The monitoring page can be seen in Figure 14 while the latest data page can be seen in Figure 15.

3.2. LEAKAGE ANALYSIS

Leakage can be seen from the comparison of measurement data made by flow meters 1 and flow meters 2. If there is a difference of up to 50% then a leak is considered. This situation is simulated by opening valve 1 to simulate it. Designation of data leakage can be seen in the picture 16.

Fig. 16. Monitoring page when a leak occurs

With the recognition of the difference in value, the system turns it into an alert or notification. Alerts or notifications are made so that they can be sent in a practical way, namely via SMS or in the form of emails,.

From figure 16 it can be seen that when a leak occurs, in this case if there is a measurement difference between sensors 1 and 2 greater or equal to 50%, then the error that occurs is shown on a web page and the system sends an alert or warning of a leak through email.

4. CONCLUSIONS

From the research it can be concluded that :

1.   Measurement of water discharge can be done digitally using a flow meter sensor. Besides that, Hall Effect with the help of Arduino Nano can also be uses as a data processor.
2.   Monitoring of measurements and data collection can be done from distant places using the Raspberry Pi 3, for digital measurement results and the data is sent via wifi .
3.   The process of reading data and leak alarm systems can be done via the internet (IoT)

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AUGMENTED REALITY, A TOOL TO ENHANCE STUDENT'S MOTIVATION IN LEARNING CULTURAL DIVERSITY:
A CASE STUDY OF POLITEKNIK TUANKU SYED SIRAJUDDIN, PERLIS.

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ABSTRACT

Immersive technology in education can influence students to learn actively and motivate them, leading to an effective process of learning. Due to that, Augmented Reality captures student and educator's attentions that provide the participants with new way of interacting, collaboration and potentially increase in motivation for learning. This research promoted the use of Augmented Reality using AURAQCD book that created by researchers during the learning process. Therefore, this paper looks at the potential using Augmented Reality tools to learn Cultural Diversity Course. This study was collected data from 120 tourism and hospitality students, Politeknik Tuanku Syed Sirajuddin, Perlis. Based on respondents' feedback, the results revealed that augmented reality has a positive impact towards process of teaching and learning in class. Thus, it can be further explored by educators and be a beneficial tool in classroom.

Keywords: Augmented reality ,motivation, learning cultural diversity

1. INTRODUCTION

There was a 30,484 demise registered in 2017, an increase of 0.3% (or 94 premature dead) from 2016. AccThe rapid evolution of technology has changed the face of education, especially when technology was combined with adequate pedagogical foundations. The integration of technology tools into the curriculum is becoming part of good teaching [1]. Teachers not only have to spend a good deal of personal time working with computers but also should have a high level of innovation and confidence to use the new technologies that are embedded in contemporary education. Quick response (QR) usage provide students ownership of their own learning, fast, flexible, convenient and user-friendly way for students to access content and learning materials online [2] Augmented Reality (AR) provides an efficient way to represent a model that needs visualization and interaction between the real and virtual environments [3]. This combination has created new opportunities for improving the quality of teaching and learning experiences. Until recently, Augmented Reality (AR) and QR code are one of the latest technologies that offer a new way to educate. Due to the rising popularity of mobile devices globally, the widespread use of AR and QR on mobile devices such as smartphones and tablets has become a growing phenomenon.

Textbook exercise, quizzes, test, reflective journal and final examination often used as a measurement method to test student understanding about Cultural Diversity Course (DTR 6012). Diploma student of Tourism and Hospitality Department at Politeknik Tuanku Syed Sirajuddin Perlis had pursued this course. Although the students are usually performing moderately, the lecturers still want to improve the students' understanding of the concepts learned for this course. Students also agreed that memorization techniques are main mode of many students and sometimes tainted. This concerned has made lecturers rethinking and redesigning learning strategy that contains student-cantered teaching features, self-directed learning and peer-to-peer assessment.

This study looks at how the merger of teaching for understanding, learning using Augmented Reality and QR codes used in teaching and learning Cultural Diversity course (DTR 6012) and monitored the effectiveness. With the use of smartphone technology tailored to the students' tendency, learning Cultural Diversity course (DTR 6012) expected to help students learn more effectively and indirectly increase the interest of learning this course.

2. PROBLEM STATEMENT

Malaysia's Higher Education Institute (MHE) is recommended to propel online to the global level in the 9th Shifts [4]. This aims to widen educational access, improve teaching and learning quality, reduce the cost of delivering and highlighting Malaysians IPT in the international arena as well as foster lifelong learning especially among Malaysians. Many educational institutions, especially higher education institutions, are considering embracing smartphones devices as part of learning aids in the class. It is because technology is penetrating world markets and becoming ubiquitous in most educational institutions settings. Governments have implemented initiatives with the aim to improve the quality and effectiveness of the teaching and learning process. Thus, there is a philosophy named as 'Falsafah Pendidikan Kebangsaan' being created for the realization of this initiative. Besides that, Malaysia is moving towards the title of a develop country and this needs a community which knowledgeable, progressive, innovative and can contributes in technology. These initiatives are motivated by the recognition that the traditional chalk and talk teaching method and the use of static textbooks are failing to engage students and leading to poor learning outcomes.

Students use smartphones as learning aids due many reasons such as they provide convenience, portability, comprehensive learning experiences, multi sources and multitasks, and environmentally friendly. They also use smartphones to interact with educator outside classes and using smartphones to manage their group assignments. Moreover, smartphone application can be used as an instrument conducive to educational and personal interaction, fostering relationships between students and lecturer [5].

However, in conducting research and teaching, lecturers face the following challenges. The students are more likely to memorize the concept and meaning of the entire Cultural Diversity course content. Besides that, the students are not ready to understand the meaning behind the concepts learned because the students are not in the working industry yet and they find that the course's learning session is something sophisticated and boring because of no practicality. The students believed that the integration of technologies would help them in their learning process. Therefore, educators have begun to seek technologies that have the potential to be integrated in education in order to help students learn actively and to improve their understanding especially in Science subjects. The following sub-sections discuss the issues that have arisen in relation to the teaching and learning of Cultural Diversity and the ways in which technology such as AR and QR Software can be applied to address these issues. Augmented Reality or known as AR is one of the variations of virtual reality can be seen as introduction of artificial stimuli over real ones, with the use of multisensory technology [6]. In other words, it includes virtual information of human senses, enhancing environment relationship. The main characteristics present in AR are mix of virtual elements in the real context, interactivity with resultant reality, positioning of virtual objects in a coherent manner according to the reality in question and influence over all [7]

3. OBJECTIVES OF STUDY

The purpose of this study is to promote fun learning using AURAQCD BOOK with AR and QR software as teaching aids that motivate student to learn Cultural Diversity course.

4. RESEARCH QUESTION

In supporting the objectives and direction for this study, the following research questions are formulated:

To investigate students' motivation toward AURAQCD book in the Cultural Diversity course.

5. LITERATURE REVIEW

Overview of Augmented Reality Technology

Augmented Reality is a new technology that involves part of real-world graphics computers. According to Ronald Azuma, the definition of AR is combining real-world and virtual, interactive in real-time, and 3D animation. [8] defines Milgram's Reality –Virtuality Continuum, as a continuum extending from a real environment to a pure virtual environment. They conclude that AR affords the ability to overlay images, text, video, and audio components onto existing images or space.AR technology has gained a following in the educational market for its ability to bridge gaps and bring a more tangible approach to learning.

Overview of QR Code

QR is short for quick response code. QR Codes consist of black modules arranged in a square pattern on a white background. They are designed to decode the data quickly. It is quite easy to create and use these codes. Using QR Codes for education is another way of using the Internet. Quick Response (QR) codes are versatile. A piece of long multilingual text, a linked URL, an automated SMS message, a business card or almost any information can be embedded into the two dimensional barcode

Active Learning

According to Mohamed Amin Embi [9] 21st learners is more focussed on student centered learning. Numerous studies have indicated that AR promotes enhanced learning performance of the student in higher education. Student-centered activities are enhanced by the incorporation of virtual and real-world experience. It allows students to explore the world in an interactive way. Constructivism also encourages students to work collaboratively, and AR provides students the opportunity to do this in a traditional school setting as well as in distance education. [10] believe that the engagement of the student as well as their identity as a learner is formed by participating in collaborative groups and communities. Constructivism has also changed the role of the teacher to become a facilitator, where the responsibility to organize, synthesize, and analyse content information is in the hands of the learner [10] warns that because AR follows a constructive learning theory it does not generate consequences for students' actions as needed, compared to a behavioural learning environment; however, AR can be used to bridge the gap between practical and theoretical learning practices along with real and virtual components being blended together to create a unique learning experience.

Active learning can be happen when the student does not only passive in the class and join the learning process as answering the crossword puzzle after end session of the learning , also when the doing discussion using AR. In Student-cantered Learning approaches, students are more self-responsible for their own progress in education, and educators act as facilitators who enable the students to learn independently and individually. Three studies report that AR enabled an increased Student-cantered Learning in the regarded learning environment. This claim also can be supported by similar research done by supported [11] and [12] stated these studies show that AR can support a Student-centered Learning approach by providing educators with new possibilities to individualize their lessons according to students' capabilities and by enabling students to learn more independently from educators.

Fun Learning

Not only that, interactivity can be seen as precondition for other presented benefits. However, Increased Interactivity through the application of AR is a characteristic which is not realized by conventional methods [12] and is therefore specified as an individual benefit. Dünser et al. [12] state that "interactions in AR engage learners with the content, and allow for knowledge to be acquired through their [the students] own manipulation of content, as supported by constructivist learning theory". While Increased Interactivity can also be related to teaching concepts, it mainly focuses on technology enabling interactivity rather than the educational decision for interactivity.

Student motivation

According to the[13], Augmented Reality, with its layering of information over 3D space, creates new experiences of the world.AR takes advantage of virtual objects or information overlaying physical objects or environments, resulting in a mixed reality in which virtual objects and real environments coexist in a meaningful way to augment learning experiences. This can be supported by [3] and [4] pointed out that AR allows for interaction with 2D or 3D virtual objects integrated in a real-world environment. Next, another technique is QR code that consists of black modules arranged in a square pattern on a white background. In placing more emphasis, Pons 2011 claimed that QR code design to decode the data quickly and quiet easy to create and use these code. The rising speed of mobile technology is increasing and penetrating all aspects of human life.

However, teaching and learning to use AR and QR code is more effective in the presence of pictures, audio and animated moves that interest students in this 21st century's learning. Through these techniques, the findings revealed positive and consistence pattern when students engaged in technology-rich environment, including significant gains achievement in improved attitudes toward learning and increase self-esteem. Thus, in an observation-based study by [14]the finding have found that the collaborative learning is where the greatest potential of the AR and QR code. Collaboration occurs when learners are involved with social interactions, which would result in improved learning capabilities. In recent studies, Juan et al 2013 claimed that students "do not have to use their imagination to envision what is happening. They can see it." that proved the effectiveess of using both AR and QR code as teaching and learning aids.

6. METHOD

The data collection method involved delivering a set of questionnaire to 120 students randomly selected students of semester five of Tourism and Hospitality department at Politeknik Tuanku Syed Sirajuddin. Quantitative method selected for data collection conducted using questionnaires. Questionnaires distributed to respondents face-to-face. The questionnaire comprised of single and multiple choice questions divided into two sections. The first sections were on demography to collect personal information about the respondents. Questions in section two were concerned with the smartphone application used by the student in learning. It also gathered data on smartphone learning awareness in 21st learning and teaching, educational activities, and if smartphone application learning improves students learning skills and academic performance.

The survey conducted to determine the effectiveness of the resulting innovation product. The survey was done after delivering the teaching and learning session using AURQACD Book. This test was conduct according to the syllabus adopted by the Curriculum and Instructional Development Division Department of Polytechnic Education.

7. POPULATION AND SAMPLE

The convenience sampling design will be used for the purpose of this study. According to Sekaran and Bougie [15], convenience sampling design under the non-probability sampling is the time and cost efficiency to obtain some basic information quickly and efficiently. The Tourism and Hospitality Department, Politeknik Tuanku Syed Sirajuddin has a total population of 711 diploma students. For the Cultural Diversity course, there are about 154 students semester 4 and 5 who enrollees this course. Therefore, according to Krejcie and Morgan [16], this population size required sample size based on the table below.

Table 1: to determining sample size for given population (Krejie and Morgan, 1970)

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

As shown in the table 1, the required sample size is 113 respondents. This amount is considered sufficient, reliable for accurate analysis and meaningful result. The sample of this study consists of 113 people based on convenience sampling. Convenience sampling according to Creswell [17] is where the researchers select respondents based on their availability for research. Students' selection is equally parallel to the aspect of students' enrollment into the polytechnic.

8. RESEARCH INSTRUMENT

The questionnaire in this study consists of two parts, Part A and Part B. Part A is about the respondents 'demographic data aimed to obtain information regarding gender as well as age in order to acquire the number of male and female respondents for polytechnic students.

Part B in this questionnaire focused on students' motivation while using the AURAQCD book which have 25 questions adapted from [18]. The scale the motivation instrument was measured based on 5 level Likert Scale which was 1: Strongly Disagree, 2: Disagree, 3: Fair, 4: Agee and 5: Strongly agree.

9. PILOT TEST

A pilot test has been conducted to investigate whether the questionnaire was reliable to generate accurate results before implementing the actual survey. A Pilot test is important in order to obtain feedback from students about the applications being used. In this study, a pilot test was carried out on research instruments to examine students' motivation after using AURAQCD book. A total number of ten sets of questionnaire were collected from the students who did not participate in the real study.

10. RELIABILITY

To test the reliability of this research instrument, the Cronbach's Alpha Coefficient was used.

Table 2: Reliability Test

Variable	Cronbach's Alpha	Number of item
Motivation	0.955	28

Table 2 refers to the value of the resolution of Cronbach's Alpha for motivational instruments. The IBM SPSS version 22 has been used in to test the questionnaire. The findings from the reliability test on the questionnaire that were outline found that the Cronbach's alpha value for all factors exceeded 0.7 (> 0.7), which means that each factor is good and reliable. Thus this questionnaire exceeded the minimum requirement of Cronbach's alpha which is 0.7, it commonly accepted by most of the researchers to indicate this variable is reliable [19] and can be continued with the following analysis

11. RESULTS AND DISCUSSIONS

The results from this study include descriptive analysis. For descriptive statistics, in order to describe demographic data and research instruments, the mean method was used. The data was analyzed using the IBM Statistical Package for the Social Science version 22

Demographic data

A total of 113 students from Diploma in Tourism and Hospitality Department semester 4 and 5 were involved in this study. The researcher received 100% responses through the google form. This amount exceeds the figure set by Kerlinger [20] which is 80%.

Table 3: Distribution of respondents based on gender

Gender	Frequency	Percentage
Male	28	29.2
Female	85	70.8
Total	113	100

Table 3 shows respondents based on gender. From 113 respondents were male 28 (29.2%) and 85 were female (70.8%).

Result Analysis

Table 4 shown descriptive evaluation of the AURAQCD Book that have been evaluated from 113 samples. The results were based on frequency distribution and weighted mean in each items of five criteria in the evaluation instruments: contents of AURAQCD book, book design with AR and QR code, product promote active learning, fun learning and usefulness of AURAQCD book.

Table 4: Contents of AURAQCD book

Contents	Mean	Std. Deviation
B1: The purpose and rational for the AURAQCD Book are fully explained.	4.04	.915
B2: The goals and objectives of the AURAQCD Book are clearly defined	4.11	.806
B3: The AURAQCD Book promoted discussion of key topics	4.12	.803
B4: The AURAQCD Book encouraged student interaction.	4.33	.995
B5: The AURAQCD Book helps with my recall of concepts/terms.	4.16	.872
Average mean	4.15	

Table 5: Book design

Design	Mean	Std. Deviation
C1: Book size is appropriate	4.32	.957
C2: The picture printed on the card is representative concepts/terms of the selected topics.	4.37	.837
C3: The material used in the preparation of the cards is durable.	4.37	.815
C4: The deck of cards is compact and can be easily carried around.	4.32	.869
C5: The used of AR & QR Technology can help to improve my understanding of the concepts/terms.	4.22	.832
Average mean	4.32	

Table 6: Active learning

Active learning	Mean	Std. Deviation
D1: The directions were clear, concise and easily understood	4.22	.853
D2: The book emphasized key points of the topic played	4.23	.824
D3: The terms used were appropriate to my level of knowledge	4.29	.820
D4: The number of book was appropriate	4.38	.783
D5; The length of time required to play the activities is reasonable	4.18	.826
Average mean	4.26	

Table 7: Fun learning

Fun Learning	Mean	Std. Deviation
E1: The activities provides opportunity for healthy competition and cooperation	4.13	.807
E2: The rules of the activities provide players with equal conditions for a fair play	4.16	.841
E3: The rules of the activities provide a set of options for flexibility in making decisions when playing the game.	4.13	.940
E4: Playing the activities were fun.	4.48	.846
E5: The activities not affected by the internet speed	4.09	.960
Average mean	4.12	

Overall findings showed thatAURAQCD Book has a positive impact on students learning to be more effective and increase the interest of learning this course.

12. CONCLUSION

The feedback of educators and students on the used of Augmented Reality (AR) and QR Code in the AURAQCD Book shown a positive in the post test conducted to the students of Tourism and Hospitality Department. Students were having fun in using the AR and QR software in the AURAQCD Book and most of the educators liked the new addition of a variety of teaching aids in the Polytechnic Tuanku Syed Sirajuddin. This is due to the augmentation reality that can add digital information on learning objects and the mobility of the smartphone devices. Not only that, the used of AR and QR Software in several fields in education especially in Cultural Diversity Course (DTR 6012). Has the potential to be further developed in education. This is because the advantages and beneficial uses od AR features are able to engage students in learning processes and helped them to improve their visualization skills.

The features in AR and QR Software can also help educators explain well and make the students easily understand what they were taught. The used of AR technology has also received positive feedback from educators and students who have shown their interest in using AR and QR Software in in their learning process of Cultural Diversity Course (DTR 6012). AURAQCD Books has proven to be an engaging way for students to participate in their learning. This new technology allows the learning to be student-centered and create opportunities for collaborations that fosters a deeper understanding of the content AR is on the way to becoming an important part of education, and its use will continue to grow. With this learner -centered approach, students are encouraged to become more independent learners who can learn at their own pace.

Furthermore, the AURAQCD Books that combine AR and QR Software has proved to be helpful in understanding complex concept of Cultural Diversity Course (DTR 6012) that was quite hard to be understood by the students. Through, AR and QR Software, teaching and learning process has been brought to a new dimension where the students can easily visualize what is happening by watching the ice-breaking video in the opening of the AURAQCD Books and doing discussion by using AR with their friends in the classroom.

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INTERNET APPLICATION OF THINGS (IOT) ON INFUSION LIQUID MONITORING SYSTEM

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ABSTRACT

In the medical world, infusion fluid have an important role because they support the patient's treatment process. This time comparison of medical personnel with number of patients is not balanced. Infusion fluid that is installed is often found not well monitored by officer. Along with development of the 4.0 industrial revolution specifically on Internet of Things (IoT) answers these problems. The author makes a smart device that uses a photodiode as a sensor to detect infusion fluid (Ringer Lactate / RL and Sodium Clorida / NaCl). This device can provide status information about infusion fluid in real time via smartphone device. This device utilizes Raspberry PI board as data processor and data executor received from the sensor. Obtained speed drops of infusion fluid for RL using the device were 45.46 rates / minute while the calculation of 46.87 minutes. For NaCl infusion fluid obtained 55.56 rate / minute and calculation of 56.49 minutes. Deviation for RL obtained 0,026% and NaCl is obtained 0,016%. With designed this device, medical officer get information speed drops of infusion fluid installed. If infusion fluid close to finish, smartphone officer will give a notification either vibration and ring so that officer can act quickly and accurately.

Keywords: : IoT, Infusion Fluid, Monitoring, Photodioda, Raspberry Pi

INTRODUCTION

Technological developments have penetrated fields, including the world of health. Technology in the world of health has many benefits to make it easier for medical people to improve the process of both saving patients. It's not foreign if we see people in the hospital getting a supply of fluids from bottles that we often call intravenous fluids. The infusion is defined as the entry point of fluid through a vein. Many types and types of intravenous fluids so it does not necessarily say that infusion is a food for sick people. When installing intravenous fluids it is often lacking in supervision, patients or families of patients often change the speed of water droplets without the knowledge of medical personnel. Those who are entitled and obliged to change the speed of drip infusion water should be medical personnel, both doctors and nurses because those who know the standard droplet speed based on medical science and the patient's condition. The other thing is that infusion is not uncommon and is not immediately replaced (if needed) because of the victim's family or lack of medical personnel. This can affect the health of the patient and the family satisfaction of the patient being treated. Therefore a prototype was designed to detect intravenous fluids using a raspberry pi based photodiode sensor with the internet. This tool serves as a patient monitoring tool and an indicator of the end of the infusion fluid that is installed in the patient's room, so that medical personnel and more alert in carrying out the action if the infusion liquid runs out. Previously, a study was conducted by brother Erik Ridwan Arifin on monitoring infusion droplets in 2015 on his thesis entitled "Monitoring Infusion Water Droplets Using Bluino-Based Photodioda with Android as Announciator" in the study as a data transfer path using Bluetooth. Therefore the researchers tried to perfect the system using internet networks that were not obstructed by distance, such as Bluetooth, provided that medical personnel were still connected to the internet network. because it does not rule out the possibility of medical staff being far apart from a device such as a different hospital floor for example.

EXPERIMENT

Modeling

In figure 1. design of sensors in the infusion explains where the sensor is, the drip infusion water sensor will be a fixture that will be installed on the infuse water reservoir. The part of the device (water drop drip sensor) consists of the following:
1. Transmitter that serves to strengthen the signal / send a signal.
2. The receiver as the signal receiver will receive a signal sent by the transmitter.
3. The circuit in this PCB contains resistors and circuits that connect between transmitter, receiver, and Arduino nano.
4. A microcontroller that functions as a brain and as a signal sender that is given a sensor component becomes the output sent to the data base and then displays.

Fig 1 : Design of Sensor Installation on Infusion
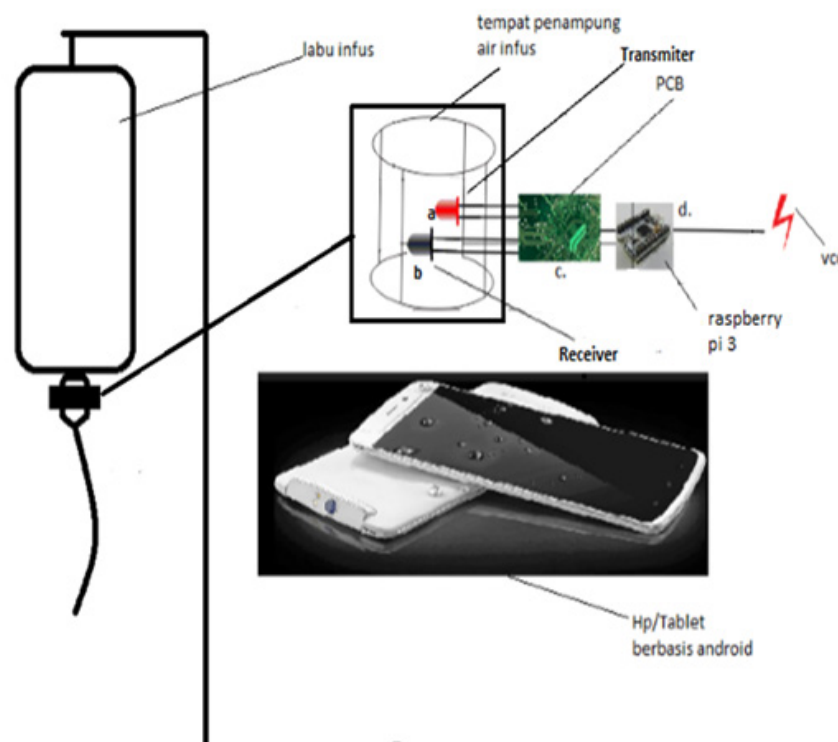
Testing

In carrying out the research, several stages of testing will be carried out to ensure that the infusion water measuring device is functioning properly.
1. Sensor Testing
At this stage the sensor will be tested and calibrated and tested for sensitivity with various methods to get maximum results in the placement of sensors

2. Sampling
The samples measured were infusion of Ringer Lactate and NaCl. Sampling was carried out by inserting the sensor into the ringer lactate and NaCl infusion water reservoirs. In sampling Ringer Lactate and NaCl were carried out to test the sensitivity of the photodiode sensor. Sampling of intravenous fluids was carried out to obtain the volume per drop of each type of infusion water to determine the consistency of the droplets of infusion water.

3. Measurements with Infusion Water Sensor
The sensor will produce a relatively small voltage value. This voltage will be converted into digital voltage to be processed into the microcontroller

4. Interface Testing

This test aims to ensure that the functions of the anonymizer function properly and can be easily operated by operators in this case are medical personnel. Anounciator here is an Android-based smartphone as its operating system.

5. Tool validation

Validation is done by testing actuators and anonciators. This test is expected to be able to find out whether the infusion water droplet sensor provides the desired output with actual data which is actually censored. In addition this test is to test whether the anonciator gives a warning that the infusion water will run out according to the specified setpoint.

CALCULATION

To find out the water droplets flowing from the infusion tube, a sensor that is connected to the microcontroller is needed. This sensor will measure the droplets of infusion water. Microcontrollers that have been given a set point on certain infusion water will calculate the number of drops of infusion water that falls. When the infusion of water droplets approaches the set point, it will give an indication that the infusion water in the infusion tube is nearing its end or has run out. When the infusion water is close to the end, the sensor that calculates the number of droplets will give a signal to the microcontroller and will be processed by the microcontroller and then provide data to the anounciator. When the sensor reads the drip water droplets it will also signal the microcontroller that will be displayed on an Android-based cellphone in the form of debit data, the number of droplets and the remaining volume in pumpkin infusion.

RESULT AND DISCUSSION

This test is carried out because there is a slight difference in the output value between a distance of 2 cm without a barrier with 2 cm using a clear acrylic barrier (0.2cm). In testing the sensor with intravenous fluids the authors used two methods and two types of intravenous fluids. The liquid used is Ringer Lactate and NaCL 0.9%. While the infusion set used is a macro infusion set intended for adults. The infusion set used by the brand GEA medical, the main reason for choosing this infusion set is because it is easy to get at the nearest pharmacy. In the infusion set set, it is stated that 20 liquid droplets are equivalent to 1mL. In figure 2 is an infusion equipment for use by the author during the study.

The sensor circuit in this experiment is no longer using the trial board but the sensor has been assembled as shown in Figure 4.4. The first method the author attaches the photodiode sensor to the infusion water reservoir without any droplets, while the second uses droplets to determine whether there is a change in output. The experiment was carried out as in Figure 3

Fig 2 : Infusion Set Equipment

after the experiment, it turns out that there is a change in the value of the output voltage and current. The value of changes in output voltage and current can be seen in table 1 as follows.

Fig 3 : Sensor Testing Using an Infusion Set
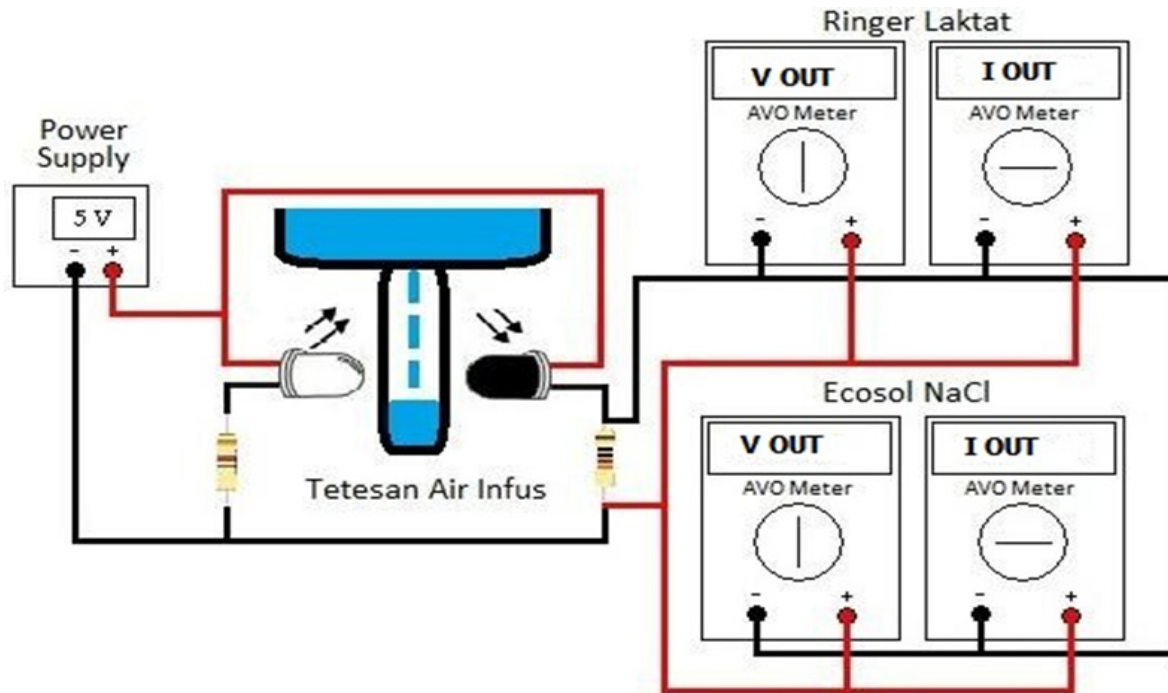
Table 1 : Sensor Test Results Using Infusion Fluid

Number	Infusion Liquid	Without Droplets		With Droplets	
		(Volt)	(mA)	(Volt)	(mA)
1	Ringer Laktat	4.73	0.71	4.71	0.7
2	NaCl	4.73	0.71	4.68	0.65

In the table without droplets, the output indicates the connection between the photodiode and the stable infrared as expected. When using droplets there is a change in output both voltage and current. These changes differ according to the type of infusion fluid used, this difference is caused by the content and the different levels in each type of liquid.

The difference in output voltage and current is small, namely 0.05 V and 0.06 mA. This difference is influenced by absorption also by the presence of small viscosity, Ringer Lactate has a viscosity of 3,032 gr cm / s2 while NaCl is 3,638 gr cm / s2.

This is an analog signal to be processed. Table 2 shows changes in each stress drop values. Thus, it can be said that the sensors are sensitive to each drop, this can be seen in Graph 1 This analog signal output will then be used as a digital signal to be used by the Raspberry input signal.

Table 2 : Sensitivity of each Drop

Droplets	Ringer Laktat (Volt)	NaCl (Volt)
1	4.72	4.68
2	4.71	4.69
3	4.72	4.68
4	4.71	4.7
5	4.72	4.68
6	4.72	4.68
7	4.71	4.69
8	4.71	4.7
9	4.72	4.68
10	4.71	4.69
Jumlah	47.15	46.87
Rata-Rata	4.715	4.687

Fig 4 : Sensitivity of the sensor against droplets of infusion water

70
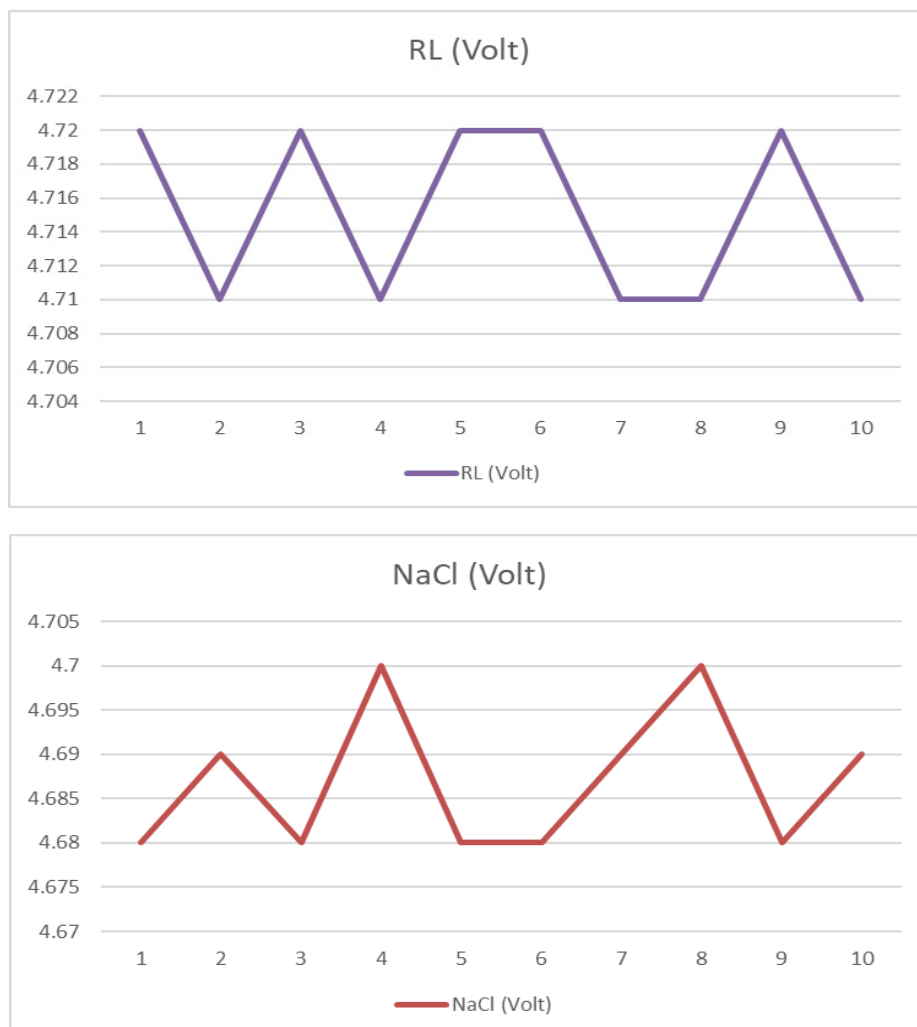
CONCLUSION

The output produced by the intravenous fluid monitoring tool is close to the real output where the results of droplet detection by the tool are the same as the real droplet results. The information available on the infusion fluid monitoring application on Android is easy in reading because according to the data needs of medical personnel, in the form of droplets, discharge that flows into the patient's body and the speed of droplets in real time and monitoring distance can be as far as the wifi area can reach an area.

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DESIGN AND IMPLEMENTATION INFORMATION SYSTEM FOR MONITORING E-LEARNING

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ABSTRACT

This study discusses monitoring e-learning activities at University of Pamulang. LP3 as an official institution that monitors the learning process and e-learning has set several provisions. One of them is the number of activities that lecturers must do for each course in a certain period. In each course, the frequency of lecturer activities is 15 "Create". Create what is meant is to open the topic of discussion by giving questions and responses to student answers. From the results of monitoring conducted by LP3 randomly over several periods, achieving "create" activities is not enough to determine the success of e-learning implementation at University of Pamulang. After further assessment, LP3 establishes several other parameters such as participation, intensity, and suitability of the content to assess the level of success of e-learning implementation. However, problems that occur in the other three parameters cannot be monitored by only looking at data originating from the server log file. Therefore, an information system is needed that presents visual information about the activities of lecturers and students to enable low-percentage entities to be identified as soon as possible and decision-making can be determined. The results of the study indicate that the four parameters can be implemented in the system. The "Generate" facility automatically shows four parameters in synergy considering the final results for the assessment of lecturer activity.

Keywords: Monitoring E-Learning Activities, E-Learning Implementation, Assessment Of Lecturer Activity

1. INTRODUCTION

The Internet has become one of the vital ways to make available resources for research and learning for both teachers and students to share and acquire information [1]. any learning that is done utilizing an Internet or Intranet connection known by the term e-learning [2]. E-learning occurs in a wide range of teaching activities where the technology of one form or another is involved. Hence, to create an effective open, flexible and distributed learning environment for diverse learners, we must explore key factors encompassing various dimensions of e-learning [3]. E-learning refers to the use of information and communication technology to allow access to online learning/teaching resources. In the broadest sense, e-learning defines as every learning refers to whatever learning is electronically activated [4]. E-learning is also interpreted as structured learning with the objective of using an electronic or computer system so that it can support the learning process [5]. Besides, the use of information and communication technology in various educational processes to support and improve learning in higher education institutions, including the use of information and communication technology as a complement to traditional classrooms, the Online learning or the combination of two modes [6].

Pamulang University is one of the higher education institutions that use e-learning models to support face-to-face learning. In the process of monitoring e-learning activities, the University of Pamulang established a special institution called LP3 as an authorized institution to monitor the e-learning and learning process at the University of Pamulang. The use of e-learning began in 2016. Currently, there are 15 study programs at Pamulang University that all use e-learning facilities, so there are many courses that must be provided. This amount will affect evaluation and assessment activities. A study has determined that the factors influencing the successful implementation of e-learning were course development, course structure, evaluation, and assessment [7]. To evaluate and assess e-learning at Pamulang University, the process begins by monitoring the e-learning log data. Presentations are limited to the amount (create, update and delete) made by the teachers and discussion forum activities. In each course, a minimum frequency of lecturer activities is 15 "create". The activity in question is opening a topic of discussion giving questions and answers to the students' answers. Based on the results of the randomized LP3 monitoring over several periods, the achievement of the 15 "create" activity is not enough to be a determinant of the successful implementation of e-learning at Pamulang University.

Besides, it was considered necessary to establish other parameters to measure the effectiveness of e-learning implementation. The level of participation of students enrolled in a course is one of them. Collaborative project-based methods, various types of didactic discussions and other approaches inspired by constructivist learning theories require active participation in the educational process [8]. Another source states that one of the strong indicators of the success of e-learning is the high level of communication and collaboration [9]. This relates to the intensity of student and lecturer interaction in discussion forums. The next consideration is the form of discussion material presented whether or not it correlates with the learning module. Given a careful examination of the content needs to be considered. Therefore, the content must match the objectives of the course to make it easier for students to meet their learning objectives [10]. This is a challenge in the management of learning quality at the University of Pamulang. Then, the assessment process is necessary through an information system that can automate the measurements by applying parameters in the form of activity, intensity, participation, and suitability of the content.

The information system was built using the RAD (Rapid Application Development) software development model. RAD is an object-oriented approach to system development which includes development methods and software. RAD aims to shorten the time generally required in the life cycle of developing a traditional system between the design and implementation of an information system. In the end, RAD also tried to satisfy rapidly changing business conditions [11]. The results showed that visual information about the activities of lecturers and students with a low percentage of parameters could be quickly identified. This experiment was carried out using even semester 2018/2019 e-learning log data from 15 study programs at Pamulang University.

2. METHODOLOGY

The system development model used in this study is Rapid Application Development (RAD). RAD is a development life cycle that is designed to provide much faster development and higher quality results than is achieved with traditional life cycles. It is designed to take maximum advantage of software development that has evolved recently [12]. In this case, the process to investigate is in the form of routines and learning patterns that use e-learning. The expected result is an information system to monitor and evaluate e-learning with several parameters to be measured, such as activity, participation, intensity, and suitability of the content. With a rapid and incremental application development model, the components or functions are developed in parallel as if they were mini-projects. The developments are time boxed, delivered and then assembled into a working prototype. This can quickly give the customer something to see and use and to provide feedback regarding the delivery and their requirements [13]. The following is the RAD development scheme in this study in as shown in Figure 1 below:

Figure 1 : . RAD Model
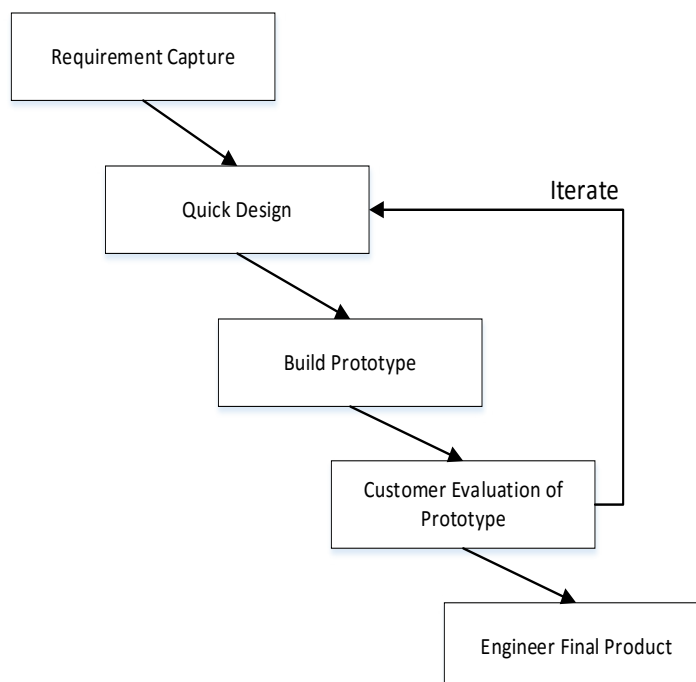
Calculation
The four parameters that will be used for the measurement to be applied in this study are "create", participation, intensity, and suitability of the content. For the calculation of the value of create, obtained when the lecturer creates a forum or answers student questions. Another measurement is the value of student participation (P) is formulated as follows:

$$P = \frac{Sact}{Sreg} \; x \; 100\%$$

P= Sact/Sreg x 100%
Where Sact is the number of students actively using the discussion forum and Sreg is the number of students registered to take the course.

The third parameter is intensity, which is formulated as follows:

$$I = \left(\frac{\sum_{i}^{t} 1 \; Ki}{t} \right) x \; 100\%$$

Where t is the number of days provided to carry out mandatory or substitute e-learning, Ki is the activeness of the lecturer for each day (i : 1st day, day 2, day 3..etc) according to the specified period.

The fourth parameter is the suitability of the content, which is formulated as follows:

$$K = \frac{fk}{fd} x \; 100\%$$

Where fk is the frequency of keywords appearing in the discussion forum for one meeting, fd is the number of keywords specified in each meeting module.

Modeling

In this section, the parameters used in the process of monitoring and evaluation of e-learning will be identified as shown in Table 1.

Table 1: List of parameters

Parameter	Explanation
Create	Lecturer activities such as making discussions and answering discussions
Participation	Comparison of students enrolled in a course with students who are active in discussion forums
Intensity	The frequency of lecturers and students in making and answering discussions every day
content suitability	Match the contents of the discussion with the keywords contained in the module

To illustrate the services provided in this system, a use case diagram is made. Use case is a high-stage description of what the approach is meant to do, whose purpose is to capture the approach requirements. In different words, if a use case represents a person interplay, many variants of this user interaction can be described. UML is involved with the interplay between the approach and external actors. One use case can name upon the offerings of a different use case making use of some relations (entails, extends, makes use of, and many others) [14]. The following is a general description of the use case design for this system:

Figure 2 : Use Case Diagram

Monitoring and evaluation e-learning system

- Monitoring Posts, Create, Participation, Intensity, content suitability
- set weight value
- generate data
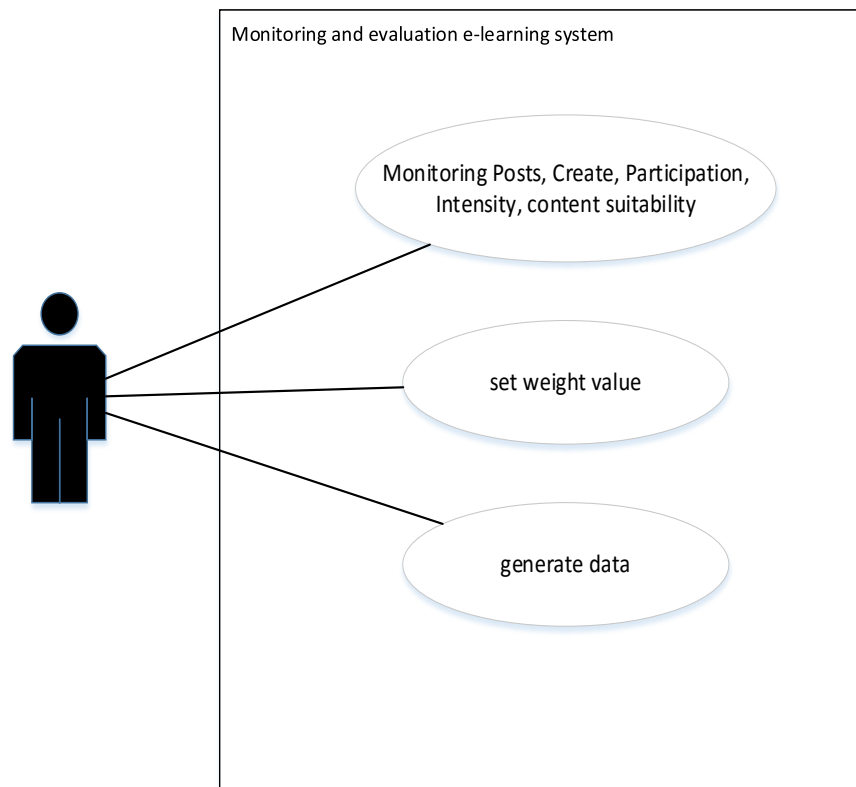
Testing

To prepare for the test, take the e-learning dataset from the e-learning log data for the even semester of the 2018/2019 academic year from all study programs. The testing procedure is briefly explained below:

1. Perform database settings in advance by entering the IP address, port, username, password, database name on the e-learning database settings page
2. Set the weight value to be created by filling in every available text field, for the weight value of participation, intensity, and content suitability, do it by sliding the existing search bar, then click the update button. And finally, save the history of changing the weight value by clicking the save history button. But in this case, the weight values for the parameters of participation, intensity, and content suitability are ignored temporarily.
3. Enter each keyword according to the course and the course module.
4. To measure each parameter, select the menu for which you want to measure the parameter values. Then enter the choice of faculty, study programs, classes, lecturers, date range, number of credits and e-learning days and finally click the search button.
5. To see the overall percentage, select the "Generate" menu, then enter your choice of faculty, study programs, classes, lecturers, date range, number of credits and e-learning days. Fill in the parallel generate to limit the amount of data that will be generated by the system, then click the "Show" button. Then the percentage achieved for each parameter will be displayed and the assessment for the lecturer obtained from the comparison of the weight value determined by the parameter value achieved. Click the "Generate" button to save the results of the assessment to the system.
6. If the weight value is determined to change, then the data that has been generated previously needs to be changed to fit the new weight value setting. To facilitate this process, click the "Generate" button again, which will update the old data generated in the database.
7. Select the report menu to view the final results in the form of the average achievement of the entire study program by entering class choices and date ranges.

3. RESULTS AND DISCUSSIONS

Data processing results for all classes (Regular A, Regular B, Regular C) in one semester period, namely in the even semester of the 2018/2019 academic year with a total of 7,235 courses. The report shows that the Indonesian Literature study program has the highest percentage for the average "create" with a percentage of 43.89%. Then, the highest participation parameter is owned by the Law Study program with a presentation of 52.17%. For the intensity parameter, the highest percentage is owned by the Industrial Engineering study program with a percentage of 60%. For the last parameter, namely content suitability, the highest percentage obtained by the Pancasila and Citizenship Education study program of 0.51%. And for the achievement of the overall parameters shown in Figure 3.

Figure 3 : Percentage of achievements in all Study Programs

NO	Prodi	Total Course	Create	Partisipasi	Itensitas	Kesesuaian Konten	Daya Serap	Absensi
1	SASTRA INDONESIA	208	43.89	31.88%	20.1%	0%	0%	33.76%
2	PENDIDIKAN EKONOMI	223	39.95	30.34%	27.35%	0.25%	0%	31.01%
3	D3 ADMINISTRASI PERKANTORAN	244	39.51	26.32%	18.61%	0%	0%	23.53%
4	PENDIDIKAN PANCASILA DAN KEWARGA	165	37.49	35.37%	26.24%	0.51%	0%	28.84%
5	S1 AKUNTANSI	1566	32.85	28.29%	17.08%	0%	0%	25.38%
6	TEKNIK MESIN	267	32.79	18.95%	23.22%	0%	0%	27.33%
7	TEKNIK INFORMATIKA	1005	29.6	26.32%	24.58%	0.02%	0%	21.84%
8	SASTRA INGGRIS	439	28.12	22.12%	12.44%	0%	0%	22.07%
9	S1 MANAJEMEN	2720	25.15	46.62%	37.74%	0%	0%	55.3%
10	ILMU HUKUM	134	21.95	52.17%	46.19%	0%	0%	54.3%
11	TEKNIK INDUSTRI	63	18.42	48.65%	60%	0%	0%	60.32%
12	MATEMATIKA	76	17.88	9.73%	7.89%	0%	0%	14.46%
13	D3 AKUNTANSI	52	15.14	33.77%	34.62%	0%	0%	30.77%
14	TEKNIK ELEKTRO	56	15.03	26.14%	29.11%	0%	0%	26.79%
15	TEKNIK KIMIA	17	14.23	34.28%	40.59%	0%	0%	41.18%

4. CONCLUSIONS

From the collection of literature and research that has been done, the information system of monitoring and evaluation of e-learning has been successfully developed by applying four parameters in the form of activities, participation, intensity, and suitability of content that can be used to measure the effectiveness of e-learning in tertiary institutions. Monitoring e-learning activities is very useful to identify lecturers who have a low "create" in building discussions and motivating students, measuring the level of student participation in discussion forums, measuring the comparison of the intensity of lecturer activities with student activities according to the number of days provided, measuring the value of content suitability in the discussion forum with keywords contained in the module. All these processes allow the accuracy of measuring the achievement of e-learning. Apart from the percentage weighting values for the parameters of participation, intensity, and suitability of the content, it was concluded that the highest "create" achievement was 60.32% obtained by the Industrial Engineering study program and the lowest percentage was obtained by the Mathematics Study Program with a presentation of 14.46%. The detailed information presented in this research may be applied to further research by surveying students and education experts at other institutions to find ideas about key success factors and e-learning evaluation criteria in addition to those mentioned above.

ACKNOWLEDGEMENT

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THEME 2 :

ENGINEERING, TECHNOLOGY AND TVET

ANALYSIS OF PULSE OXIMETRY (SPO2) USING IOT BASED MONITORING DEVICE

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ABSTRACT

At Present majority working parents are handing over duties to monitor their child to babysitters. Numerous incidents have been resulted in premature infant demise due to babysitters' negligence. In order to address further premature death of babies and infants, an IoT Based monitoring device was designed to keep babysitters constantly alert to the baby's or infant's health condition and parents receive information concurrently on the child's health condition remotely. The focus of the device is to monitor babies' or infants' wellbeing, focusing on those having a congenital heart defect (CHD), sudden infant death syndrome (SIDS), and Hypothermia. The main components used to monitor is Pulse Oximetry (SPO2). Pulse Oximetry (SPO2) is a non-invasive method of measuring the oxygen saturation level in the blood, which are detect the health condition. This project is enhanced by using a wireless system to facilitate babysitters or parents to perform other tasks while monitoring the baby's health condition. The wireless function transmits messages when abnormal reading is obtained, message will notify parents and babysitters via mobile phones with toning alarms and data which will be recorded continuously. The result of this study was obtained through real-time reading transmitted to application and compared to theoretical reading. From the obtained result, this device deemed very usefully for the care and monitoring of the health of infants and babies.

Keywords: IIoT; CHD; SIDS; Hypothermia; SPO2.

INTRODUCTION

There was a 30,484 demise registered in 2017, an increase of 0.3% (or 94 premature dead) from 2016. According to the central statistical office, the death statistical of babies for every year increases are due to Congenital Heart Defects (CHD), Preterm Birth and Low Birth Weight, Sudden Infant Death Syndrome (SIDS), Lung Diseases, and Hypothermia. These causes can be monitored by Pulse Oximetry (SPO2) Pulse Oximetry (SPO2) is a noninvasive method of measuring the oxygenation level in the blood (MacGill, 2017).

The present lifestyle is making parents rush with their daily activities and hand over their children to babysitters. Creating an emotional vacuum in parents as they are constantly worried, they cannot monitor their children's health remotely. Alternatively, there are also parents who take their children to the medical center for monitoring but this is a solution for a short period of time. However, if a baby or infant needs specific care for a long period, such as chronic illness and lung disease, parents may need a trained babysitter to help them.

In order to solve this problem, a MyMed device was designed to keep babysitters constantly alert to the baby's and infant's health condition and as parents can monitor the child's health condition remotely. The communication system works based on WI-FI medium throughout the server. This device was detected through the SPO2 sensor. Allowing the device to alert the parents about the infant condition one hour once and any emergency case. Moreover, parents can do any activity without worrying about infant health. This device is also helpful for the caretakers who had their own care centers. This device will update data analysis in statistical wise to monitor the infant health condition and easy to refer the doctor with the data collection in device.

2.0 METHODOLOGY

2.1 Hardware of Device

The MAX3010X sensor is an integrated High Sensitivity Pulse Oximeter and Heart Rate monitoring module. The sensor is included with internal LEDs, photo-detectors, optical elements, and low-noise electronics with ambient light rejection according Polina Gelfer. In this case, the module was used to indicate the reading of Pulse Oximetry (SPO2). The light is partially absorbed by underlying tissues, including peripheral blood. The photo-detector from the sensor was collected reflected light at both wavelengths and returns two corresponding relative intensities using I2C protocol. Since absorption spectra for oxygenated and deoxygenated hemoglobin different for both wavelengths, the reflected light has a variable component as the amount of arterial blood that is present under the skin pulses with each heartbeat as shown in fig. 1. Figuring out oxygen saturation is based on the signal processing software.

Figure 1 : Scenario of photo-detector transmits a signal to verify the reading.
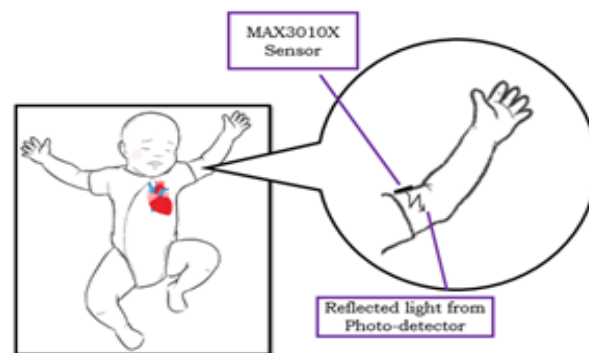
Besides that, the device was developed with two microcontrollers, which are Arduino Nano and NodeMCU. This is because to reduce the latency while processing data of the device. So, the device is controlled systematically according to the programming and schematic diagram. Additionally, the block diagram of the component mention as fig. 2 based on the process of data throughout the component.

Figure 2 : The block diagram of the component
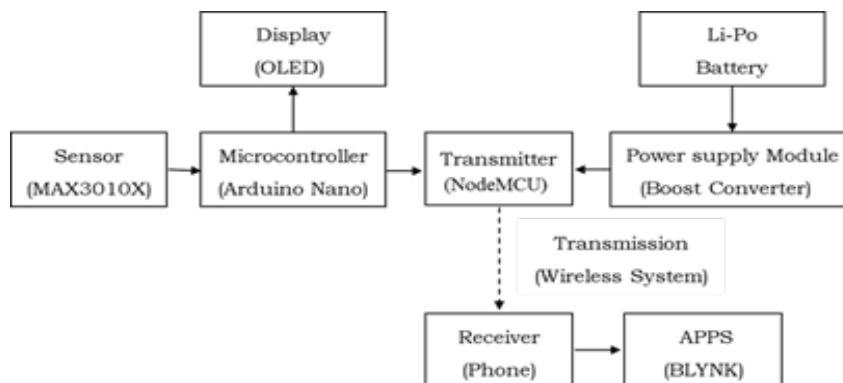
2.2 Software of Device

The device was programmed using two software such as Blynk and Arduino IDE. Blynk is an Internet of Things Platform aimed to simplify building mobile and web applications. It can control the device according to the programming which is created. This application will store the data statistically to monitor the condition. The open-source Arduino Software (IDE) is written in Java and based on Processing. This software has been used for programming according to the project to compile and upload without error.

2.3 Measurement limitation table

The programming codes are created in Arduino IDE throughout theoretical statement from medical health care. This is because each parameter contains a specific reading to monitor the health condition. In this case, the reading was taken from iheart sourced from the website, which is shown as table 1.

Table 1: Range of SPO2

< 90%	91-94%	95-100%
90% or less consider have to consult doctor.	Below average for population monitor closely.	3.27
	The red blood cells are well oxygenated and sufficiently transporting oxygen around the body.	

RESULTS AND DISCUSSIONS

3.1 The Development of Device and Application

The developed device and application was shown in fig. 3 and 4. The device was indicated Pulse Oximetry (SPO2) reading throughout the photo-detector of the sensor, which was placed below in the device to detect directly under the skin.

Figure 3 : The developed MyMed device

Figure 4 : The labeling of the MyMed application from Blynk platform
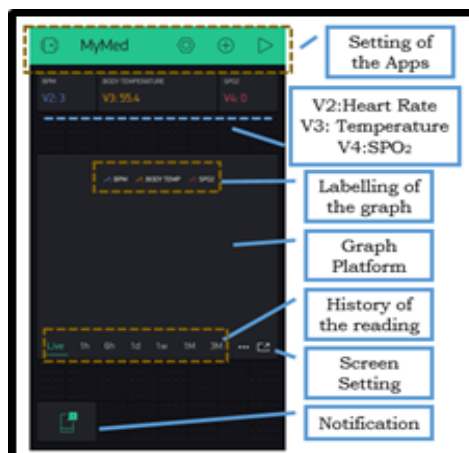
Based on the data collection, the result was plotted as a graph in statistical wise to identify the health condition and the history of the graph will send to email for extra monitoring and analysis purposes, which was shown in fig 5 and 6.

Figure 5 : The history of the graph from the application send to email
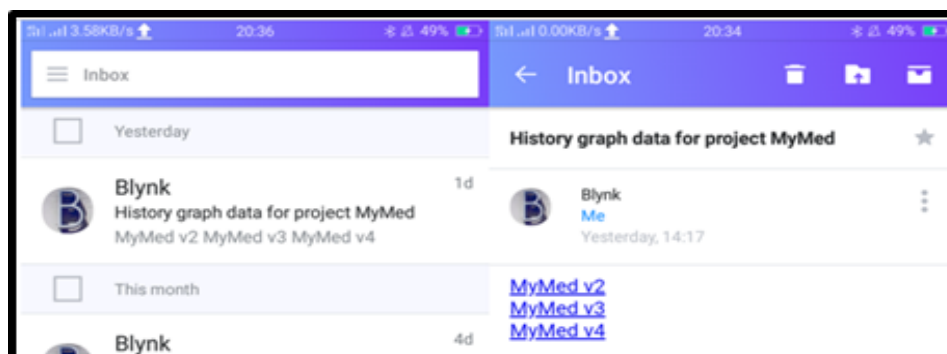
Figure 6 : The Statistical Data In The Mymed Application From The
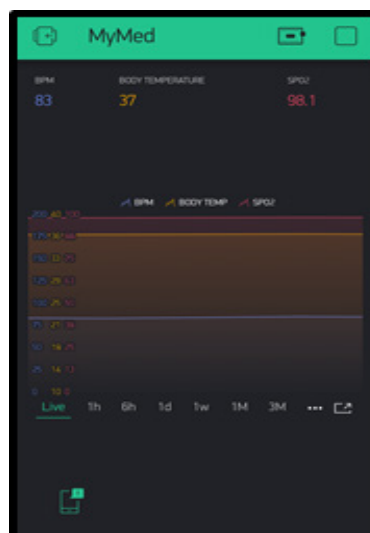
3.2 Analysis of SPO2

The data of MyMed device was collected and compared with the actual medical device, which is Patient Monitor, model Nihon Kohden BSM-2353K as shown in Graph 1. Moreover, the comparison is done according to 8 times testing with 5 minutes wearing the actual device and 5 minutes wearing the prototype to the sample. This is to verify the data stabilization of a person while wearing the medical device. Besides that, the testing is carried out without wearing the same time both devices concurrently due to avoid the high electrical signal passing through the body to calculate a similar parameter. This is done to observe the accuracy of the MyMed device.

Graph 1 : The comparison of MyMed device and Patient Monitor

The SPO2 Comparison Between Two Device

	1	2	3	4	5	6	7	8
Nihon Kohden BSM-2353K	98	99	99	98	99	98	99	99
MyMed	98	99	99	98	98	98	98	99
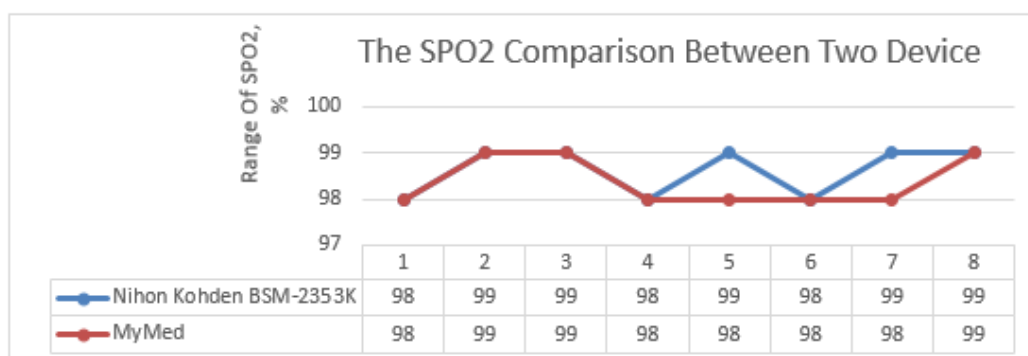
The reading comparison between the two devices is unparallel because the percentage of error is 0.01% due to the movement. Rather than that, the reading is also compared with the theoretical values as shown in Table 1 due to monitor the health condition range. The sample is healthy due to the tests.

CONCLUSIONS

As a summary, the device was developed to resolves the problem commonly occurred in-home, nursery, and health care industries. As a method to address the infants or babies needs to be monitored due to the health condition. As a result, it may help the users to reduce their burden and decrease the numbers of mortality. The SPO2 is an important diagnose system for health industries. So, the reaches undergoing to innovates an excellent product due to the potential level in the market.

The device was designed for monitoring purposes by applying the latest technology for the target society. Moreover, the latest technology mention for the MyMed device was the communication system and SPO2 sensor, which are used to detect the internal reading of the body and transmit through the wireless module. The communication system for the device is based on the Internet of Things (IoT). The device was harmless while wearing throughout the days. This innovation may help in diagnosing the yearly stage of health problems by using daily lifestyle. Besides that, the device reduces the burden while do not wait for a long queue in hospitals in order to check the health condition. According to this device, the data were recorded systematically. The data collection and also known as history was uploaded in email for monitoring purposes. The data from the device was accurate while compared to the actual device in the hospital.

ACKNOWLEDGEMENT

As a summary, the device was developed to resolves the problem commonly occurred in-home, nursery, and health The author is thankful to those who provide the possibility to complete the device with theoretical and knowledgeable ideas. The author also would like to thank the supervisor, Mdm. Zarina Bt Che Amin, whose guide and support to complete the product.

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DEVELOPMENT OF DESIGN FOR LOWER EXTREMITY THERAPY FOR CEREBRAL PALSY CHILDREN

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ABSTRACT

Cerebral Palsy (CP) is a condition marked by impaired muscle coordination that may occur before, during or immediately after birth. At this stage, the infant's brain is still developing. Examination of the motor system offers a particularly appealing method for studying cerebral palsy by providing different kinds of treatments. The treatments are usually conducted at the hospital, but sometimes it is conducted at location which is according to patient's guardian preference. 'Computer Assisted Therapy in Lower Extremity for Cerebral Palsy' also can be known as CATLoC mainly focused on children aged from 7-12 years old diagnosed with CP condition. This paper presents the main objective of the project which is to build a device that can be used for lower limb exercise for CP children. Flow of process in completing project is included. This project enables monitoring using the graphical user interface (GUI) system. This project uses Arduino circuit with software programming and magnetic sensor to detect the motion of foot swing. Furthermore, a Bluetooth module is used to ease connection between the device and the user's laptop. CATLoC facilitates the lower extremity therapy process that may be useful for rehabilitation and diagnostic purposes.

Keywords: Cerebral Palsy, Rehabilitation, Lower Extremity, Gui System

INTRODUCTION

Cerebral palsy (CP) is a condition marked by impaired muscle coordination, known as spastic paralysis and other disabilities that occurs from brain injury during the prenatal, perinatal or postnatal periods. CP cannot be cured, but with continuous rehabilitation treatment and from help of assistive devices may ease their movements and improve their lifestyles [1]. About 70-80% of CP person that have affected limbs demonstrate increased in deep tendon reflexes, tremors, muscular hypertonicity, weakness and a characteristic scissor gait with toe-walking. It is known that a person who have CP often faces difficulties in movement due to the muscle tightness, range of motion limitations and sensory impairments. Because of that, physical therapies are beneficial for them to overcome the problems [2]. Another paper written in the year 2012, stated that strength training does give positive impacts in improving muscle strength and it able to improve gait and motor function, but only if the training was done frequently [3]. Basic movements such as standing, walking and running for cp children are limited [4]. Other than that, children with CP has an unstable coordination or less dependent on balance [5]. Therefore, pedals are attached for leg exercise at the walker and is added with seat. There is also a limitation in using GUI system for monitoring progress when doing treatment at home, so Graphical User Interface (GUI) system is used to increase convenience in monitoring the treatment process done by user. GUI system is designed as the chronological order of user input events and consists of text boxes and clickable buttons [6] [7]. Along with the development of time where innovations take place, this patient-operable device should also be able to shorten the meeting time during the check-up appointment since this device also can store memories of the user's progress.

From a paper written in the year of 1999 [8], a paper of design of an exercising device in providing therapy to lower and upper extremity, consist of a frame, a disc mounted to the frame and a hand or feet pedal on both left and right side of the disc. The device is equipped with motor to provide a rotating motion and has two types of mode; active and passive mode where the speed can be adjusted for the passive mode, while in active mode, the resistance is adjustable. Another paper written in the same year by different authors using different method [9]. This invention is related with general exercise, rehabilitation in medical field and toning of the lower extremities' muscles. The difference between previous design is, it used a rocking-type for the foot. There are two pedals attached for left and right foot. The pedal is mounted on a base, while the pivot point is mounted vertically between the base and the pedal. This device can be performed in seated position and the main purpose is to maintain the tone of the muscles of the legs and to encourage blood circulation in the lower extremity part, especially foot and legs. Another method studied is by using functional gait re-trainer that is written in the year 2015 [10]. This device focused on a person's lower extremity in strengthening the muscles. The inventor suggested that a functional way in exercising is a must to strengthen the lower extremity muscles. It consists of movable belt, horizontal plane and elastic band. The user for this device will perform walking pattern on the plane. When a person performs this exercise, it will create force from their own leg.

The device uses a variety of controllers, processors, computers and user interface. The communication used is with sensors, detectors, systems, processor or with hardwire or wireless.

METHODOLOGY

In this methodology part, a complete process in developing lower extremity therapy is shown. The process includes the development of hardware and software is elaborated and method used in collecting data is also mentioned in this section.

2.1 Development of CATLoC Hardware

This project will undergo the process of design development. The process of designing is one of the crucial parts in developing CATLoC. The condition of a person with CP such as their muscle pattern or activity, stability and others must be put attention to. The initial design of this project is shown in the Figure 1 below:

Figure 1 : Front View Of Sketch Design For ATLoC
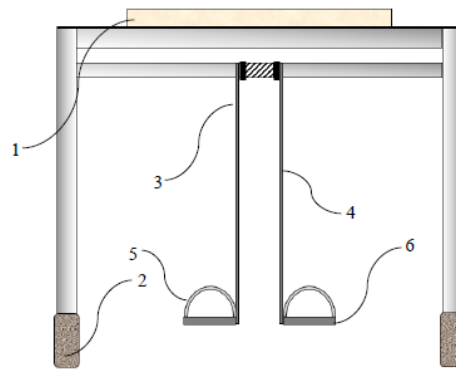
Referring from Figure 1 above, we have labelled the item required to form CATLoC. The name of each item can is in Table 1 below:

Table 1: Item labelled from prototype Figure 1

NO.	ITEM
1	Seat
2	Wheel
3	Hex nut
4	Extendable flat rod
5	Velcro strap
6	Foot paddle

CATLoC comes from of a normal walker frame that is used to assist a person in walking. Referring to the Figure 1 above, the walker is equipped with a seat to provide a comfortable seating position when user wants to perform the exercise. The function of hex nut is to tighten or loosen the flat rod. The tighter it is, the higher force is needed for the user to perform swing motion and vice versa. Considering that every person has a different height, it is recommended to have an extendable flat rod to suits everyone comfortability. It will also have Velcro strap to ensure that the foot is correctly placed on the foot paddle.

The circuit operation for this project is by using two pairs of magnetic sensor [11], Arduino Uno that has been set up using IDE software [12][13], HC-05-bluetooth [14]. Magnetic sensor was located at the flat rod area and will function as a detector for the user's foot motion. There are two pairs of magnetic sensors, both carries the same function but for different region; left and right foot. During the foot swinging, the increasing number will be recorded from the sensor and the data will then be processed by Arduino Uno. Two Bluetooth are prepared which will act as a transmitter and receiver. Circuit diagram is shown in Figure 2 below.

Figure 2: Schematic Diagram Of Circuit Used For CATLoC
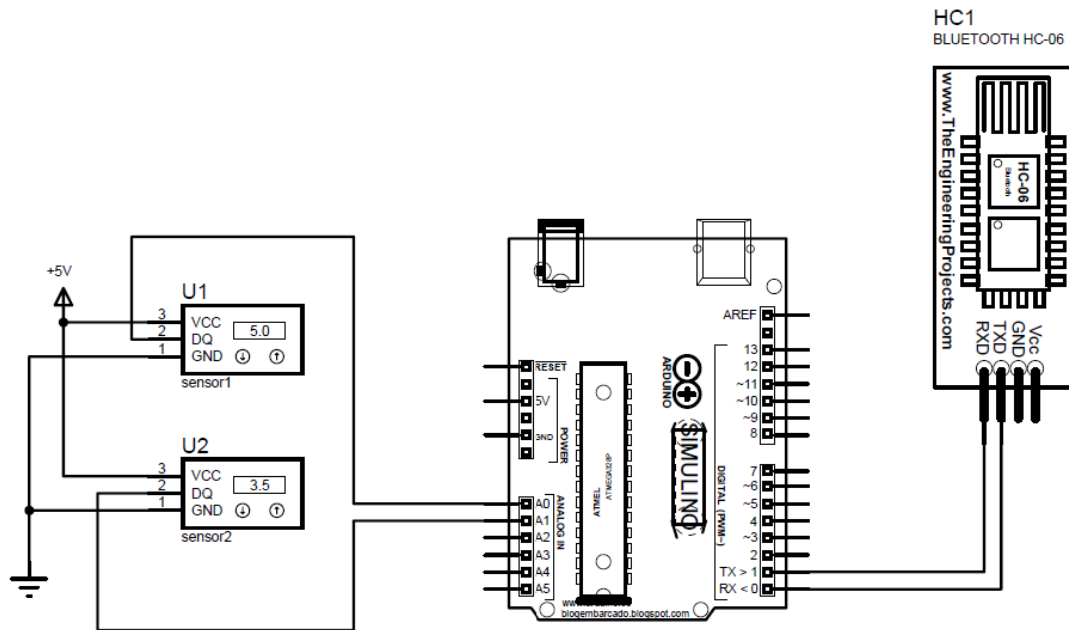
Referring to Figure 3 below is the simple diagram of connection established in this project. The data will be transferred using Bluetooth HC-05. There are two Bluetooth that is responsible in transferring data. The first Bluetooth is the one that connects with the Arduino Uno, while the second one, we use a USB plug in Bluetooth for the laptop or desktop which will receive the data. The connection established for communication in CATLoC operation is briefly summarized in Figure 3 below.

Figure 3: Connection of devices for data transfer
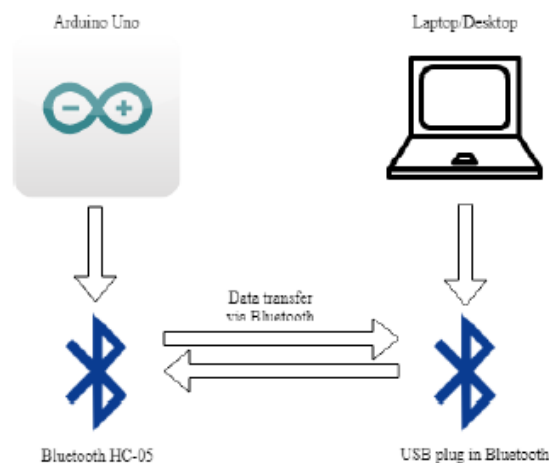
2.2 Development of CATLoC software

For the development of CATLoC in terms of their software, it involves with the programming and coding. For the GUI system, we use Visual Basic software to create GUI display and Arduino IDE software to program the Arduino Uno. Referring to the block diagram below (Figure 4), only with correct programming written in Visual Basic software and Arduino IDE software, the project is successfully functioned. Starts with the input from a magnetic sensor, the process of collecting data will be going through the Arduino Uno and Bluetooth and after that it will be displayed on the GUI display at the laptop.

Figure 4: Block diagram for CATLoC
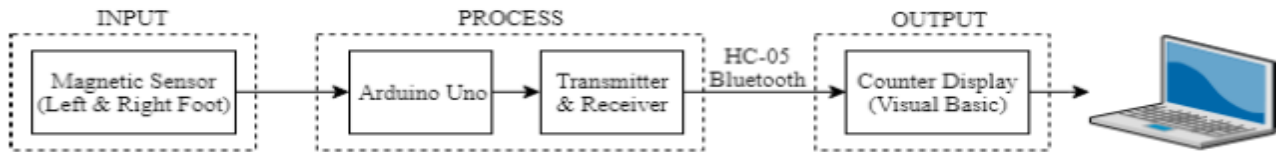
GUI system, which can be known as 'Graphical User Interface'. GUI testing can be defined as a GUI based application, that has a graphical-user interface front-end and is tested by performing an arrangement of a story on GUI widgets. The events that involving the GUI usually will take input from users and change the state or condition of its widgets. The widgets can be in a form of any buttons that has its own function, opening menu, or typing in a window [6]. GUI takes events as input from users and then changes the state of its widget [3]. Once the connection between Bluetooth has been established, user should open the executed program for CATLoC (Figure 5) and insert the correct number of ports used.

Figure 5: CATLoC Program In User's Laptop
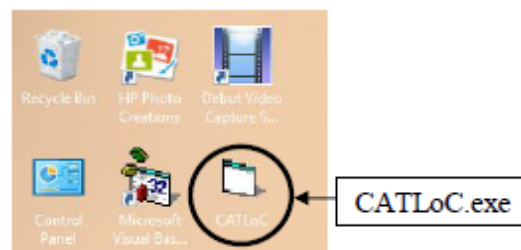
After all this process using the laptop is completed, user can start performing the exercise by swinging their left and right foot. From the exercise made, number of progress for both left and right foot from the user will be shown at the GUI display (Figure 6).

Figure 6: GUI Display Made For CATLoC
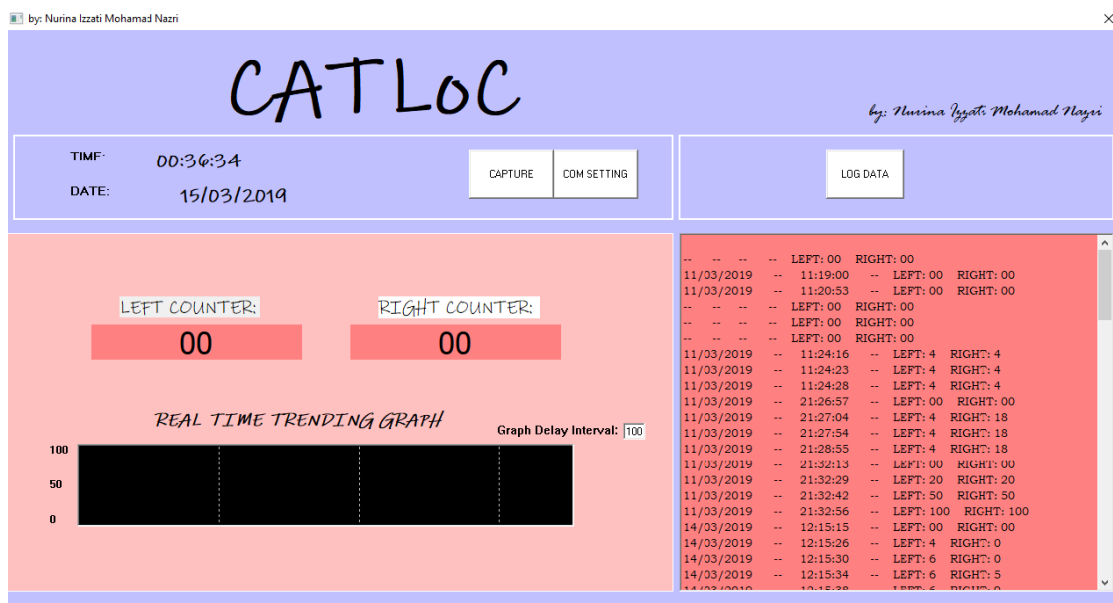
Our GUI display have interesting features that were made with vibrant colors and attractive fonts. Other than that, the GUI display will have project's title on the top of the window. A real-time and date will also show at the window for the user's reference. The main feature for this GUI is the swing counter for both left and right foot. But other than that, we also have a real trending graph. This can be use if the guardian or the user want to check the progress history whether the activity increases or declining. On the right side of the GUI, we have the data shown about number of swing exercise made by the user. Once CATLoC's user exit the executed application, they can still see the history of progress activity which is stored as log file (Figure 7).

Figure 7: History Record For Progress Activity

Log File
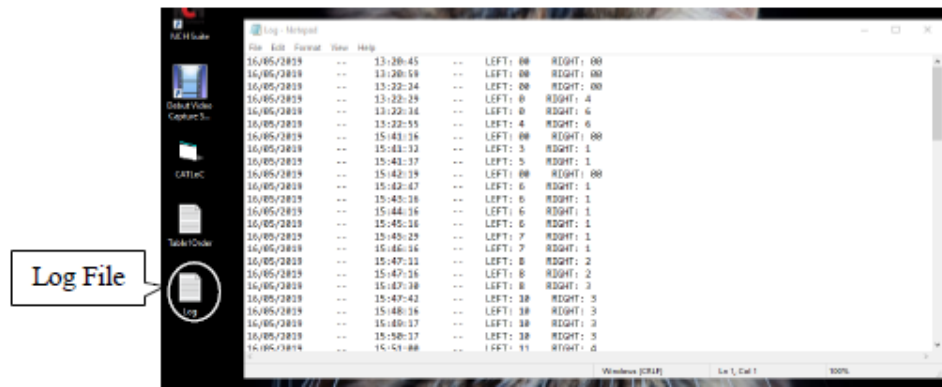
A flowchart is used to show steps in using the CATLoC. The operation of this project should be done accordingly by following the correct steps. Referring to the flowchart above, the operation will start by switching on the laptop. The Bluetooth, which is the receiver part, is connected into any ports at the user's laptop. In this process, the LED at the Bluetooth will keep on blinking continuously. This indicates that the Bluetooth has no connection with anything. After that, switch on the circuit that is in the circuit box at the walker. Once the circuit is on, both Bluetooth, receiver and transmitter should connect with each other. During this time, user can check the connection by observing the Bluetooth, it will blink slower or show no blink at all. Figure 8 below shows the flowchart for CATLoC's operation from the beginning operation until the completion of process:

Figure 8: CATLoC's Flowchart Of Operation
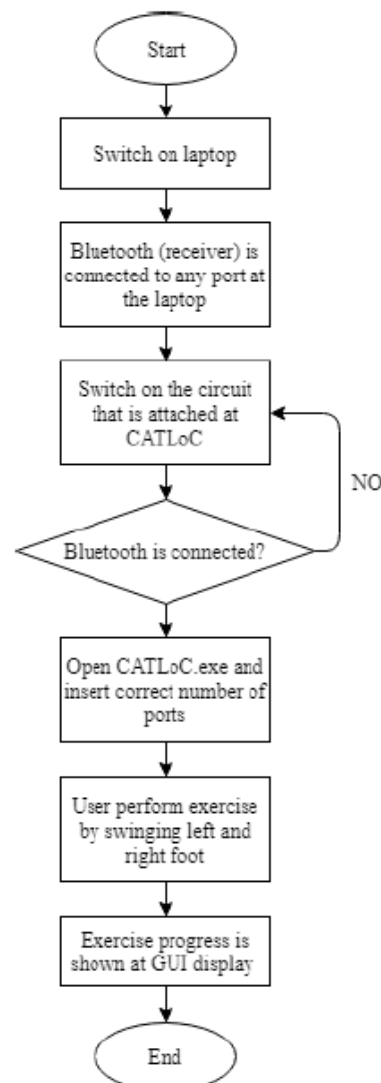
The usage in CATLoC is for detecting the foot motion, where each side of left and right side will have a pair of magnetic sensors. Referring from Figure 9 above, it is a rough diagram of side view of CATLoC's foot paddle. Notice that there are two magnetic sensor which in here is identified colored as yellow and red. Both sensors are located with a difference in angle. The user should swing their foot in a specified angle of movement. Once the magnetic sensor is side by side, there will be a counting occurred. This is because, a magnetic sensor produces a magnetic field around it, and if another magnetic field interfere that comes from another magnetic sensor, a disturbance occurred and that will be taken as a counter. Due to this act, a change and increasing of number will show at the GUI display.

Figure 9: Side View of Foot Paddle's Swinging
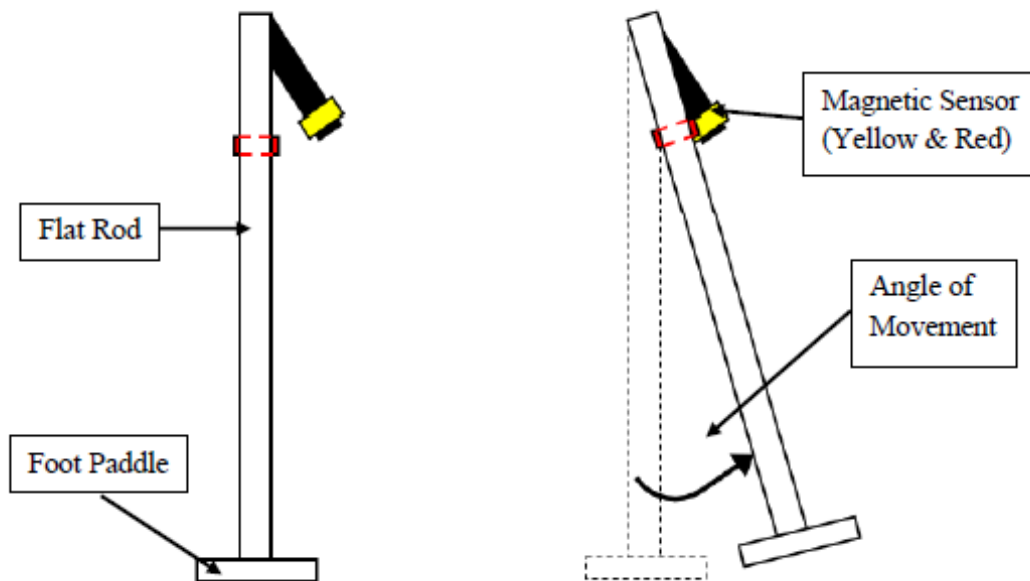
2.3 Quantitative and Qualitative Analysis

Method of analysis used during this project is quantitative and qualitative analysis. As can be seen in next chapters, we can see there are visual aids such were used to display about data collected. From this method, a more understandable to represent our result can be observed. Few stages involve in analyzing quantitative data; data validation, data editing and data coding. We calculated percentage of respondents' working status for questionnaires and summarization of interview conducted.

RESULTS AND DISCUSSIONS

The development of this project is finished by completing final prototype and has undergoes few evaluations such as questionnaires and interviews.

A. Final Prototype

As for CATLoC, we built a prototype that has a real function just like how has been described previously. The completed prototype is shown in Figure 10 and the specification is in Table 2:

Figure 10 : Front View and Side View of CATLoC

Front view   Side view
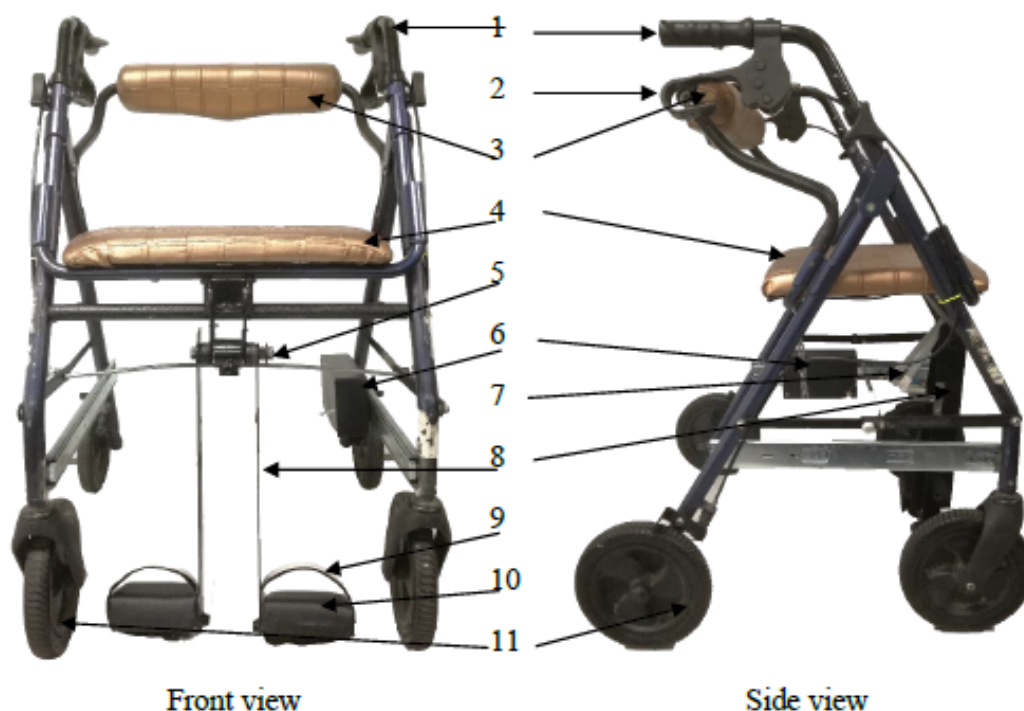
Table 3.7 below shows the dimensions of CATLoC:

Table 1: Item labelled from prototype Figure 1

ITEM	DIMENSIONS
Height	80 cm (min) - 90 cm (max)
Width	60 cm
Length	48 cm
Height from ground to seat	55 cm
Flat rod	29 cm
Radius of wheel	9 cm
Seat's thickness	2.5 cm
Foot paddle height	3 cm
Foot paddle length	10 cm
Foot paddle width	7 cm

B. Questionnaire

The main purpose that we create questionnaires is to see the project from a different view of many people with different background. Data is collected from different ways such as set of questionnaires, and interviews. Based from all method use to do data collection, we have evaluated the results and is elaborated as follows. Questionnaires is divided into three sections; (A) Device Design, (B) GUI Program, and (C) Display and Gait in Cerebral Palsy (walking ability). The feedback collected is from a total of 24 respondents, 75% of them has a working status.

Figure 11: Graphical View of Questionnaires Analysis for Each Sections
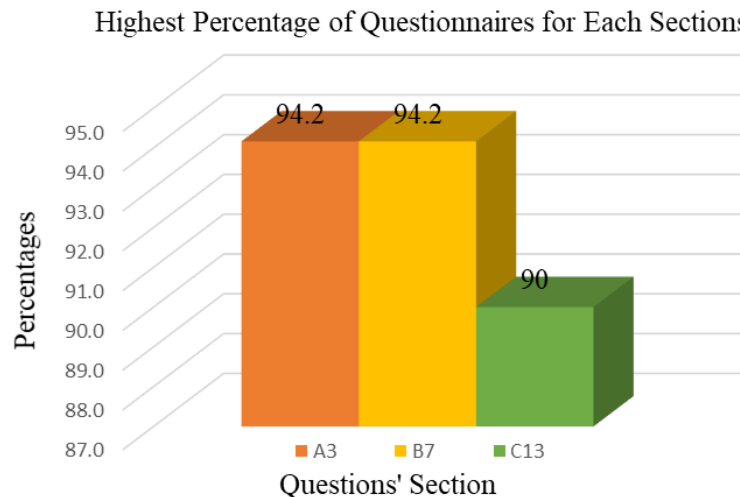
Referring to Figure 11 above, it shows the highest percentage reached for each section. In section (A), the highest percentage reached for the first part is 94.17% where our respondents mostly agree on question 3 that asked whether CATLoC is suitable to be used for indoor activities. 87.5% of respondents stated that they would recommend this device to their acquaintance. 90.83% believed that CATLoC may ease the physiotherapy process for CP children. Other than that, 87.50% said that CATLoC is safe and suitable to be used by CP children. The lowest percentage hits 85.83% is about the usage of CATLoC as outdoor activities.

As for the second section (B) on the GUI program and Display, the highest percentage scored is also 94.17%. The question that gain highest score is about the application of GUI system. Respondents were asked whether the usage of GUI system for CATLoC is very helpful in this process. This result shows a very good result because our main features for this project is about creating the GUI display. Second highest percentage is 93.3% that is about the relevancy of GUI system to be used nowadays.

Besides that, scores that reached 90% relates with questions about the easiness to use the device. In this part there are two questions with the same lowest percentage which is 89.17%, are about the sufficiency of information displayed and the combination of GUI system and device is worth to be bought.

The last section of this questionnaires, section (C) is about gait in CP or their walking ability. Only this part consists 4 sub questions to be answered. The highest percentage is 90% that agrees on the usage of foot pedal on CATLoC can train and increase functionality of the foot muscle. Second highest percentage for this part reaches 89.17% for the question about frequent usage of CATLoC can improve CP children's walking ability. Next, 85% scored for the questions that relates with their knowledge about CP children's walking pattern is different compared to normal children. While for the lowest percentage is 78.33%, is about whether our respondents know about CP.

C. Interviews

After completion of product, we conducted a meeting with a parent who have a son with CP. We interviewed with consent and few questions were asked regarding their son's condition and therapy, and also about their view on CATLoC. The overall interview is summarized in Figure 12 below.

Figure 12: Summarization of interviewSections

CONCLUSIONS

CATLoC has undergoes various phases into its' completion. Starting from by brainstorming for the design, studies conducted based from previous research paper about CP and the problem existed for them and the family. With the usage of GUI system, it helps a lot in monitoring the user's activity. By using Visual Basic software, we have successfully created a GUI system that has main features to display the monitoring progress for swinging activity and can also keep previous data in log file.

In the data collection phase, we use few methods such as questionnaires and interview, we have collected quite a satisfying feedback for our data collection. Results from questionnaires shows that the highest percentage is about the usage for indoor activities, application of GUI and they believe that this training can increase CP's foot muscle functionality. Besides questionnaires, we also made a few feedback forms to be answered by the respondents. An interview was purposely made for us to see from the eyes of the parents who has CP children regarding this device. However, a further study should be made to ensure the effectiveness of using this project frequently. Future research should include an experimental procedure to test the product's durability and effectiveness. The procedure will start from before using the device until after using the device.

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This research was conducted using help from various parties. Especially with the guidance and persistent help from my supervisor, this CATLoC project is successfully completed.

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DEVELOPMENT OF EMPTY FRUIT BUNCHES (EFB) SEEDLING POT FOR SEEDLING GROWTH

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ABSTRACT

Palm oil industry is one of the major industries in Malaysian agriculture. 70% of waste quantity in the form of empty fruit bunches (EFB) and palm shells is derived from fresh fruit processing. EFB is a agricultural waste accumulated in a factory area that can be a reproduction of pests and venomous animals that can harm humans and cause disease infections. EFB is also openly burned that can cause pollution that can affect the environment and local communities. There are several ways used by the local community to reduce the wastage of EFB used as organic fertilizer because EFB has good nutrients for soil and plant. Therefore, the rest of the EFB needs to be recycled naturally to acquire value-added innovation products to country and local communities. This study is to development of seedling pot from EFB for seedling growth. The EFB is immersed in clean water and boiled at a temperature of 100 ℃ for 30 minutes and then air drying for one day until dry. Then the EFB is blended in the blender machine before being immersed in an anti-fungal solution and dried again until dry. The EFB will be mixed with organic binder is starch flour with three ratios of 50%: 50%, 60%: 40% and 70%: 30% to be used as a seedling pot. The results showed that seedlings that were sown in EFB seedling pot with a ratio of 70%: 30% managed to grow well within 14 days. Hopefully this EFB seedling pot can be used extensively in plantation sector for forest tree seedling with various sizes.

Keywords: Empty Fruit Bunch, Seedling Pot, Seedling Growth.

1. INTRODUCTION

The agricultural industry plays a significant role in the overall economic growth in the world. The second agricultural crops grown in Malaysia are palm oil has a total area planted of 4.7 million hectares by 2015 [1] and the yields produced within a year are estimated 65 million [2]. Globally, 998 million tonnes of agricultural waste is produced per year and landfills annually [3]. Almost 70% of the volume form the processing of fresh fruit bunch is removed as waste in the form of empty fruit bunches (EFB), fibre and shells [4]. For the production of oil palm waste estimated at 80 million tonnes in 2016 and is expected to increase by 100 million tonnes in the 2020s [5]. Subsequently, production for the remaining EFB is 20 million tonnes a year and EFB production is 7 times higher than Malaysia's wood production [6]. The disposable method for this oil palm are left to decay at the factory area some are used for animal feeds. EFB waste left in the plantation which is susceptible to open burning. Another, it can be dwelling pests like a rats, snake, scorpion and this can pestilence for human. This ways can bring side effect for human and environment [7]. Therefore, the rest of the EFB needs to be recycled naturally to acquire value-added innovation products to country and local communities.

However, plastic pollution is caused by the accumulation of plastic waste in the environment. It can be categorized in primary plastics, such as cigarette butts and bottle caps, or secondary plastics, resulting from the degradation of the primary ones. It can also be defined by its size, from microplastics - small particles (<5 mm) of plastic dispersed in the environment - to macroplastics. The bags will likely take about 1,000 years to decompose. Because such a large number of bags are produced and it takes a long time for them to decompose, the plastic bags that are thrown away create a lot of waste in the landfills on top of the trash that may be inside of them. Previous research from group of Innovative Forestry Diploma III student management creates a replant of a seedling container to reduce the pollution of plastic waste in the nursery named "Cocopeat Polybag". This innovation is one of the results of the Student Creativity Program in the field of Karsa Cipta which has been passed and funded by the Ministry of Technology and Higher Education.

Hence, this study was carried out to development of seedling pot from empty fruit bunch (EFB) for seedling growth.

2. METHODOLOGY

2.1   Materials

i.   Empty Fruit Bunch (EFB)

EFB are produced after fresh palm bunches are processed by the process of steaming, separating or treating palm oil for oil production [8]. The EFB used in this study were taken from Palm Oil Factory Felda Lepar Utara 04, Bandar Pusat Jengka, Pahang Darul Makmur, Malaysia. The EFB was soak and boil in clean water to remove impurities or soil attached to EFB and remove tannin substances that can delay the seedling. Dried EFB was cut and grind before mix with starch binder.

ii.   Starch

The starch used made from tapioca flour is mixed with 350ml of water at temperature $100°C$ before pour into the mould to produced EFB seedling pot.

2.2   Experimental Design

The experimental design below (Figure 1) shows the three different ratios of EFB, i.e 70%, 60% and 50%. Starch flour solution of 30%, 40% and 50% were used as binding agent. This study was determined the effectiveness of EFB Seedling Pot based on duration of seedling growth testing. For duration of seedling growth testing, observation was made based on 7 days, 14 days, 21 days and 28 days.

Figure 1: Experimental Design
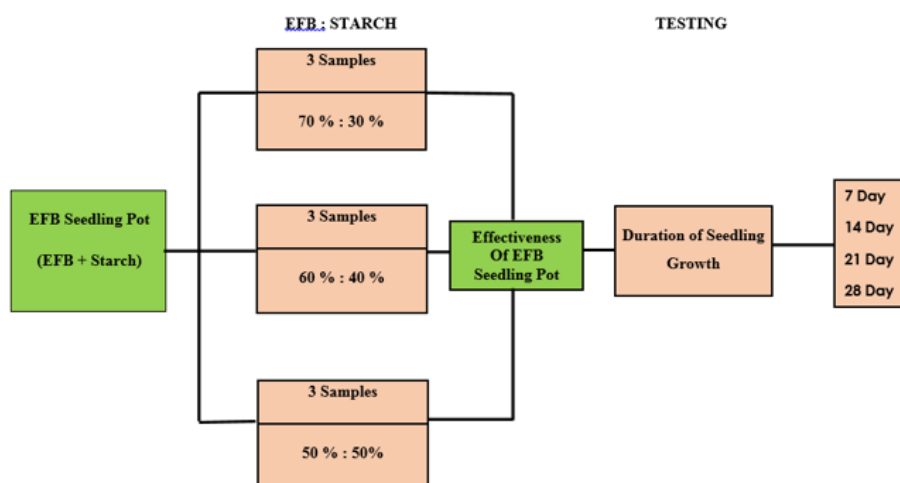
2.3   Flow Chart Process

The flow chart below (Figure 2) shows the process of seedling pot from empty fruit bunch (EFB) for seedling growth.

Figure 2: Flow Chart Process
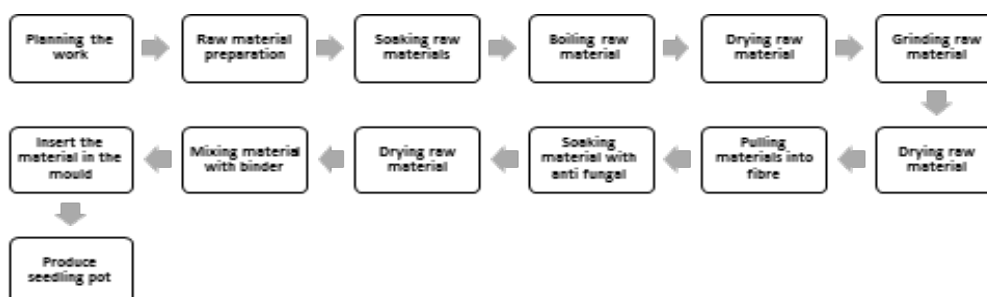
3. RESULT AND DISCUSSION

Based on 7 days, 14 days, 21 days and 28 days observation, the results showed that seedlings that were sown in EFB seedling pot with a ratio 70% : 30% managed to grow well within 2 weeks compared with ratio 50%:50% and 60%:40% (Figure 3). From Figure 3, after 28 days of sowing, it shows that the seed sown for 50%:50% have no growth development at all whilst for ratio 60%:40%, showed average seedling growth development with leaflet length of 2 to 3 cm, and for the 70%:30% ratio mixture showed the highest seedling growth with the longest leaflet length approximately 5cm.

The high percentage of EFB containing in the 70%:30% mixture allows the seedling to grow finely because of the higher nutrient content that is readily available in the EFB itself compared to 50%:50% and 60%:40% mixture.

Figure 3: Duration And Seedling Grow Development

i.   The first date of planting : 24 April 2018
      Duration for seedlings grow : 30 April 2018 (7 days)

50%:50%   60%:40%   70%:30%
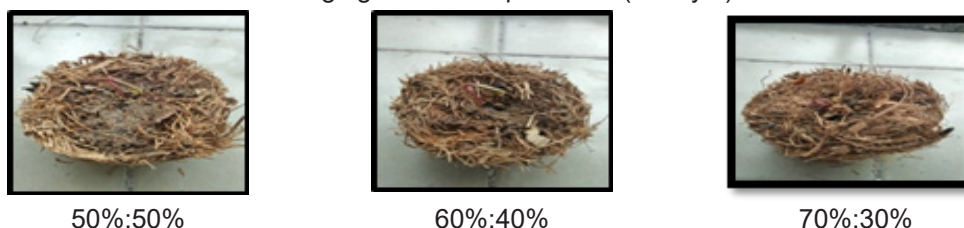
ii.   Duration for seedlings grow : 7 May 2018 (14 days)

50%:50%   60%:40%   70%:30%
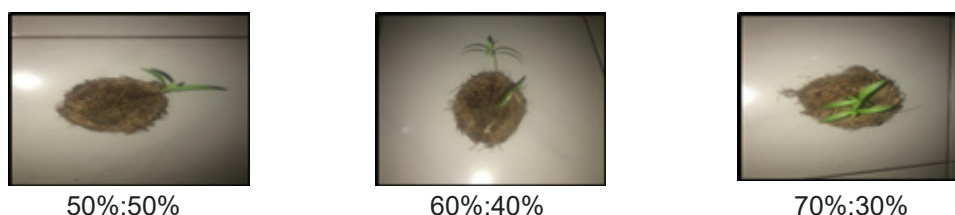
iii.   Duration for seedlings grow : 14 May 2018 (21 days)

50%:50%   60%:40%   70%:30%
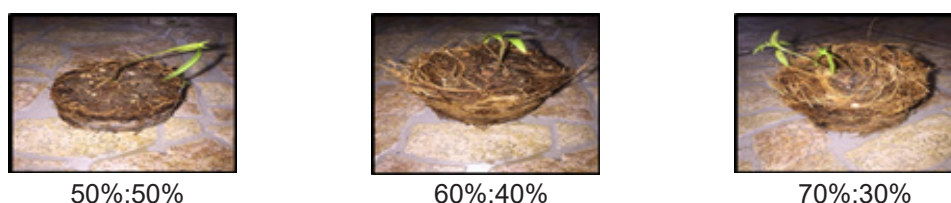
iv.   Duration for seedlings grow : 21 May 2018 (28 days)

50%:50%   60%:40%   70%:30%
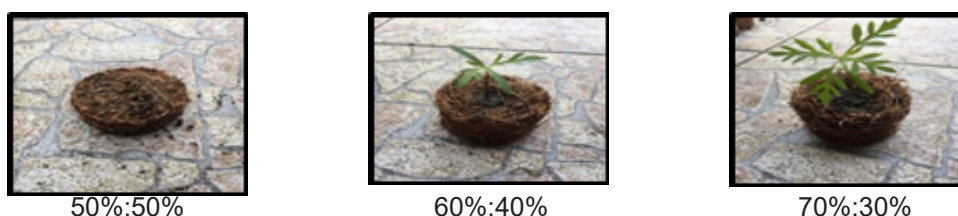
In order to observe the effectiveness of the seedling pod, a control method have been taken. In Figure 4, it shows the controlled normal seedling growth method that was planted in soil without EFB. On the other hand, the seedling that was sown in soil with the EFB waste shows an active growth development. Even the length of the leaflet in the pot with 70%:30% EFB to starch content shows the longest length of 5cm and the most leaflet quantity of 6 leaflets compared to the controlled pot with leaflet length of 3cm and leaflet quantity of 4 leaflets. Hence, the EFB seedling pod not only substituting the use of polybag in agriculture but also act as nourishment provider for young plants to grow.

Figure 4: The Growth Of Seedling

50%:50%   60%:40%
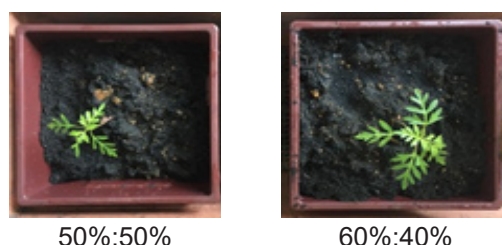
4. CONCLUSIONS

Overall, based on effectiveness of EFB Seedling Pot observation was found the EFB Seedling Pot has been successfully implemented according to the objectives. From the result, it shows that the EFB Seedling Pot is better than polybag available at the market. This is because, EFB Seedling Pot is a cheap resources, green technology product, suitable in plantation sector, composed in a short time, as fertilizer for plants, cheap EFB seedling pot price, long life services and lightweight.

Hopefully this EFB seedling pot can be used extensively in plantation sector with various sizes and design.

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EFFECT OF COUPLING AGENT ON MECHANICAL AND PHYSICAL PROPERTIES OF UNSATURATED POLYESTER-RICE HUSK-GLASS FIBER HYBRID COMPOSITES

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ABSTRACT

Hybrid composites are defined as the combination of hybrid materials and composite materials. Composite materials consists of two or more materials use different properties that are combined to make each other stronger. However, compatibility and interfacial properties between them are expected to be poor because of hydrophilic nature of lignocellulosic materials and hydrophobic of thermoset. Thus, incorporation of coupling agents in hybrid composite can improve on mechanical and physical properties of composites by improving the adhesion level between matrix and filler. In this study, unsaturated polyester (USP) hybrid composites were produced using rice husk (RH) as filler and glass fiber (GF) as reinforcing agent in USP matrix. Overall filler content is 40% and the size of the GF length is 3.2 mm. The ratio between RH and GF used is 100% RH, 50% RH / 50% GF and 100% GF. The two types of coupling agents were used 3-trimethoxylpropyl methacrylate (3-TPM) and 3-aminopropiltrietoksi silane (3-APE) at different percentages (1%, 3% and 5%) based on filler weight. In general, the increase of 3-TPM and 3-APE coupling agents for the treated composite can produce significantly to improve the mechanical properties of composites and it mainly on the use of 1% of the coupling agent content and subsequent increases (3% and 5%) where it can affect the mechanical properties of composites. The results also show that the use of the 3-TPM coupling agent is more appropriate/suitable in this study compared to the 3-APE coupling agent because the 3-TPM coupling agent gives more tensile strength, flexural strength and impact strength properties than the 3-APE coupling agent. This had been accomplished through the improvement adhesion of interfaces between fillers and matrix. All composite with coupling agents showed lower absorption and thickness swelling. The absorption and swelling decreased as the loading of the coupling agents was increased.

Keywords: Unsaturated Polyester, Rice Husk, Glass Fiber, 3-Trimethoxylpropyl Methacrylate, 3-Aminopropiltrietoksi Silane

INTRODUCTION

Nowadays, lignocellulosic as a natural resources have various applications in eco-friendly composite materials because they have many advantages, such as low cost, low energy consumption, low density, renewability, environmental safety, less abrasiveness to expensive moulds and mixing equipments, and especially biodegradable ability when compared to synthetic fibers (Rozman, 2000; Rassiah, 2016; Ishaya, 2014; Rozman, 2010). A number of different wood raw materials were used for composition board, ranging from logs to wood dust. Agriculture residues and non-wood materials such as rice husk, oil palm tree, bagasse, kenaf, bamboo, coir, sisal, and abaca are also of importance in various parts of the world (Hazlan, 2017; Abdul Khalil, 2006; Maloney, 1993). In the recent trends, lignocellulosic materials have been the subject of intensive investigations, either in replacing existing wood species in making conventional panel products or producing plastics composites.

The interesting trend in using non-wood materials has been induced by the growing demand for lightweight, high performance materials coupled with abundant supply of lignocellulosic fibers. However, the use of high-density inorganic fillers, such as glass fiber or mica in polymer composites also offers a wide variety of property improvements, particularly in ultimate strength of the material (Hazlan, 2017). Nevertheless, their incorporation may not be favorable in terms cost effectiveness on a volumetric basic. Hence, it would be possible to benefit both inherent characteristics of lignocellulosic materials and glass fibers by combining them in a composite to produce a composite which has more favorable balance of properties.

In producing a good lignocellulosic-thermoset composite, with regards to mechanical and physical properties, the main obstacle to be solved is the compatibility between reinforcement material and polymer matrix. The compatibility and interfacial properties between them are expected to be poor because of hydrophilic nature

of lignocellulosic materials and hydrophobic of thermoset. Many attempts have been carried out to improve the properties of the composites such as utilization of chemical reagents to enhance the interfacial properties between the constituent materials (Rozman, 2010; Imoisili, 2012; Ramli, 2011)) and addition of glass fiber as a counterpart with lignocellulosic material in the hybrid composite system. Incorporation of coupling agents in unsaturated polyester-rice husk-glass fiber hybrid composite can improve on the mechanical and physical properties of composites by improving the adhesion level between matrix and filler. Coupling agents can be hydrophilic and hydrophobic. This property will enable it to act as a bridge between the matrix and lignocellulosic filler.

In this study, rice husk used as a filler and glass fiber used as reinforcement materials in preparation of hybrid composites based on unsaturated polyester. The objective of this study to investigate the effect of coupling agents were used, which were 3-trimethoxylpropyl methacrylate (3-TPM) and 3-aminopropiltrietoksi silane (3-APE) on the mechanical and physical properties of hybrid composites.

EXPERIMENT

Materials

The matrix material used was commercially available unsaturated polyester (USP) Reversol P-9728P with acid value 15-25 mgKOH/g, specific gravity 1.1, non-volatile 52-56% and gel time 24-30 min. Chopped type E-glass fiber with 3.2 mm length glass fiber is used as a reinforcing agent in composite production. The coupling agents used to treatment the fillers are 3-trimethoxylpropyl methacrylate and 3-aminopropiltrietoksi silane.

Filler Preparation

The Retsch Test Sieve Model 5667, W. Germany was used to separating rice husk (RH) filler into different sizes. The filler size used in this study was of mesh 35-60, that is, 270-500 µm. Then RH is placed in the oven at 105 ° C for 24 hours.

Compounding and Processing

Coupling agents (3-APE and 3-TPM) used are in liquid form and for their use, these coupling agents are first diluted in ethanol to produce as much as 1 liter of solution where it is enough to soak the filler (RH and GF) for 24 hours . Then the filler (RH and GF) is put into the oven to remove all ethanol. Rice husk (RH), glass fiber (GF) and unsaturated polyester (USP) are then mixed by using the head-mixer 'Framo-Geratetechnik'. The ratio of RH: USP samples was used as 60:40 ratios calculated based on dry weight. The proportions of RH and GF for each of fibers loading as tabulated in table 1. The size of the fiber glass (GF) used is 3.2 mm long. The mixing process is performed for 15 minutes using a 400-600 rpm rotor speed. The mixture is transferred into a dimension of dimensions of 155 mm x 155 mm x 12 mm (length x width x thickness). The mixture is heated at 135 °C for 5 minutes at a pressure of 500 kg/cm2. Then the resulting composite is subjected to the cooling process for 5 minutes.

Table 1: The Proportion of RH and GF Ratios

Sampel	RH/GF Proportion	Sample Name
1	100%RH/0%GF	RH 100
2	50%RH/50%GF	RH 50 GF 50
3	0%RH/100%GF	GF 100

Testing

The board produced was cut into four types of test samples, namely, tensile, flexural, impact and water immersion tests. Tensile tests were carried out according to ASTM D3039 on samples with dimension of 100 mm x 12 mm x 5 mm (length x width x thickness) at a crosshead speed of 2 mm/min. The flexural test was conducted according to ASTM D790, that is, a three-point bending system. The samples with dimension of 80 mm x 12 mm x 12 mm (length x width x thickness) were tested at a crosshead speed 2 mm/min. The charpy impact test was carried out according to ASTM D256 on samples with dimension of 65 mm x 12 mm x 12 mm.

Water immersion test was conducted according to ASTM D570 and carried out by soaking all the sample in distilled water at temperature was set up at 30°C for 29 days. Water absorption was determined by weighing the specimens after immersion in water for a specific time (29 days). The water absorption at any time t (Mt) was calculated by using an equation (1)

$$M_t = \frac{W_w - W_d}{W_3} \times 100\% \qquad (1)$$

where W_d and W_w are the original dry weight and the weight after exposure to water for a 29 days, respectively. The thickness swelling (Tt) was calculated according to the formula based on an equation (2)

$$T_t = \frac{T_w - T_d}{T_d} \times 100\% \qquad (2)$$

where T_d and T_w are the original dry thickness and the thickness after immersion for 29 days, respectively.

RESULT AND DISCUSSION

Figure 1: Effect of Coupling Agent on the Tensile Strength of Hybrid Composites.
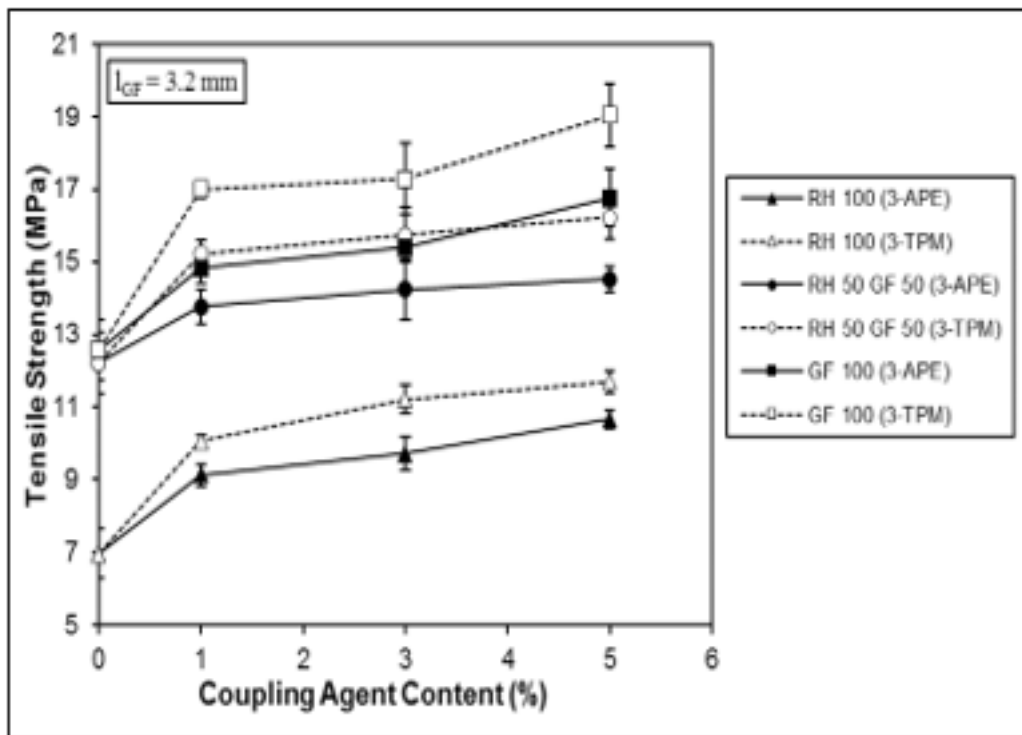
The results of effect of coupling agents on the tensile strength properties of hybrid composites are shown in figure 1. It is obvious that the strength of hybrid composites with coupling agents increases as the loading of the coupling agents is increased (compared to those without coupling agents), showing that the incorporation of coupling agent is able to enhance the tensile strength of the composites. Similar results were also observed in previous studies (Rozman, 2000; Rozman, 2010; Imoisili, 2012; Kushwaha, 2010; Tran, 2013) employing similar coupling agents. Composites with 3-TPM show higher strength than those with 3-APE for all filler ratios (100% RH, 50% RH / 50% GF and 100% GF). 3-TPM is believed to serve as a bridge with higher efficiency when compared with 3-APE to couple two distinct phases, RH/GF and polyester matrix. This may be due to the better interaction of the 3-TPM methacrylate group with the polyester matrix compared with the amino group in 3-APE (Rozman, 1998).

Figure 1: Effect of Coupling Agent on the Tensile Strength of Hybrid Composites.
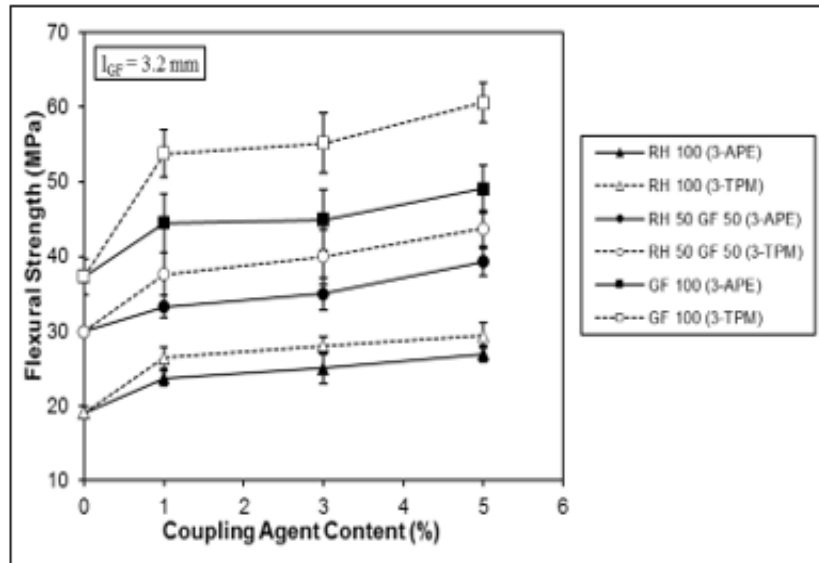
Figure 2 shows the effect of coupling agent on the flexural strength properties of hybrid composites. Identical observation as shown in tensile strength is evident, whereby flexural strength increase with increasing coupling agents loading. Hybrid composites with higher amount of GF show higher flexural strength with the presence of coupling agents. This observation is in line with previous studies (Sood, 2017; Tan, 2003). Comparatively, 3-TPM shows a better enhancement in flexural strength than 3-APE. This is understandable that a good filler-matrix interaction could be derived from the formation of the 3-TPM methacrylate group with the polyester matrix compared with the amino group in 3-APE.

Figure 1: Effect of Coupling Agent on the Impact Strength of Hybrid Composites.
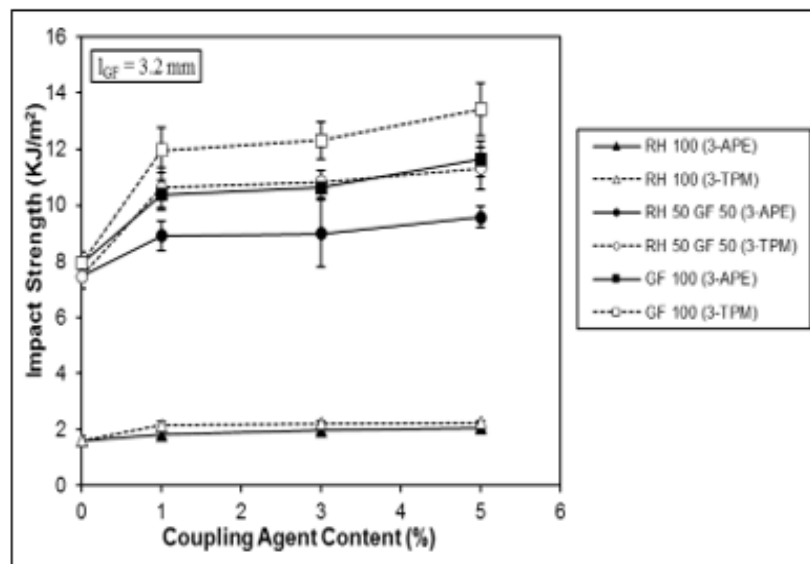
Figure 3 shows the effect of coupling agents on the impact strength properties of hybrid composites. It is obvious that GF has tremendous effect on the impact strength of hybrid composites with filler ratios (100%GF and R50%RH/50%GF) compared with filler ratio 100% RH. This shows that more efficient energy transfer has occurred as more GF are present in the polyester matrix. This again may be attributed to the higher aspect ratios which enable better transfer of stress from the matrix to the GF. As presented earlier, the incorporation of RH in the matrix has resulted in the reduction of stress transfer efficiency due to the irregular shape of the RH, which also affects the impact strength of the composites (Hazlan, 2017). Composites with 3-TPM show better improvement in impact strength than those composites with 3-APE. It again indicates that 3-TPM promoter better linkage between filler and polyester matrix. This situation explains the presence of a better interface adhesion between the filler and the matrix together with the addition of 3-TPM. 3-TPM plays its role as a coupling agent by increasing the spread of fibers with matrix and reducing the tendency of fibers to stack. This shows that more energy is required to thwart the composite as a result of the impression of the filler interface adhesion with a better matrix with the presence of a 3-TPM coupling agent. A similar pattern of results has been reported by previous studies (Rozman, 1998; Tan, 2003; Mohd Ishak, 1998).

Figure 4: Effect of Coupling Agent on the Water Absorption of Hybrid Composites.
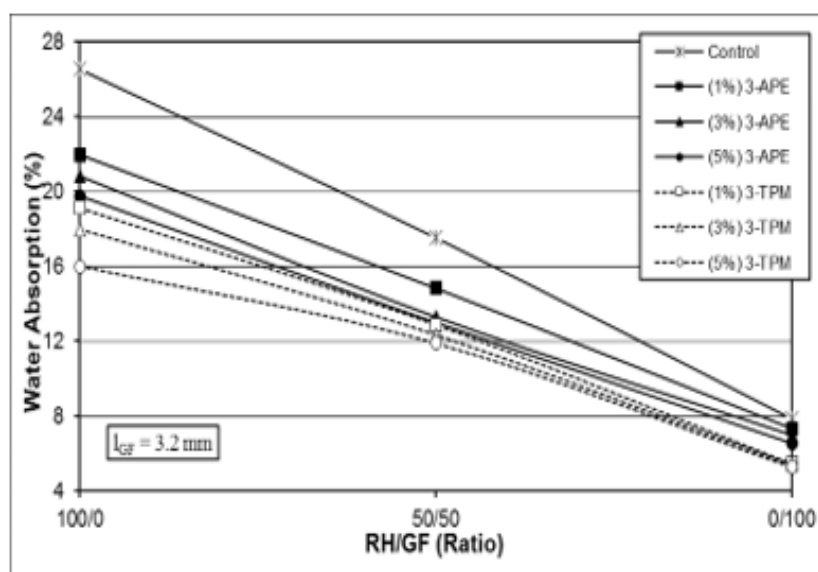
Figure 5: Effect of Coupling Agent on the Thickness Swelling of Hybrid Composites
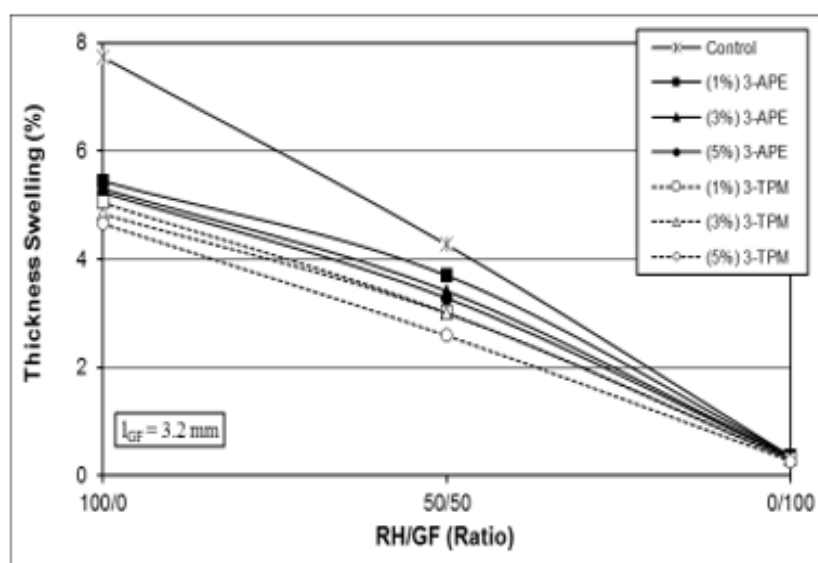
Water immersion test reveals the behavior of the composites when immersed in water, was significant with the percentage of water absorbed as shown in figure 4 and degree of the thickness swelling (figure 5). The results show that the percentages water absorption and thickness swelling decrease as the loading of RH is decreased or in other words as the loading of GF is increased. This is expected because RH being a lignocellulosic material that consists predominantly of cellulose, lignin, and hemicellulose may readily absorb water into its cell wall through the formation of hydrogen bonding between its OH groups and the hydrogen from water. The absorption of water into the cell wall would subsequently result in the swelling of the cell wall. This phenomenon is reflected in the changes in the thickness of the composites. Figure 4 and 5 also shows, the percentages of water absorption and thickness swelling of the hybrid composites decrease as the amount of coupling agents added is increased. Thus, composites with 3-TPM exhibit higher hydrophobicity than those without coupling agent or added with 3-APE. This may has been reduced as a result of the interaction between 3-TPM and hydroxyl groups from fillers, and the hydrophobicity imparted by the polyester chain of 3-TPM.

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EVALUATION OF OUTPUT VOLTAGE PERFORMANCE BY USING GENERAL PURPOSE DIODE AND SCHOTTKY BARRIER DIODE IN FULL-WAVE RECTIFIER CIRCUIT

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ABSTRACT

This paper presents the voltage performance of rectifier circuit between general purpose diode and Schottky barrier diode of full-wave bridge rectifier circuit by using resistive and inductive load. This study focuses on the voltage perform the effect of diodes and to make a comparison between RMS voltage and peak voltage value for both circuits and the effect of diodes. This study focuses on single phase 240V AC supply, where the frequency is 50Hz. The evaluation of output voltage performance using general purpose diode and Schottky barrier diode in full-wave rectifier circuit. Besides that, the parameters for the analysis are based on the output waveform, the peak and RMS value of voltage. The instrument for measuring the parameter is depend on measuring technique by using voltmeter an oscilloscope. In addition, this study used method of simulation by using Multisim software. The results found that the overall voltage performance by using general purpose diode and Schottky barrier diode in full-wave bridge rectifier circuit.

Keywords: Output Voltage, Full-wave Rectifier, General Purpose Diode, Schottky Barrier Diode

1.0 INTRODUCTION

This study focuses on the voltage performance of rectifier circuit between general purpose diode and Schottky barrier diode by using Bridge Rectifier technique. By definition, the rectifier circuit is the method to change the (Alternate current) AC voltage source to (Direct current) DC voltage source. The most important component used in rectifier circuit is passive and active components whereas the most popular component used are diodes [1][13- 14]. To design rectifier circuit, there are six characteristics that can be following to [3]:

1. Waveform of the load current
2. Regulation of the output voltage
3. Rectifier efficiency
4. Peak value of current in the rectifier circuit
5. Peak value of voltage across the rectifier element in the reverse direction
6. Ripple factor

The bridge rectifier technique is one of the best methods that can produce the voltage or current in purely DC because the average current in the AC source is zero. Besides that, this technique can produce less ripple in output waveform when compared to half-wave rectifier [6]. Diode also is used in the converter for passive power factor improvement [19]. The function of passive power factor improvement is similar to low pass filter; in which it will filter out all the harmonic contents (ripple) in the circuit [4]. The purpose of this study is comparing the value of voltage in RMS and peak value between both circuits and thus we can determine the effect of diodes to variety resistive and inductive loads. The combination of series resistive and inductive loads model is referring as a DC motor drive circuit or battery charger [15]. The voltage and current for resistive loads is in phase which the power factor is 1 (unity). Thus, the load does not contribute the ripple in rectifier circuit. Meanwhile the current for Inductive loads is lagging 900 with the voltage [11], when this happen the ripple in rectifier circuit will increase and can become the poor power factor.

1.1 GENERAL PURPOSE DIODE

A general purpose diode is formed between PN type junctions of semiconductor, which allows the flow of current in one direction only. The breakdown voltage (VR), typically of the order of 200 to 1000 volts and the forward voltage drop (Vf) of a rectifier diode is between 0.7 to 0.9 V [7]. This type of diode is also reacting as a bipolar device and can be used in high frequency.

Figure 1: IV characteristics of general purpose diode [5][14]
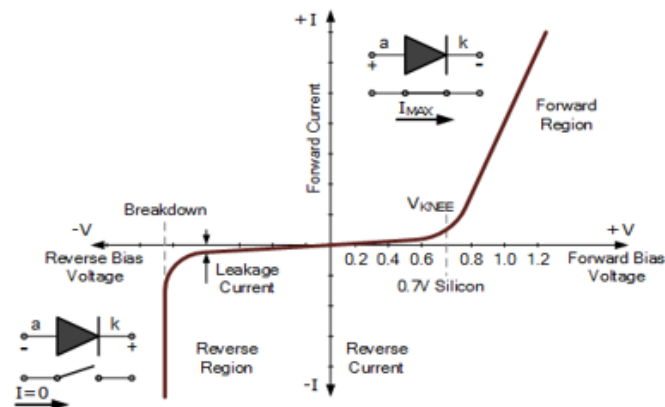
From the Fig. 1 above the depletion region of forward bias for general purpose diodes is greatly reduced allowing current to flow through it in the forward direction, and when reverse biased the diode resistances are very large and it does not allow current to flow through it [12].

The operation of biasing in this diode using an external voltage to either forward or reverse bias it decreases or increases respectively the resistance of the junction barrier. Thus the voltage-current relationship (characteristic curve) of a diode is influenced by the resistance value of the junction. The general purpose diode is a nonlinear device so its DC resistance will vary with both the biasing voltage and the current through it.

1.2 SCHOTTKY DIODE

A Schottky diode is formed with N type junction of semiconductor to the metal plate. This diode mainly used for low voltage circuit because forward voltage drops of Schottky diode (Vf) is less than a general purpose diode, typically in the range of 0.25 to 0.5V. Besides that, this diode is reacting as a unipolar device (no holes' movement in the opposite direction). So, it does not have much reverse leakage current and can be used in high frequency [7].

Based on Fig. 2, the general shape of the IV characteristics for Schottky diode is very similar to that of a general purpose diode, except the corner or knee voltage at which the junction diode starts to conduct is much lower at around 0.4 volts.

Figure 2: IV characteristics between Schottky diode and General Diode [5][8]
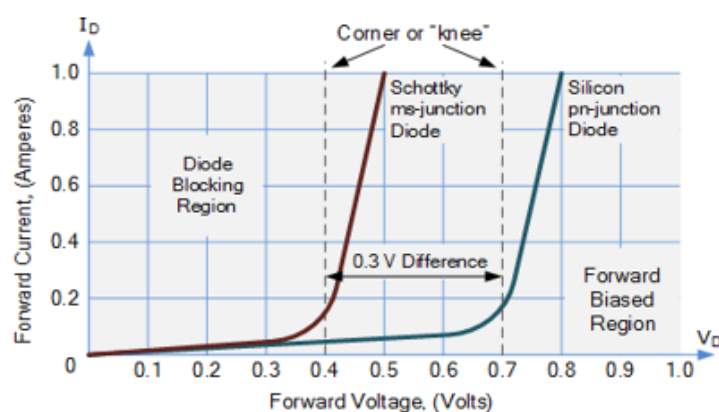
Due to this lower value, the forward current of a silicon Schottky diode can be many times larger than that of a typical general purpose diode, depending on the metal electrode used. By referring to Ohm's law the power equals voltage times with current, (P=I×V) [9] so a smaller forward voltage drops for a given diode current, ID will produce lower forward power dissipation in the form of heat across the junction. This lower power loss makes the Schottky diode a good choice in low-voltage and high-current applications such as Dc motor or battery charging in laptop.

2.0 RESEARCH DESIGN

Fig. 3 shows the process which is adapted in this paper for simulation purpose. In designing a circuit, there are three (3) stages that need to be considered. The first stage is, from the power source which enables electrically operated equipment to be connected to the alternating current (AC) in any premises or buildings. In the status quo, the voltage will be extremely high for electronics appliances in spite of the difference in connectors, shape or voltage and current rating of the electrical plugs. Before going to the second stage the value of AC source will be step down by using a transformer. The second stage is known as the converter. The converter will change the alternating current (AC) source to direct current (DC) sources which is certifiably known as a full-wave rectifier [6]. In this stage, the rectifier uses is bridge circuit. Stage three (3) is the final stage in this simulation which the considered of the variety resistive and inductive loads.

Figure 3: Block Diagram of simulation circuit
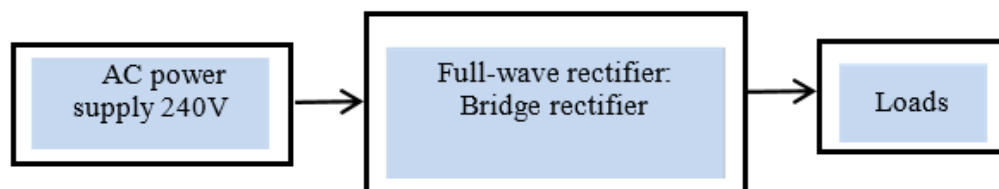
3.0 RESULT AND ANALYSIS

3.1 BRIDGE RECTIFIER BY USING GENERAL DIODE (IN4001)

Figure 4: IN4001 Bridge Rectifier Circuit
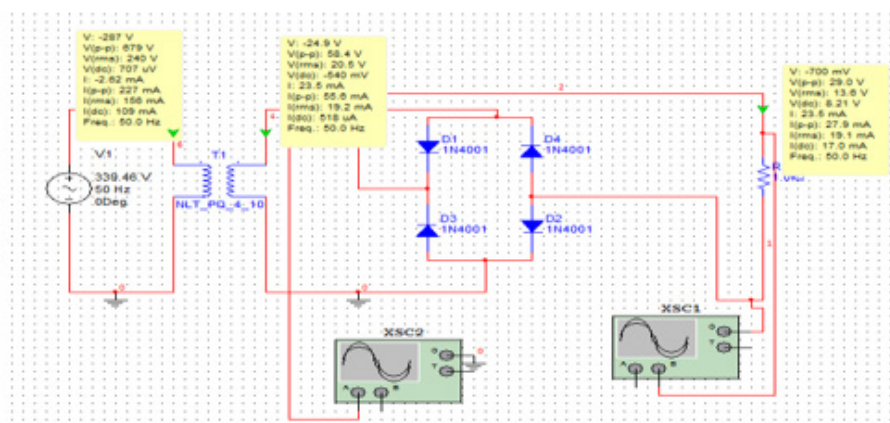
Figure 4a : Output voltage when R=1KΩ
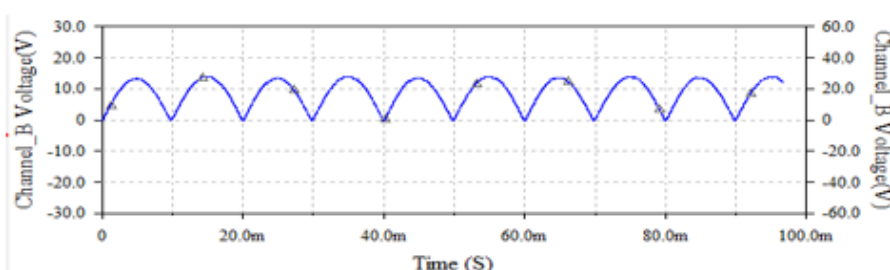
Figure 4b: IN4001 Bridge Rectifier Circuit
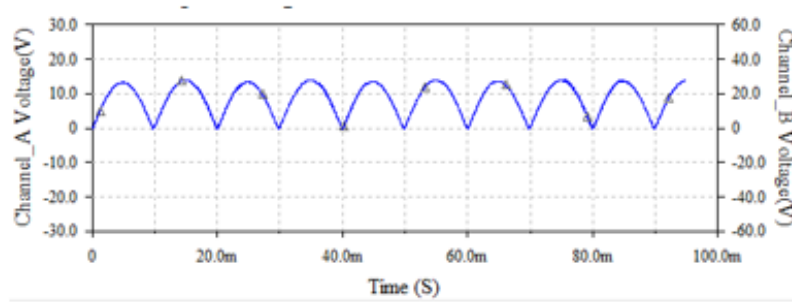
Figure 4c : Output voltage when R=1KΩ
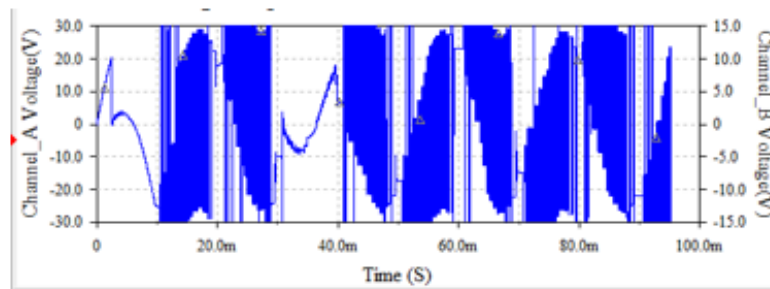
Table 1: Summary of Bridge Rectifier by using IN4001

Types of diode	Load Resistor (ohm)	Load Inductor (mH)	VRMS (V)	VPP (V)
General	1000	0	13.6	29
purpose	1000	20	13.7	29
IN4001	22	220	19.5	53.9

Based on the Fig.4a, 4b, 4c and Table 1 above, when the impedance value is adjusted, the value of output RMS voltage (VRMS) and peak to peak voltage (VPP) is changing. When the value of inductive reactance bigger than resistance the output of general purpose diode become bigger and has a distortion. This happened because the inductive load produces a harmonic for the circuit. The harmonic distortion is the total voltage ratio divided by the fundamental voltage harmonic [12]. Besides that, distortion happened because the switching process between D1, D2 and D3, D4 is slow.

3.1 BRIDGE RECTIFIER BY USING GENERAL DIODE (IN4001)

Figure 5: IN3882 Bridge Rectifier Circuit
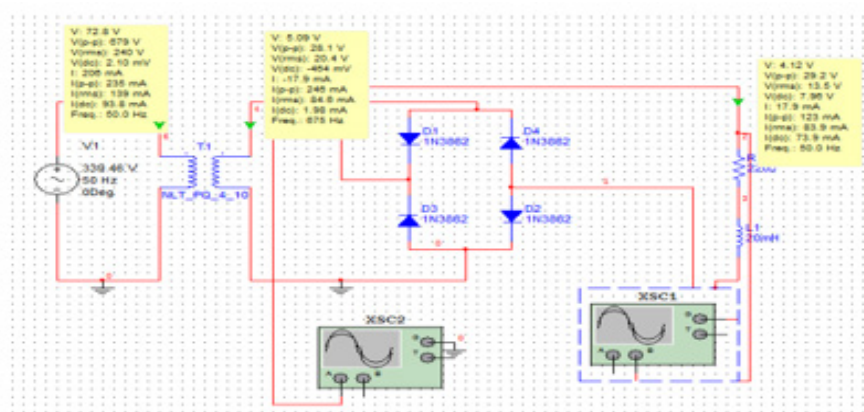
Figure 5a: Output voltage when R=1KΩ
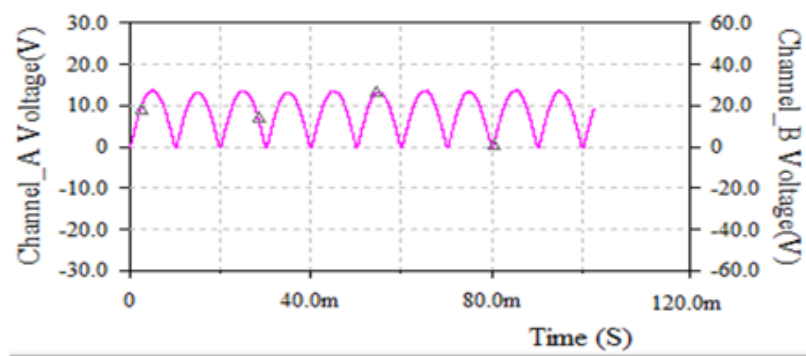
Figure 5b: Output voltage when R=1KΩ
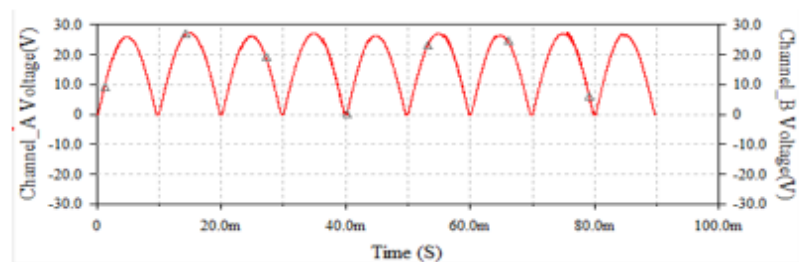
Figure 5c: Output voltage when R=22Ω and L=220mH
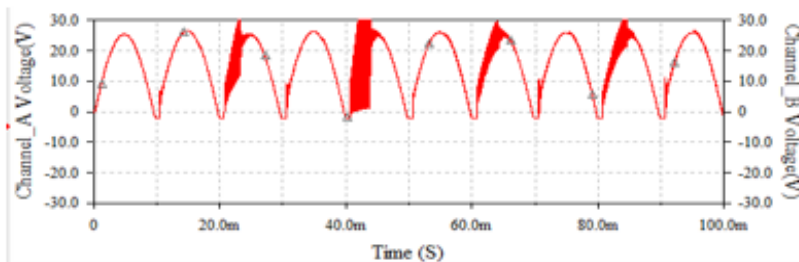
Table 2: Summary of Bridge Rectifier by using IN3882

Types of diode	Load Resistor (ohm)	Load Inductor (mH)	VRMS (V)	VPP (V)
General	1000	0	13.5	29.3
purpose	1000	20	13.6	25.8
IN3882	22	220	8.67	24.5

This analysis shows a rectifier circuit with diode IN3882 is incorporated in this design. Based on the results in Fig. 5a, 5b, 5c and Table 2, it can be concluded that the reading of VRMS and VPP has become lower compared to the reading using the diode IN4001. The ripple still same like before which when the value of inductive reactance larger than resistance the ripple will appear at the output waveform but by using this type of diode the ripple is much better.

3.3   BRIDGE RECTIFIER BY USING SCHOTTKY (BAT54)

Figure 6: BAT54 Bridge Rectifier Circuit
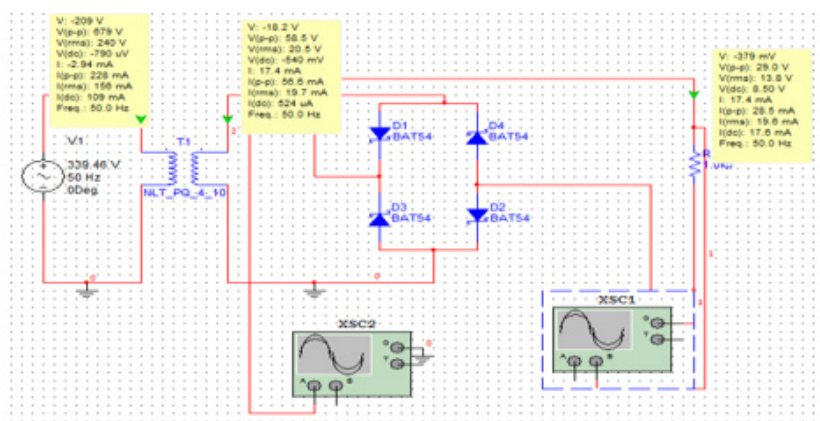
Figure 6a: Output voltage when =1KΩ
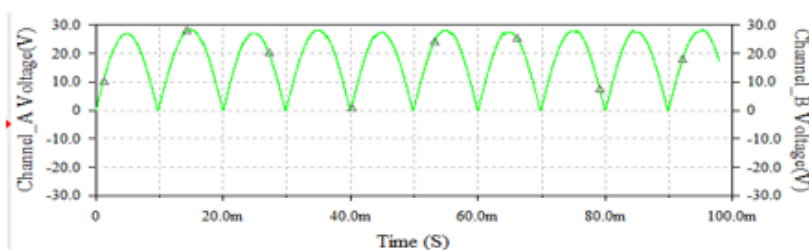
Figure 6b: Output voltage when R=1KΩ and L=20mH
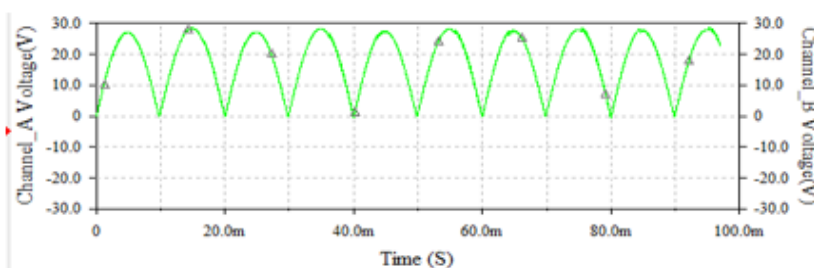
Figure 6c: Output voltage when R=1KΩ and L=20mH
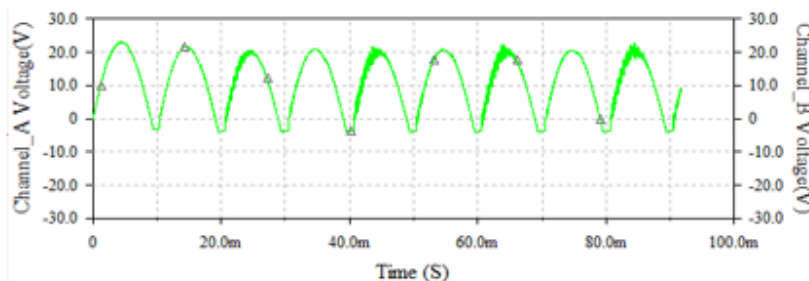
Table 3: Summary of Bridge Rectifier by using Schottky BAT54

Types of diode	Load Resistor (ohm)	Load Inductor (mH)	VRMS (V)	VPP (V)
Scoktty	1000	0	13.8	29
BAT54	1000	20	13.9	25
	22	220	11.8	30.6

Based on the Fig.6a, 6b, 6c and Table 3, it can be concluded that the reading has been significantly improved as compared to the previous method (when inductive reactance larger than resistance). The VPP value is tally with the theory result. By using formula $V_{RMS} = 0.707 \times V_P$ [5][20] the VPP is equal to 33.38V.

3.4 BRIDGE RECTIFIER BY USING SCHOTTKY (BAS82)

Figure 7: BAS82 Bridge Rectifier Circuit
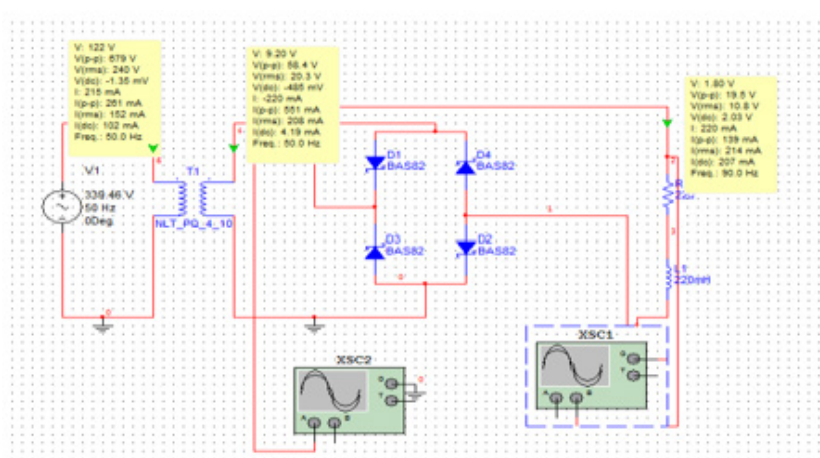
Figure 7a: Output voltage when R=1KΩ
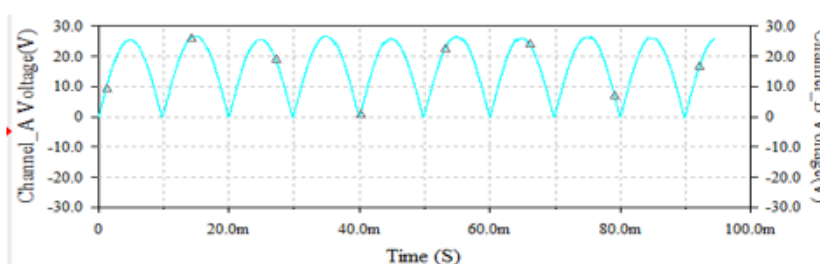
Figure 7b: Output voltage when R=1KΩ and L=20mH
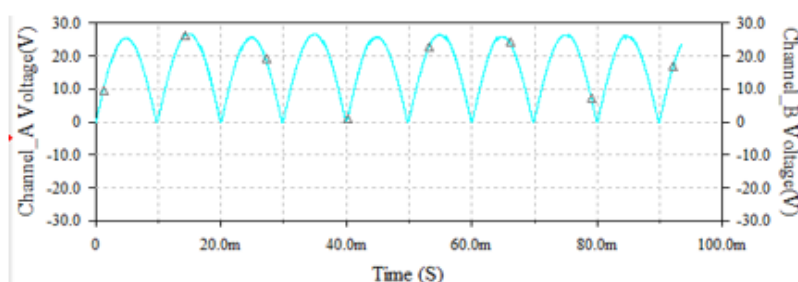
Figure 7c: Output voltage when R=22Ω and L=220mH
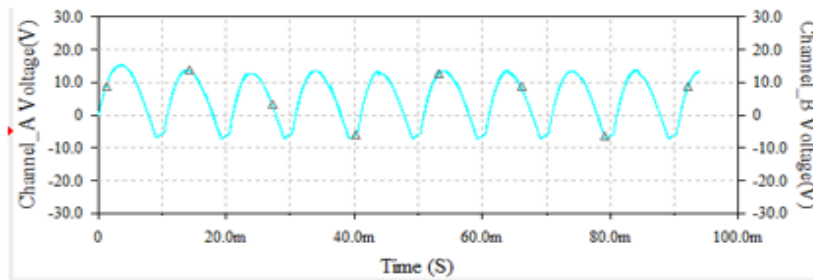
Table 4: Summary of Bridge Rectifier by using Schottky BAS82

Types of diode	Load Resistor (ohm)	Load Inductor (mH)	VRMS (V)	VPP (V)
Schoktty	1000	0	13.5	29.3
BAS82	1000	20	13.5	29
	22	220	10.8	30.5

For the final analysis, the method for rectifier using diode BAS82 is introduced. In this method, the results from Fig. 7a, 7b, 7c and Table 4 is approximate with diode BAT54. All reading is constant and tally with the theoretical result.

Table 5: Summary of Bridge Rectifier

Types of diode	Load Resistor (ohm)	Load Inductor (mH)	VRMS (V)	VPP (V)
General	1000	0	13.6	29
purpose	1000	20	13.7	29
IN4001	22	220	19.5	53.9
General	1000	0	13.5	29.3
purpose	1000	20	13.6	25.8
IN3882	22	220	8.67	24.5
Schoktty	1000	0	13.5	29.3
BAT82	1000	20	13.5	29
	22	220	10.8	30.5
Schoktty	1000	0	13.8	29
BAT54	1000	20	13.9	25
	22	220	11.8	30.6

Table 5 is a summary of Bridge Rectifier between General Purpose Diode and Schottky Diode. The Schottky rectifier method solves the issues of ripple when the value of inductive reactance larger than the resistance. From the simulation findings, it can be concluded that Schottky diode can reduces the reading of ripple in comparison to the previous methods (using general purpose diode). In compliance to this, these two methods can produce an output voltage but the result were difference when the value of inductive reactance larger than resistance. For the general purpose diode, the voltage drop is bigger compare to Schottky diode. In this paper both circuits are supplied with power from a 20V DC power source. This was happening because the general diode consumes 0.7V and leaving only 13V to power the load. With its lower forward voltage drop, the Schottky diode consumes 0.3V and leaving 17V to power the load. If our load required 15V then only the Schottky diode would be up for the job [10]. Based on this for better efficiency of output, the voltage drop should be less [16].

4.0 CONCLUSION

In this paper, the voltage performance of rectifier circuit between general purpose diode and Schottky barrier diode by using Bridge Rectifier technique has been presented. It can be concluded that the performance of Schottky diode is more stable and suitable to apply for linear (resistive load) and nonlinear (resistive and inductive load) load. The Schottky diode is better than general diode because of two differences. First the turn on voltage of Schottky diode is less than general diode and secondly the switching process of Schottky diode is due to the injection of majority carriers over a potential barrier [8]. The most effective diode to amend the output voltage performance has been discussed in this paper.

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DEVELOPMENT OF LED CONE FOR ROAD USERS

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ABSTRACT

Traffic cones are device used to divert traffic temporarily. Normally, the cones are bright in colour such as red, yellow and orange to attract road user attention so that they will be more cautious. Nevertheless, the cones are deemed slightly ineffective due to two major reasons. Colours does not effectively catch the road user's attention such that they are unaware of the cones' presence. The problem worsens during night time when vision is limited and causes the road user to accidentally hit the cones. During heavy rain, visibility is also poor. Secondly, the cones may easily move from its original position due to strong wind and heavy rain. Further improvement needs to be done to enhance the functionality of the cones. The use of LED lights and the addition of rubberise base are possible enhancement to the cones. This study examines the effectiveness of LED lights and rubberise base in addressing the above problems. The modified cones (also known as Supermoon cones) with the LED lights and the rubberise base were tested at several sites. A questionnaires was conducted to assess the effectiveness of the Supermoon cones. Results indicated that the cones are effective in attracting the road user's attention even at a very far distance. The cones are found to be stationary and not easily displaced from the original position.

Keywords: Output Voltage, Full-wave Rectifier, General Purpose Diode, Schottky Barrier Diode

1.0 INTRODUCTION

Traffic cones are usually used during road work for the purpose of diverting the traffic flow or providing traffic caution or traffic prevention. At times, safety cones are placed around the work area to prevent public vehicles from entering the work area. These cones also act as road guides and markers. It will be arranged in accordance with the instructions set by the local authorities [1]. Among the numerous traffic signs, traffic cone is a very important mark used to guide cars where to go [2].

Traffic cones wasinvented by Charles D. Scanlon, an American citizen who first came up with ideas while working as a painter for the Street Painting Department of the City of Los Angeles. The coneswas used at that time to indicate if a child is playing or if there is an object blocking the path [3].

Traffic cones, also known as poles, road cones, safety cones, or construction cones, are of conical shape. They are usually placed on highways or pedestrian areas as markers to redirect road users to safer lanes during maintenance or road work in progress. The design of a road cones vehicle is targeted to be simple, efficient and reliable. It is able to be isolated quickly from the incident scenes to avoid harsh traffic jams, decrease traffic injuries, and it has played a key role that prevents the traffic situation from getting worse [6]. Some cones may be placed to warn of significant hazards, and others for non-hazardous purposes [7]

Traffic cones are also commonly used to separate or connect route during road construction or road accidents for the safety of road users. Traffic cones are designed to be highly visible and portable. Road users understand that safety cone is a warn of a hazard of some kind, which was to be avoided [8]. Cone sizes varies ranging from about 30 cm (11.8 in) to over 1 m (39.4 in). The cones are designed with several colours, such as orange, yellow, red and others. However, orange, yellow and red are the most commonly used colours due to their brightness and high visibilty. Despite these bright colours, the cones fail to attract or catch the attention of road users, thus making them unaware of the cones' existence [8]. The situation worsen at night where the vision is limited such that the road users may accidentally hit the cones [9]. During windy heavy rain, traffic cones may easily move by the strong wind whilst the visibility is also poor due to the rain. Thus, the tendency of road users to accidentally hit the cones is high. Traffic signs recognition is a basic task for autonomous vehicle [10].

As mentioned earlier, the current cones has several weaknesses, i.e. (i) visibility impairment during night time and heavy rain, and (ii) the cone movement due to wind. Therefore the existing cones need to be improved to address the problems. Light-Emitting Diode (LED) was introduced to enhance the cone visibility during night time as well as during heavy rain. The LED attached to the cones (known as Supermoon cones) will lit to glow in the dark. In addition, the LED has a rubber mix that is waterproof and can be used during heavy rain.The LED cones will be arranged in the extended position by connecting all cones with the same wire. The cones were also added with rubberise base to prevent from slipping. It will be tested with conventional traffic cones in terms of visibility. From the results, it was found that LED lights can be used as a warning signal traffic control and can function to prevent accidents.

2. METHODOLOGY

In general, the methods used to complete the project are divided into several stages, starting from the design process of the Supermoon cones to testing of product usability. A survey was conducted to collect information on the functionality of the Supermoon Cones and normal cones.

Figure 1: Flowchart of producing the LED Cones
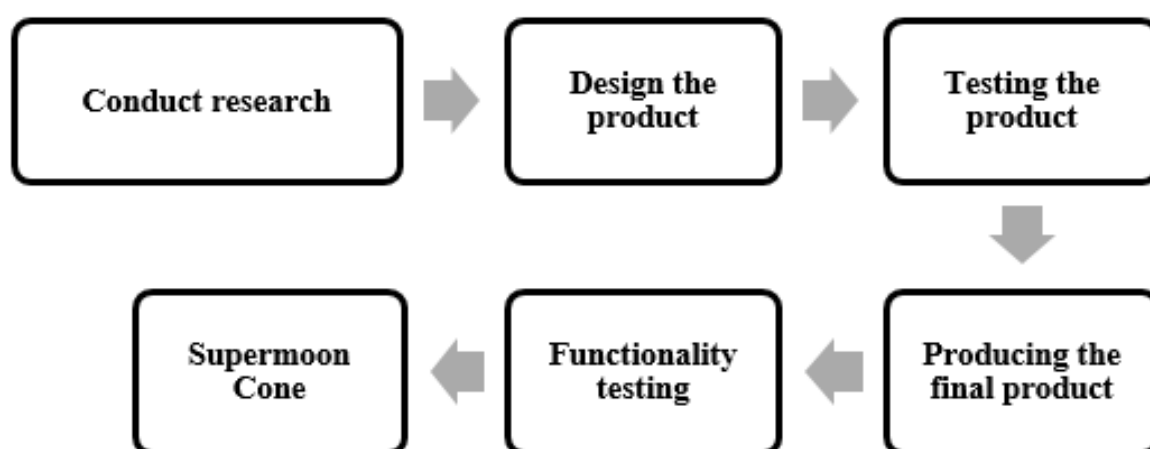
Figure 2: LED Cone process
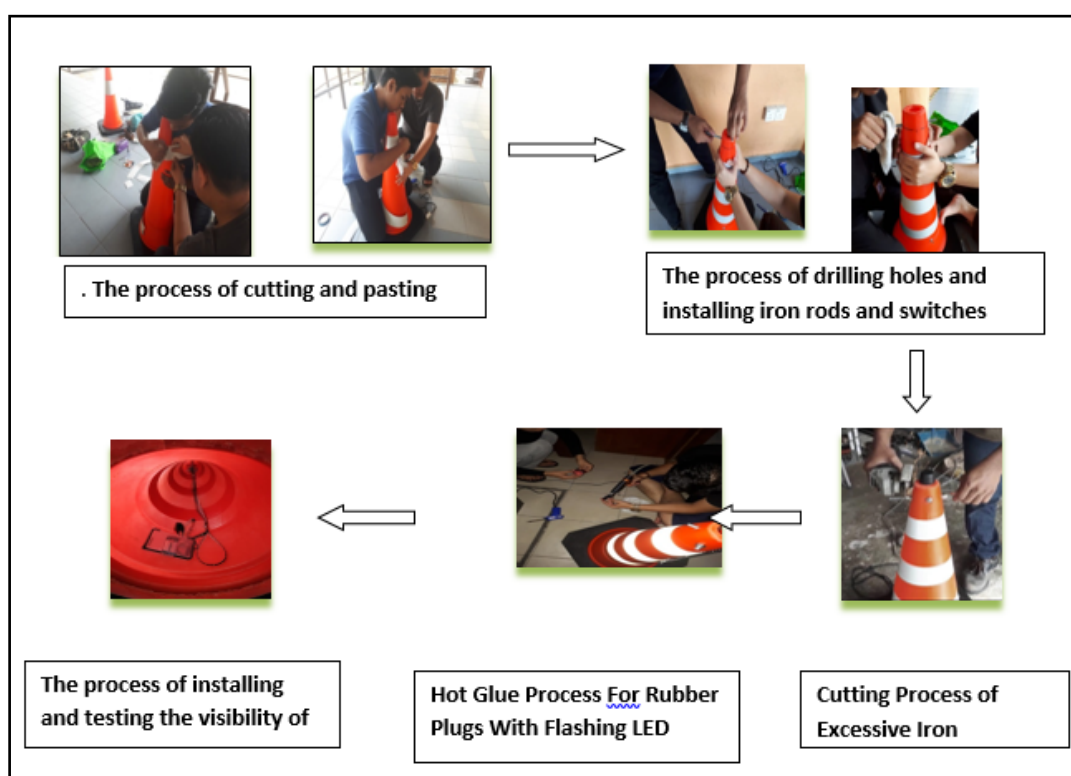
3. RESULTS AND DISCUSSIONS

The data analyzed in response to the survey were conducted to road users and construction workers.A total of 60 sets of questionnaires were distributed and answered by respondents. Respondents were expected to answer the questionaires based on the Likert scale set in Table 1. The effectiveness of the cones were measured according to score set in Table 2. The data collected from the respondents will be quantitatively processed using Statistical Packages for The Social Science (SPSS) version 19 software. The results of the analysis performed on the questionnaire are presented in the form of bar graphs and tables.

Table 1 : Minimum Score

Likert Scale	Category
1	Strongly disagree
2	Disagree
3	Agree
4	Strongly agree

Table 2 : LED Cone's effectiveness and safety

Minimum score range	Category
3.00-4.00	High
1.50-2.99	Moderate
0.00-1.49	Low

Analysis of the Results

The data from the questionaires was analyzed based on two sections. Section A covers on the demographic of the respondents which consisted of sex, race, age and types of vehicle used. Section B focuses on the functionality of the cones addressing 8 items of the questionaire, i.e. visibilitydistance, suitability for night use, safe material, not easily displaced from position, LED appearance as glowing in the dark, the products brightness when LED flashing, road user's alertnessto the cones, and the appropriateness of the cones usage. Section B was analyzed based on the mean score ranging from low, medium and high rating.

Bar Chart 1 : LED Cone Rating
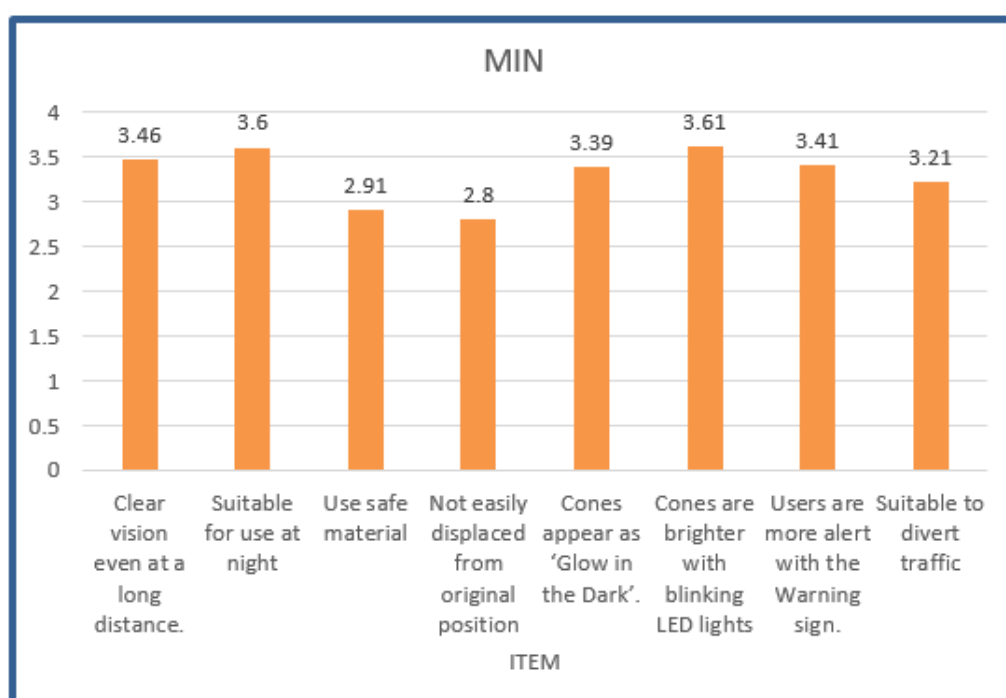
Table 3 : Section B Minimum Score

	Item	Rating	Level
	Clear vision even at a long distance.	3.46	High
	Suitable for use at night.	3.6	High
	Use safe material.	2.91	Moderate
	Not easily displaced from original position.	2.80	Moderate
	Cones appear as'Glow in the Dark'.	3.39	High
	Cones are brighter with blinking LED lights.	3.61	High
	Users are more alert with the Warning sign.	3.41	High
	Suitable to divert traffic	3.21	High
	Average	3.30	High

Based on Bar Chart 1, the average overall mean score reached 3.30. The highest score started with item 6: brighter with blinking LED lights (3.61), followed by item2: suitable for night use (3.60), then item 1: by clear vision at long distance (3.46), item 7: users are more alert (3.41), item 5: glow in the dark (3.39), item 8: suitable to divert traffic, item 3: use safe material (2.91), and lastly item 4: not easily displaced (2.80). Six of the items are having high scores (above 3.0) whilst the remaining items having moderate scores (1.50-2.99). The results indicated that all items in the questionnaire are above the mean score of 2.0.

4. CONCLUSIONS

In conclusion, the LED Cones (Supermoon Cones) can be considered as effective traffic cones capable of catching the road user's attention as well as not easily displaceable. The cones are suitable to divert traffic, made from safe material, can be seen at far distance, are brighter when blinking, users will be more alert, and function as glow in the dark, thus give many more benefits to road users.

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THE DEVELOPMENT OF INTEGRATED INCUBATOR WITH HUMIDITY AND EMBRYO DETECTION (IoT)

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ABSTRACT

The technological advancement play important role in the modern agroindustry production as to ensure the continuously supply for meat and eggs to the consumers. Artificial methods have been used to increase the production and hatching rates. This project consist of the development of an incubator with the ability to display and gather information for four main parameters of the incubation process such as the temperature and humidity, egg rotation, retain oxygen levels and removal of carbon dioxide gas produced. With latest internet technology and electronic devices, the data monitoring using the integrated incubator will improve the hatching rates and contribute information for correction and enhancement of real-time entries. From the integrated prototype egg incubator build, all of these factors can be supervised via the cloud server and the automation of the system really assist the user to perform an optimum incubation monitoring process with high hatchability rates. Results revealed that the integrated prototype functioned according to the designed and predetermined set point operating temperature, humidity, egg turning, and ventilation.

Keywords: Incubator, Integrated, Monitoring, Humidity and embryo detection, Internet of Things (IoT)

1.0 INTRODUCTION

Global meat production has increased rapidly over the past fifth decades, with 317.85 million tons meat production in 2014 (4 – 5 fold since 1961). Corresponding to the demand of meat production, Asia is becoming the largest meat producer covering around 40 – 45 percent of total meat production. At the global level, the dominant livestock types are poultry with 8.92 million in 1961 and 109.02 million in 2013. The production of poultry meat increased almost 100.1% (Hannah & Max, 2017). Indonesia has the highest poultry livestock with 1.77 billion and Malaysia with 339.80 million livestock in 2014. Among the poultry livestock, demand for chickens doubled in these two decades (OECD, 2015).

In order to meet the high demand for poultry meat, improving the hatchery techniques and provide more fertile eggs are essential to maximize chick production. The aim of this paper, is to describe the development of integrated incubator for maximizing the hatchability of healthy chicks and monitoring the main incubation parameters by connecting the incubator system to the internet (internet of things) IoT. The design of this incubator is following a framework of critical success factors for a new product development process. Critical success factors (CSF) are the factors that are necessary and guarantee commercial success comprising from new product strategy, idea generation, screening and evaluation, development, and testing (Nadia Bhuyian, 2011).

A fertile egg should contains living cell that can become a possible embryo and then a chick. Hatchability will decrease if the eggs are damage, poorly handled or expose to extreme hot and cold in transit. According to Gregory and Cartwright (2000) the egg quality and embryo survival are influenced by hen and sire's age, ratio, health, genetics, nutrition, and stress. According to Jeffrey et al. (2008), the key environmental factors that are needed for artificial incubation are: temperature, humidity, airflow, position (turning), and sanitation (Jeffrey, Martin, & Fanguy, 2008).

An incubator is basically an identical cabinet box that hold the poultry eggs. In this project, the artificial incubation technique comes with a chamber in which temperature, humidity, ventilation, and poultry eggs tray position are controlled by programmable logic controller for the purpose of hatching a large number of healthy eggs at a time. Riding on the wave of forth industrial revolution, the incubation system for this project is connected to the internet for the purpose of monitoring and internet enabled activities.

Best incubation period to hatch time for chicken is 21 days, maintaining the temperature at 37.5 degree Celsius will gives better hatch result. Setting manually for the previous incubator, the temperature is checked twice per day and relative humidity is set at 55 – 60 percent. If the humidity in the incubator is too high or too low the hatch will fail. The balance combination between the temperature and humidity during incubation process will result larger air cell of the poultry egg. Optimal physical incubation conditions benefit egg hatchability, quality chicks with possible survival and performance benefits (Boleli et. al, 2016). Throughout the incubation process, chicken eggs lose 12 to 14 percent of their total weight to evaporation. Therefore, to examine the problems with humidity and evaporative lose, we can weigh the racks of eggs during incubation before a hatch is destroyed.

According to Robinson (2013), egg-turning failures may reduce the formation of embryonic fluids, as well as the formation and growth of embryonic annexes, hindering embryonic and fetal development. Different species of poultry have different incubation periods (Gregory & Cartwright, 2000). Incubating different species together in the same incubator is not recommended. Table 1 below show the incubation period to hatch time for common birds.

Table 1 Incubation period to hatch time for common birds

Poultry Types	Incubation conditions			Hatcher
	Days	Temperature °C	Humidity %RH	Transfer day
Chicken	21	37.5	58	18
Duck	28	37.5	58 - 62	25
Goose	30	37.5	62	27
Japanese quail	17	37.5	58 - 62	15
Bobwhite quail	23	37.5	54 – 58	21
Turkey	28	37.5	54 - 58	25

In the half decade, the artificial egg incubation systems have experienced a scientific, commercial, and social evolution. Remarkable internet technology development and advance controller allowed the transition from manual incubation to large automation and integration incubation machines and hatcheries. This incubation technology, increasing the hatching rates with less labor, and improving the operational costs especially energy and water expenses to maintain necessary incubation processes.

2. METHODOLOGY

The development of integrated incubator with humidity and embryo detection using IoT system consists of two main parts; 1) Incubation process and 2) Embryo detection.

2.1 Incubation Process

The IoT system for incubation process is used for monitoring the main incubation parameters during the incubation period. This application involves a cloud server that storing the databases and records about the:
- Incubation temperature
- Incubation temperature
- Humidity
- Egg turning (tray position), and
- Air quality

All the recorded data can be accessed using the computer or smart phone via the graphical user interface (GUI) from the dashboard. The user will get notify, when there is a problem with the heating system or the temperature rise exceeds the corresponding setting limit.

2.2 Embryo detection

The embryo detection system for the incubator is very significant as to remove the infertile and death eggs from the tray. Candling techniques is used to identify these undesirable eggs. This process of monitoring embryo development inside eggs by shining a bright light through the egg. The embryo is located in the large end of the egg and appears as a dark spot inside the egg shell. Pale or white eggs are more easily candled than speckled and dark eggs. The presence of embryos can be confirmed easily after 7 days to 15 days of incubation. A short-term exposure of the egg to the hot light source such as 40 degree Celsius may kills all embryos.

2.3 Incubator Process Flow Chart

This incubator has two modes of control that is manual control mode and automatic control mode. In automatic control mode, the user is allows to set the following automation sequence begin with setting the birds or poultry types, egg turning (tray position), and cooling period. Figure 2.1 shows the incubator process flow chart.

Figure 2.1 Incubator process flow chart
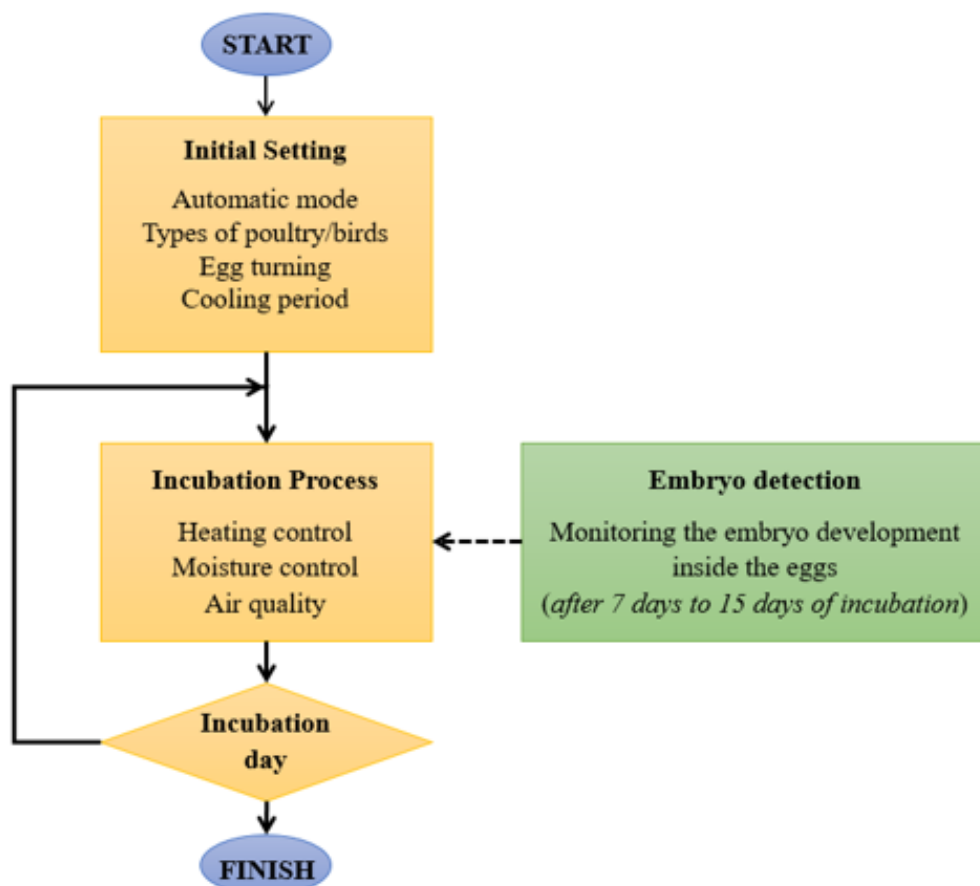
2.4 Overall System description and Internet of Things (IoT)

The key driven for innovation of the integrated incubator is the integration between the internet technology and the devices attached to the incubator. IoT as a part of industry 4.0 already a phenomena in modern agroindustry, and more projects related to IoT will benefits the producers and consumers in this field. The heart of the main control unit of this project is the Programmable Logic Controller (PLC) that controls the entire operation of the incubator system including the temperature, humidity, and egg turning (tray position) see Figure 2.2.

Figure 2.2 : Overall control system for Incubator V3
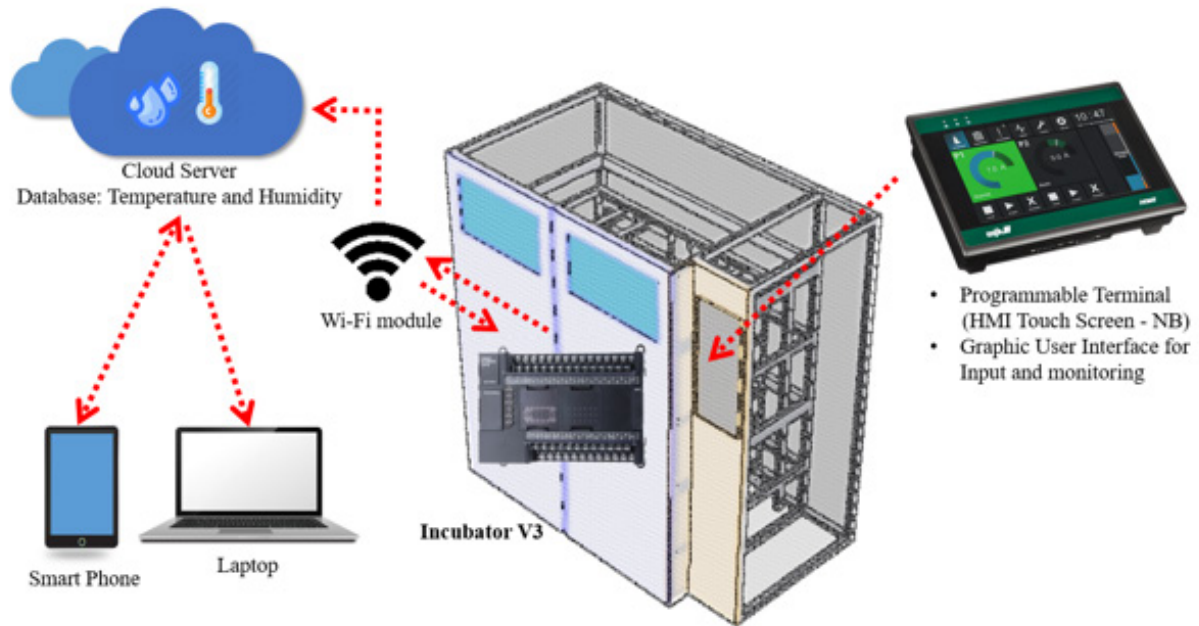
Thermocouple is used to measure the temperature and combining this module with proportional integral derivative controller (PID) mechanism will control the temperature for the incubator. The temperature controller takes an input from the thermocouple and has an output that connected to the heater and fan. This PID controller will keep the temperature inside the incubator to the desired control temperature, and predetermined set point.

The incubator is equipped with automatic humidifier that keeps the humidity at a right level for good hatching rate for the period of incubation. This humidifier system will automatically controlling the water evaporation level in the incubator based on the adjusted percentage of moisture. The humidifier tank also equipped with the infra-red level sensor as to easily monitoring the liquid level in the container.

The chick embryo consumes oxygen and release carbon dioxide. According to Gregory and Cartwright (1994) from the manufac¬turer's recommendations to guarantee that the developing chicks have adequate oxygen and good ventilation. The level of dust inside the incubator is monitoring by introducing a dust optical sensor into the system. This system will improve the air quality inside the incubator. The sensor will detect each dust particles concentration in the air by using optical sensing method. When the unsatisfactory level of dust trapped inside the incubator is reach, the system will activate the blower automatically and remove all the trapped dusts from the incubator. Figure 2.3 shows the block diagram of the main controlling system for the incubator.

Figure 2.3 : Block diagram of the main controlling system for the incubator Figure 2.2 : Overall control system for Incubator V3
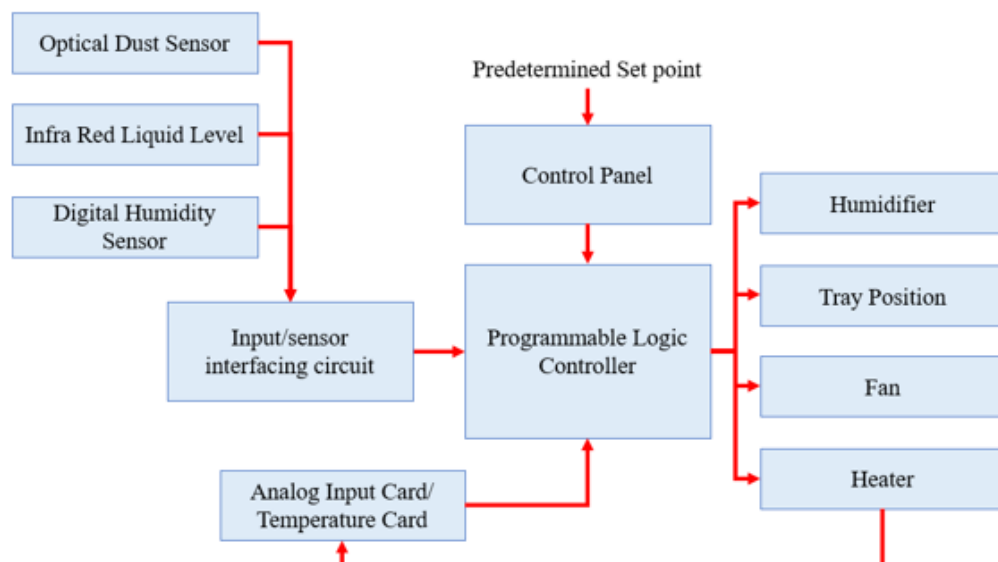
3. RESULTS AND DISCUSSIONS

3.1 Performance of the integrated prototype egg incubator

The integrated prototype of egg incubator was found to operate as designed (Figure 3.1). Performance evaluation of the incubator was made by filling the incubator with 30 pieces of chicken eggs and were assumed to be fertile eggs. The egg turning system is designed for automatically turn smoothly the eggs tray every 12 hours 2 times a day throughout the incubation period. The fan which designed to improve the air circulation inside the incubator also performed as designed. During the incubation period the temperature, humidity, and air quality can be monitored from the cloud server database. Predetermined set point of the testing session is run for automatic chicken incubation period according to Table 1. The heater perform at the desired level till the incubation period end.

Figure 3.1 : Prototype integrated egg incubator

3.2 Fertility and Hatchability

From the candling technique performed in day eight, it was found that 27 eggs out of 30 were fertile equivalent to 90% of fertility. Overall, 20 eggs are hatched in 21 days of incubation while 7 eggs were hatch after 21 days of incubation period. The percent hatchability therefore is 74%. It has been reported that overheating is more critical than under heating (Philip, 2009). Running the incubator at 40.5 degree Celsius for 15 minutes will extremely effect the embryos, while running it at 35 degree Celsius for 3 to 4 hours will only drop the chick's metabolic rate. It is note that chicks which hatched in 21 days of incubation period will grow into healthy chickens and able to familiarise to their new environment.

Figure 3.1 : Prototype integrated egg incubator

From the observation, chicks that successfully hatched in 21 days of incubation period will have long feathers and the fingers are not bent. Figure 3.3 shows the effect of high temperature during the incubation period. Egg turning is very important during the incubation period, successfully egg turning will result in good development of the embryo. Frequent power outage during the incubation period may result a delay development of the embryo during incubation period (Rogelio & Vinyl, 2016). Figure 3.4 shows the result of poor egg turning during incubation period.

Figure 3.3 : Chick that exposed to high temperature during incubation period

Figure 3.4 Appearance for under develop embryo when the tray is not properly turning the egg position

4. CONCLUSIONS

The main factors that influence the incubating eggs artificially are the temperature, humidity, egg turning, and ventilation. Temperature and humidity are the most critical factors. From the integrated prototype egg incubator build, all of these factors can be supervised via the cloud server and the automation of the system really assist the user to perform an optimum incubation monitoring process with high hatchability rates. Results revealed that the integrated prototype functioned according to the designed and predetermined set point operating temperature, humidity, egg turning, and ventilation. Embryo detection system also plays an important role as to remove the infertile and death eggs from the tray.

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TERMOELECTRICT AND SOLAR PANEL APPLICATIONS AS MINI PORTABLE DISPENSERS

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ABSTRACT

Has implemented design of solar power dispenser. Sunlight (solar) is a source of abundant energy, because of the Earth of Indonesia is on the equator. With solar energy for free, can be used to meet energy needs, such as electricity. The electrical energy generated by solar power is environmentally friendly, and very promising for the need to reduce energy and reliable power production, which continues to be the burden of domestic life and profitability of your business. Therefore the design of solar energy applications for home appliances such as water supply and hot or cold conditions dispenser of solar power. Dispenser designed solar energy with solar panels and thermoelectric modules have been able to work according to the principle of Peltier effect. In his work, sunlight converted by the solar panels into direct current (DC) flows in the thermoelectric module which causes heat to move from one side of the thermoelectric cooler to the other, thus forming a cold side and a hot side that can produce hot water in a hot tub and cold water in a cold water bath. Solar power dispenser is becoming more cost-effective, environmentally friendly, because it uses a thermoelectric cooling system, instead of Freon, CFCs and other chemicals that do not produce carbon or the effects of air pollution.

Keywords: Dispensers, Solar Power, Eco-Friendly,Economic

INTRODUCTION

Sunlight is an abundant source of energy, because Indonesia's earth is on the equator. With free solar energy so that it can be used to meet energy needs, such as electricity. Electrical energy generated by solar power is environmentally friendly, and very promising. As an alternative to replace power plants using steam (with oil and coal). The solar energy system, reducing the world's dependence on fossil fuels, imagine free and continuous energy sourced from our earth is provided for energy needs and can reliably reduce power expenditure, which continues to be a burden on domestic life and the benefits of your business. Using electricity alone from solar power (self) is it possible? Isn't PLN already providing fairly cheap electricity? What are the benefits of using independent electricity? The advantages of using electricity independently using solar panels / solar panels:
- Is a renewable energy that never runs out
- Save electricity in the long run
- Reducing global warming
- Clean and environmentally friendly
- Practical does not require maintenance
- Long life of solar panels
- Not dependent on PLN

Regarding these benefits, a solar power application system for household appliances can be designed. Solar power dispenser, designed using solar panels, temperature controllers, battery charging controls, heaters and coolers, and a water reservoir. Because of the heating process in the hot tub and cooling in the cold water bath, then hot and cold water will be obtained in the dispenser.

THEORY

The concept of solar power dispenser is simple. That is to convert sunlight into electrical energy using solar cells. The solar cell system used consists of solar cell panels, charging controller circuits, and 12 volt batteries. Furthermore, the electric power from the battery needs to be changed from DC voltage to heating and cooling water in 2 (two) water reservoirs by a thermoelectric module, as shown in Figure 1.

Figure 1 : Diagram Block of a solar dispenser system
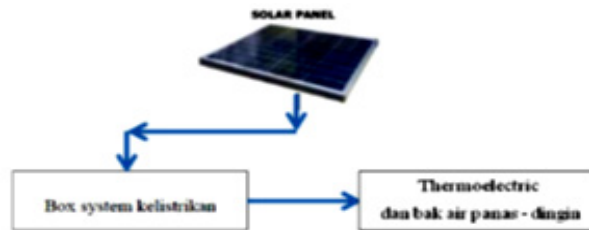
The components needed to design a solar power dispenser consist of:

1. Solar panel / solar panel
Solar panels / solar panels convert solar energy into electricity. Silicon cells (also called solar cells) that are illuminated by the sun / solar, make photons that produce electricity. A solar cell produces approximately 0.5 Volt of voltage. So a 12 Volt solar panel consists of approximately 36 cells (to produce 17 Volt maximum voltage). Generally we calculate the maximum amount of sunlight that is converted into electricity throughout the day is 5 hours. Electricity in the morning is stored in the battery, so electricity can be used at night, where without sunlight.

2. Solar charge controller
Solar charge controller functions to regulate traffic from solar cell to battery and load. This electronic device also has many functions which are basically intended to protect the battery.

3. Battery
The battery serves to store the electric current generated by solar panels before being used to drive loads. Load is a thermoelectric that requires electricity.

4. Thermoelectric.

Figure 2 : Diagram Block of Thermoelectric System
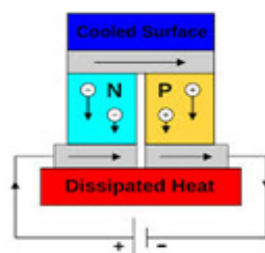
The thermoelectric cooling module in Figure 2, works based on the Peltier effect, will function if DC electric current is applied to one or several N and type P semiconductor pairs. The absorbed heat will move through semiconductors along with the movement of electrons to the heat side of the module (Th). In ideal conditions, the amount of heat absorbed on the cold side and released on the heat side depends on the Peltier coefficient and the electric current used. When operated the amount of heat absorbed on the dinign side will be reduced due to two factors, namely the heat formed in the semiconductor material due to the temperature difference between the cold side and the heat side (conducted heat) and the Joule Heat which will equal the square of the electric current used. So that under any conditions the thermal equilibrium that occurs because the Peltier effect on the cold side will be equal to the amount of heat formed in the semiconductor summed by 1½ Joule heat. Apart from the relatively small size, thermoelectric modules have other advantages, namely:

- The thermoelectric module has no moving parts, so for easier maintenance.
- Lifespan testing has proven that thermoelectric modules can be used for 100,000 hours.
- Thermoelectric modules do not contain chloroflourocarbons (CFC) or other materials that require periodic additions.
- Thermoelectric modules can be operated in environments that are too small for conventional cooling systems

5. Water Storage Tube

The water reservoir consists of two parts, namely hot water and cold water which functions as a water reservoir. This body has thermoelectric as a heat generator and water cooler. Because of the heating process in the hot tub and cooling in the cold water bath, then hot and cold water will be obtained in the dispenser. With the addition of a temperature regulator so that the water temperature can be adjusted as desired.

METHODOLOGY

Material :

To build solar power dispensers, materials are needed including Solar Cell Photovoltaic panels, mono 12Volt / 10Watt type, 12 Volt Solar charge controller / 10 Ampere, 12Vdc / 7.6 Ah battery / Battery, TEC1-12706 thermoelectric, connecting and tubing cables water reservoir.

Equipment:

The tools used in this design are Voltmeter, Thermometer, electric soldering iron, cutting pliers, hacksaw, screwdriver, iron glue and mechanical key.

Work procedures

Prepare all materials and equipment to be used. Install and connect the connecting cable between the solar panel and the solar charger controller, then connect to the battery / battery and temperature controller as well as to the thermoelectric module section according to Figure 2. The thermoelectric module is installed on the surface of the reservoir with hot side in the hot tub and cold side cold water tub, tighten it with iron glue. After everything is connected, do the test by checking the relationship of cabling, measuring the voltage with the voltmeter at each connection point and measuring the temperature in each tub of water. Make measurement data and do data processing to get the characteristics of each part. After the trial is complete, do the work of perfecting the solar power dispenser by including it in a nice and attractive package. After completing everything, do a retest for the final evaluation and completion. Perform refinement of solar power dispenser characteristics data according to the results of the trial. To keep the temperature in the hot and cold water tubs do not affect each other, do the outer wall of the container with glasswool evenly so that the temperature does not leak out. Also do a calculation of heating time and re-cooling water in the dispenser if water is taken for use.

RESULT AND DISCUSSION

The design of the wiring diagram / wiring from a solar power dispenser can be shown in Figure 3

Figure 3 : Diagram of wiring a Solar Dispenser
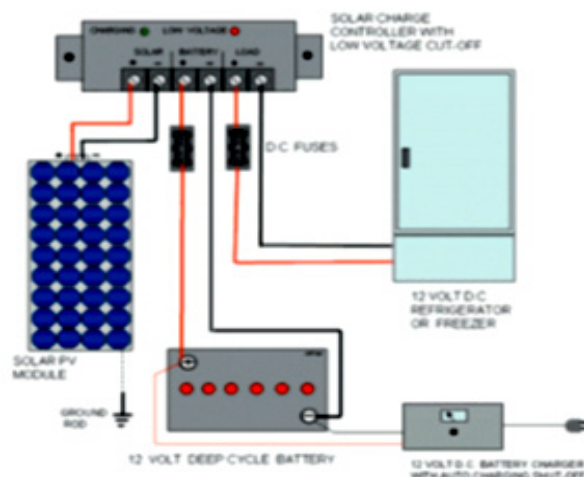
From Figure 3, it is shown that sunlight is received by a solar panel (solar PV Module) and converted into a DC voltage voltage of 12 Volt. The output of solar panels is fed to the safety section, namely the solar charge controller, so that the process of charging the battery / battery and the output voltage can be controlled safely. The battery pole +/- is connected to the solar charge controller. Likewise the output to the load (Load) is connected with a 12 Volt thermoelectric module so that later it can provide electricity to process the heating and cooling of water in a water reservoir.

While a complete solar power dispenser can be seen in Figure 4.

Figure 4 : Solar Dispenser (front view)

From Figure 4, it can be shown that the design of solar power dispensers is used electric dispenser packs that have not been used, so that they can take advantage of cold and hot water collection tanks. While the cable terminal that connects the dispenser with solar panels is placed on the back of the packaging.

For water cooling data can be shown in Figure 5 below:

Figure 5 : Curve of The process of cooling water
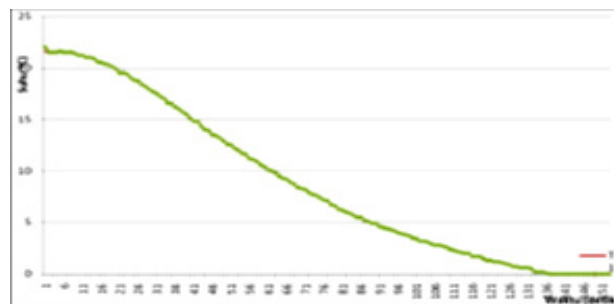
The process of cooling water from room temperature around 22˚C to 0˚ only takes about 157 seconds depending on the temperature of the environment. The higher the ambient temperature the cooling process takes longer.

Figure 6 : Curve of process of heating water
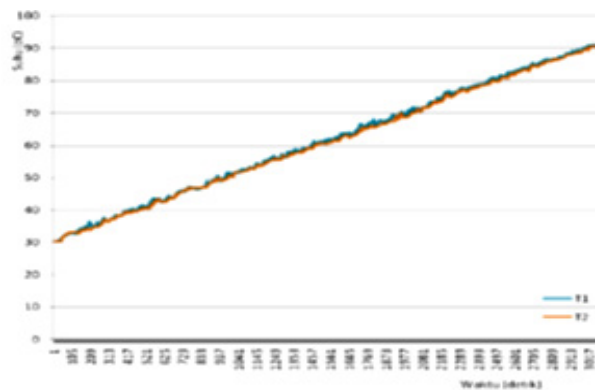
The process of heating water from room temperature around 22˚C to 90˚ takes about 3017 seconds depending on the temperature of the environment. The higher the ambient temperature the faster the heating process

CONCLUSION

Solar power dispensers designed with solar panels and thermoelectric modules have been able to work well. In its work, sunlight is converted by solar panels into a direct current (DC) flowing in a thermoelectric module which causes the heat to move from one side of the thermoelectric cooler to the other, so that a cold and hot side can produce hot water in a hot tub and cold water in a cold water bath. This solar power dispenser is more cost-effective, environmentally friendly, because the cooling system uses Thermoelectric, not from CFC or other chemicals so it does not produce carbon or air pollution effects.

ACKNOWLEDGMENTS

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DETERMINATION OF PROGRAMMING SELF-EFFICACY:
A CASE STUDY FOR POLYTECHNIC STUDENTS.

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ABSTRACT

Fundamental programming has been gradually emphasized in Technical and Vocational Education and Training (TVET) institution especially for students who pursue engineering program. However, this subject was consider difficult and complex as the students not well perform. One of the factor to investigate the performance of programming was self-efficacy because it relates students perception on their own competence to difficulties of programming. Therefore, the purpose of this study is to understand student's perception about their own learning in fundamental programming. In order to measure students' self-efficacy perceptions, Computer Programming Self-Efficacy (CPSES) scale was used with seven likert scale. The sample group consist of 110 students from two polytechnics who taken Fundamental Programming Course. From the analysis, it shows that the majority of programming self-efficacy level was at middle and high level. The results also revealed that there is significant difference of programming self-efficacy level for the students that have programming experience prior taking the course. However, it does not show any meaningful difference between programming self-efficacy and genders. The findings of this study have implications to assist the lecturer for the design and delivery of the fundamental programming course.

Keywords: Programming, programming self-efficacy, prior programming experience, gender

1. INTRODUCTION

As a key player in technical and vocational education and training (TVET), polytechnics are relevant in producing graduates with technical skills especially in engineering programmed. With the rapid evolving and converging technologies of the industrial revolution 4.0, today the industry not only in demand of skilled labor and knowledge in the technical field solely, the demand for Information and Communication Technology (ICT) literacy also are necessity (Satoglu, Ustundag, Cevikcan, & Durmusoglu, 2018). One of the elements of ICT literacy was programming knowledge capabilities. Therefore, polytechnics need to ensure the availability of future talent by equipping students with the necessary skillsets to work in the Industry 4.0 environment.

1.1 Research Background

Programming involves four main processes; (i) problems, (ii) design, (iii) coding and (iv) maintenance (Blackwell, 2002). Students are vital to understand all the four programming process which involves a variety of complex cognitive activities and the capacity to build mental representations (Reginamary, Hew, & Koo, 2009; Soska, Mottok, & Wolff, 2016). It is a challenging intellectual task that requires high thinking and creative skills.

Programming is the process of writing, testing and debugging computer programs using different programming languages. In order to execute the entire programming process, a programmer needs good declarative and procedural knowledge involving programming language syntax and semantics which in turn requires memorization and comprehension skills (McGill & Volet, 1997). Other skills required are problem solving and program design skills which in turn require additional skills such as abstraction and logic thinking, and domain knowledge (Sorva, 2013). Therefore, programming is considering as complex task and need multiple skills and knowledge.

Factors such as student self-efficacy are also closely related to the programming performance. Self-efficacy can be defined as the perceptions of students regarding their own skills and is thought to be directly associated with their performance and effort in performing a task (Bandura, 1977). Students with high self-efficacy tend to learn and strive for success over low self-efficacy students, even though they have similar abilities.

Ramalingam, LaBelle, & Wiedenbeck (2004) research finding shows that student having high self-efficacy and prior programming experience was important to obtain programming skills and performance. If students have high self-efficacy, they will attempt to resolve the difficulties inherent natural consequence of the existing features in programming. Therefore, self-efficacy was found to have a correlation with programming performance (Askar & Davenport, 2009; Chilton & Riemenschneider, 2000; Kanaparan, Cullen, & Mason, 2019; Ramalingam et al., 2004; Ramalingam & Wiedenbeck, 1998; Wendy Doubé, 2012).

Based on previous studies, there may be gender differences in the experience and level of confidence of the students in the subject of programming (Guzin, Akar, & Altun, 2017; Kallia & Sentance, 2018). Male and female students have different learning styles, attitudes and interests in science, math and engineering. Male and female students have a different, learning style, attitude and interest in science, mathematics and engineering field. However, lately the achievement of female students in programming is better compared to male student [9]. A survey conducted by Murphy, Richard & McCauley [10] show that females generally considered the programming concepts to be no more difficult than did the male. Hence, this study intends to carried out for identifying the programming self-efficacy level associated to prior programming experience and gender.

1.2 Research Objective

The research objectives of this study are:
  i)   To know the level of student programming self-efficacy
  ii) To determine the differences of programming self-efficacy score between prior programming experience and without having prior programming experience,
  iii) To determine the difference of programming self-efficacy score between gender

2. METHODOLOGY

The study employs a quantitative approach to examine the level of student's self-efficacy and the link between programming self-efficacy, programming experience and gender. A survey of questionnaire was administered which consist two main part. Part A of the questionnaire covering the general background information from a respondent, including gender and programming experience. Part B of the questionnaire consist of an instrument Computer Programming Self-Efficacy (CPSE) was adapted based on the scale developed and validated by Ramalingam & Wiedenbeck (1998) to measure the level of student's programming self-efficacy. The instrument consisted of 27 items asking students to assess their ability in various tasks and programming situations consisting of four constructs : i) Simple Programming Task (9 items); ii) Complex Programming Task (6 items); iii) Independence and Persistence (8 items) and iv) Self-Regulation (4 items). The CPSE Scale uses a Likert scale with seven response formats. Scores range from 1 to 7 (1 = "not confident at all", 2 = "mostly not confident", 3 = "slightly confident", 4 = "50/50", 5 = "fairly confidence", 6 = "mostly believe" and 7 = "absolute confident").

The respondent involved two polytechnics who taken Fundamental Programming Course which. 64 (58.2%) respondent were Politeknik Port Dickson (PPD) and 46 (41.8%) respondent were from Politeknik Sultan Azlan Shah (PSAS).

Arithmetic mean and standard deviation (SD) from descriptive statistics are employed for the analysis of data collected. Then, the independent t-test is applied to examine the difference of programming self-efficacy score between student's programming experience and gender. For the research objective that has a statistically significant difference, a Cohen's d effect size (Cohen, 1988) will be calculated to provide a measure of the practical significance of the result using the formula below:

$$d = \frac{|M_1 - M_2|}{s_{pooled}} \quad \text{where} \quad s_{pooled} = \sqrt{\frac{s_1^2(n_1 - 1) + s_2^2(n_2 - 1)}{n_1 + n_2 - 2}}$$

The Cohen's d effect size will determine whether there is small, medium or large significance based on the Cohen's d guideline (Cohen, 1988) below:

Table 1 : Cohen's d GUIDELINE

Effect Size (d)	Strength
0.2	Small
0.5	Medium
0.8	Large

SPSS 21.0 (Statistical Package for the Social Sciences) is used for statistical analysis of the data, and the level of significance is identified as 0.05. The interpretation of programming self-efficacy level: low, medium and high level is referring to Çoklar & Akçay (2018) as shown on Table 2.

Table 2 : Self-Efficacy Evaluation Criteria

Range of Evaluation	Evaluation Criteria
1.00 – 3.00	Low Level
3.01 – 5.00	Medium Level
5.01 – 7.00	High Level

3. RESULTS AND DISCUSSIONS

3.1 Instrument Reliability

Instrument reliability was determined using the alpha cronbach's internal consistency method. Table 3 shows the results of the Cronbach's alpha reliability test for CPSES consisting of 4 constructs. The Cronbach Alpha value for all the construct is between .908 to .926. This indicates that the questionnaire has high reliability (Pallant, 2011)

Table 3 : Summary Of Instrument Reliability Analysis

Programming Self-Efficacy Construct	Number of items	Alpha value
Simple Programming Task	9	.908
Complex Programming Task	6	.919
Independence and Persistence	8	.926
Self-Regulation	7	.917
Total	27	.968

3.2 Respondent Profile

From 110 respondents who answered the questionnaires, 75.5% (n = 83) are male and 24.5% (n = 27) are females. While 33.6% (n=37) having programming experience and 66.4% (n=73) do not have programming experience.

3.3 Result

3.3.1 Programming Self-Efficacy Level

Table 4 summarize the programming self-efficacy score according to CPSES construct, overall programming self-efficacy Score, programming experience and gender.

Table 4 : Summarize the level of student's self-efficacy.

	N	Mean	SD
Self-Efficacy Construct			
Simple Programming Task	**110**	**5.23**	**.825**
Complex Programming Task	**110**	**4.62**	**1.057**
Independence & Persistence	**110**	**4.99**	**1.083**
Self-Regulation	**110**	**4.65**	**1.198**
Self-Efficacy Score	**110**	**4.93**	**.934**
Gender			
Male	**83**	**4.93**	**.937**
Female	**27**	**4.99**	**.940**
Programming Experience			
Yes	**37**	**5.23**	**.808**
No	**73**	**4.79**	**.963**

3.3.2 Programming self-efficacy Between Programming Experience

An independent-samples t-test was used to determine if there was a difference in programming Self-Efficacy between Student Programming Experience. There was a homogeneity of variances, as assessed by Levene's test (Table 5) for equality of variances ($p = .09$). The Self-Efficacy score for students having programming experience ($M = 5.23$, $SD = .808$) was higher than student does not having programming experience ($M = 4.79$, $SD = .963$), as shown in Table 4.

Table 5 : Equality of varience test (Programming Experience vs SE Score)

		Levene's Test for Equality of Variances	
		F	Sig
SE Score	**Equal variance assumed**	**2.87**	**0.09**

There was a statistically significant difference in self-efficacy scores between students with programming experience and students with no programming experience, $MD = .443$, $SE = .185$, $t(108) = 2.399$, $p = .018$ (Table 6). The difference of 0.443 mean scores indicated a medium effect size with the value of Cohen's $d = 0.50$.

Table 6 : Independent T-Test Result

	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
SE Score	**2.399**	**108**	**.018**	**.443**	**.185**

3.3.3 Programming Self-Efficacy Difference Between Gender

An independent-samples t-test was used to determine if there was a difference in programming Self-Efficacy between Gender. There was a homogeneity of variances, as assessed by Levene's test (Table 7) for equality of variances ($p = .81$). The Female Self-Efficacy score ($M = 4.99$, $SD = .940$) was higher than male self-efficacy score ($M = 4.93$, $SD = .937$), as shown in Table 4.

Table 7 : Equality of varience test (Gender vs SE Score)

		Levene's Test for Equality of Variances	
		F	Sig
SE Score	**Equal variance assumed**	**0.056**	**.814**

There was a no statistically significant difference in self-efficacy scores between male and female, MD= .443, SE = .185, t(108) = 2.399, p = .018 (Table 5).

Table 8 : Independent T-Test Result

	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
SE Score	.325	108	.746	.0676	.2079

3.4 Discussion

According to the research, it is observed that the programming self-efficacy in general are at medium level. As they demonstrate high level performance to perform simple programming tasks, they only show medium level performance when performing complex programming tasks. Research finding from Yukselturk and Altiok (2017) also found that students have medium level programming self-efficacy perceptions; and their complex programming skills would improve once they are trained with Scratch programming tool. Therefore, to improve student's motivation or efficacy level for better programming acquisition, they can be exposed to programming visualization tool and ensure there are actively involved with the tool (Al-Sakkaf;, Omar;, & Ahmad, 2019; Derus & Ali, 2015; Egan & Mcdonald, 2014; Grissom, Mcnally, & Naps, 2003).

The research finding shows that there is significantly different previous knowledge or prior experience in a certain field mostly emerge as having a balancing effect in differences related to individuals' skills. In other words, if the individual has sufficient preliminary knowledge or experience, the previous experiences he has will facilitate the process without feeling the need to use that skill, even if some of his cognitive skills are low. In related literature, the effect of preliminary knowledge or experience on programming performance is dealt with either separately or as a single factor (Bergin & Reilly, 2005; deRaadt et al., 2005; Lau & Yuen, 2011)

The result also revealed there is no significant difference of programming self-efficacy between gender. The finding of this study differ from Askar & Davenport (2009). This difference may be due to the small number of respondents involved in this study.

4. CONCLUSIONS

Programming self-efficacy can be an effective predictor of student performance. Therefore, self-efficacy can be considered an important effect on the amount of effort individuals apply to programming task. This study shows that having high self-efficacy and existing programming experience have a significant impact on programming performance. Lecturer should provide the right teaching technique and methods employed in the programming class to encourage the students' self-efficacy level. It is because stronger self-efficacy beliefs associated with positive outcomes, such as better grades, greater athletic performance and healthier lifestyle.

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DEVELOPMENT OF SEMI-AUTOMATIC LEMONGRASS CUTTER MACHINE BETWEEN VERSION I AND VERSION II

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ABSTRACT

The process of cutting Lemongrass can be quite a tedious job as currently, no machine is available for specifically cutting lemongrass. The Version-I Lemongrass Cutting Machine build up with the dimension of 60 x 30 x 50 inch. This machine uses the concept of the petrol engine as a power supply to provide the rotation of circular blade for the grass cutting process. Besides that, the overall design of machine used the aluminium plate as the cover for safety and tidiness. For the frame, it used the hollow square mild steel to assembly each other part. This design has flaws that have been improved in Version II. The function of the Lemongrass Cutting Machine Version-II is to cut lemongrass leaves and roots together at the same time. In addition, the production and efficiency of machine has been improved with the addition of conveyor unit and automatic water sprayer. This objective of this study is to compare the development and effectiveness between Semi-Automatic Lemongrass Cutter Machine Version I and II.

Keywords: Semi-Automatic, Lemongrass, Automatic Water Sprayer, Cutting Machine

1. INTRODUCTION

Cymbopogon citratus, also known as lemongrass, is a plant cultured in almost all tropical and subtropical countries as a source of essential oil. Lemongrass is used in Peru for preparing soft drinks and is used as an aromatic, enjoyable-tasting herbal tea all around its distribution area. The infusion or decoction of its aerial parts has widespread use in general medicine. The plant is recommended to treat unsettled stomach, inflammation, diabetes, nervous disorders, and fever as well as other health problems (Leite, et al., 1986). The area of herbs plantation in Malaysia is expected to increase by 15% per annum from 1,000 hectares in 2010 to 4,000 hectares by 2020. Commercial production and development of herbs and spices will focus on 11 herbs and 10 herbs including lemongrass as cited in Dasar Agromakanan Negara 2011-2020, (2011).While lemongrass has significant advantages and utilization for users and farmers, there is still a lack of studies on cutting machine specifically designed to cut the herb. In order to satisfy the increasing demand of the growing population and for exports, the productivity of ground and labour needs to be significantly enhanced, requiring greater power input and better management of food production systems (Hegazy, Molari, & El-Sheikha, 2011). Labour-driven methods continue to be prevalent in the maintenance and harvesting of most fresh fruits and vegetables worldwide, but particularly in developing nations, Agricultural workers involved in labour-intensive practices are exposed to a multitude of MSD risk factors. The literature has shown three main risk factors that are of the utmost priority in agriculture. These include: lifting and carrying heavy loads (over 50 lb); sustained or repeated full body bending (stoop); and very highly repetitive handwork (clipping,cutting) (MARDI, 2013). Therefore, in order to decrease these risks, better automation process such as using effective cutting machine is needed.

The function of the Lemongrass Cutting Machine Version-I (SALGC-I) is to cut lemongrass leaves and roots together at the same time. In addition, the petrol engine used to rotate the circular blade, have high torque, which can provide high rotation for the cutting process. SALGC-I uses sliding concept to feed the lemongrass to cutter mechanism which is less accurate. Other than that, the machine only has one task which is the cutting and cut one lemongrass at a time. Using petrol engine as a drive given the machine advantage in terms of mobility but creates pollution from the sound of the engine.

New lemongrass cutter machine Version – II (SALGC-II) uses conveyor as a feeding device to feed lemongrass to the cutter. More improvements have been made on this machine including the washing process for the cut lemongrass, replace the drive from petrol engine to electric motor to reduce noise and overall change for the design of the machine.

2. METHODOLOGY

2.1 Concept of product

Concept research (conceptualization, conceptual design) is often a project planning stage involving the production of concepts and the pros and cons of applying those thoughts. This phase of a project is performed to minimize the probability of mistakes, handle expenses, assess risks and assess the project's future success. In any case, prospective solutions must be recognized once an engineering problem or other problems have been described. These alternatives can be discovered through the use of ideation, the mental process that generates thoughts. In fact, this step is often termed Ideation or "Concept Generation." For many years, the design process has been the focus of research, and a number of designs and methodologies are available. A methodology of design is a framework within which a designer can practice thoroughly. One approach of such calls "total design" (Bekele, et al., 2017).

Using sharp material for cutting, such as knife, blade and other materials are common methods in the traditional way. The machine specifically for cutting vegetables is crucial for the user to increase productivity. Lemongrass usually cut by using a knife and the machine specifically for cutting lemongrass is unrecognized for the time being. The need of such machine comes from the research of the lemongrass farm at Junjung, province Kulim in state of Kedah, Malaysia (Figure 1). The farmer is using a knife to cut the lemongrass as shown in (Figure 2). This process of cutting come with safety risks such as the sharp leaf of lemongrass or the knife itself could harm the farmer.

Figure 1 : Field Research To Lemongrass Farm

Figure 2 : Farmer using a knife to cut lemongrass

The concept of the machine comes from the workflow of farmer cutting the lemongrass leaf and stalk to leave the consumable lemongrass. These processes are replicated to the machine

Figure 3 : Process of cutting lemongrass using the manual method SALGC-I and SALGC-II
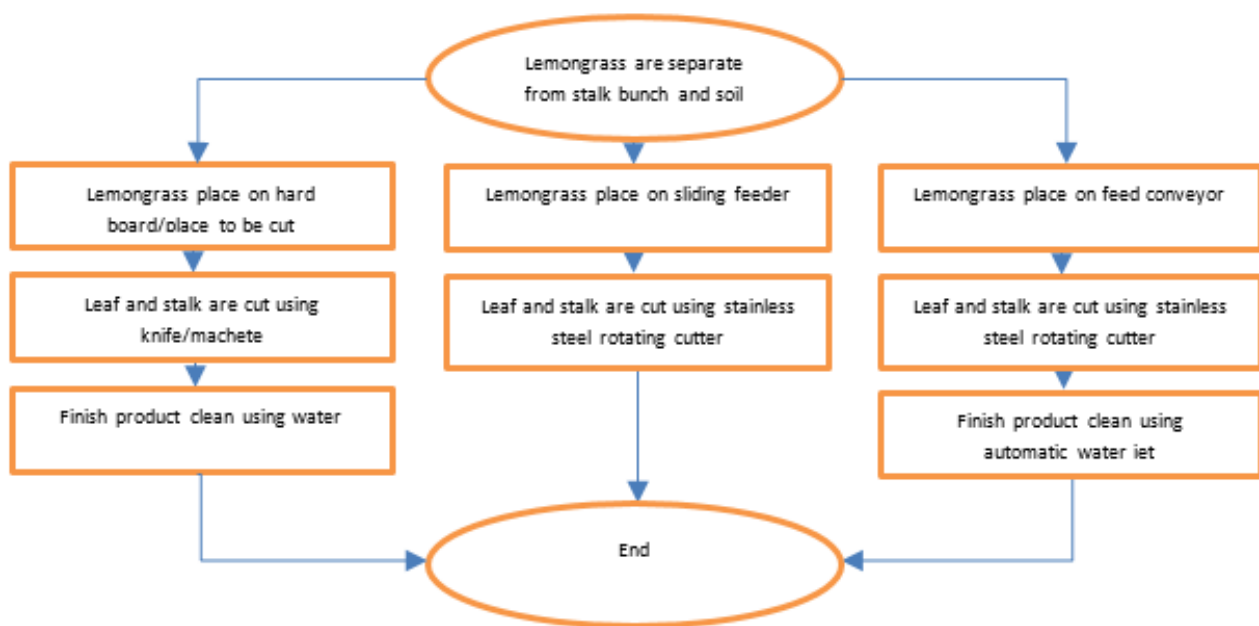
2.2 Design selection

Concept design of SALGC-I and SALGC-II are initially based on the general idea of cutting lemongrass manually which is translated to the design using AutoCAD software as shown in figure 4 and 5. The design also based on the selection of material. The main component of SALGC are: Driven unit, cutting unit and lemongrass transferring unit   (Chams & Singh, November, 2006.)

2.2.1 Driven unit

The driven unit used for SALGC-V1 was 2 stroke petrol engine as shown in (figure 6) providing 2 HP with one forward speed and a maximum speed of 10000 rpm. The engine provides motion to two round stainless steel cutter that transmits through pulley and V-belt. The improved driven unit for SALGC-II used 230V, 1.8A AC electrical induction motor (figure 7) providing ¼ HP. The motor provides motion to cutting unit with maximum 1720 rpm power transmitted by pulley and belt.

Figure 4 : Design for SALGC-I
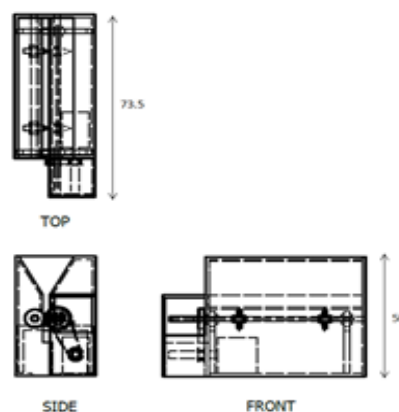
Figure 5 : Design for SALGC-II
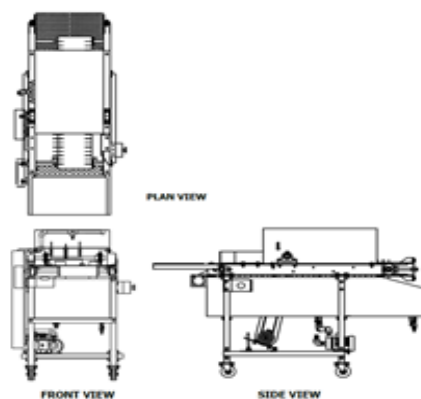
Figure 6 : SALGC-I 2 Strokes Petrol engine

Figure 7 : SALGC-II AC Induction Motor

2.2.2 Cutting unit

The developed cutting unit consist of two cutter disc, both SALGC-1 and SALGC-II used the same 150mm diameter circular stainless steel cutting blade, this blade was made of steel 2mm thickness as shown in figure (figure 8). Lemongrass consists of cellulose-rich fibers which can be used as a prospective source of raw material for multiple applications, including pulp and paper (Fathallah, 2010), because of this rich fiber content, the use of a notched disc cutter is not applicable as the lemongrass tends to stick to the cutter disc notch. Both discs were fitted to the metal shaft which connected to the frame and inner circle of ball bearing, both bearing and cutting disc are fit on its specific place as shown in (figure 9)

Figure 8 : Circular blade
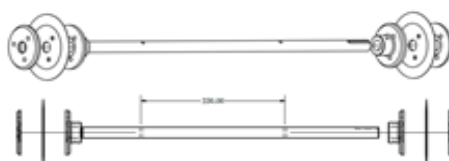
Figure 9 : Placement of cutting unit a) SALGC-I (b) SALGC-II
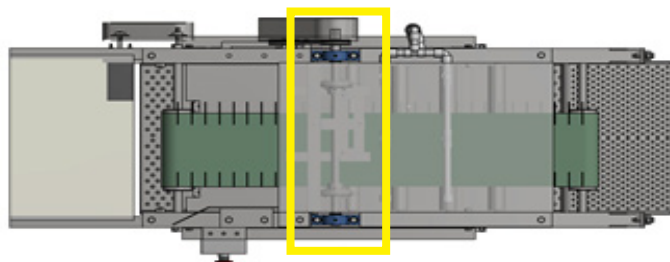
2.2.3 Lemongrass transferring unit

The transferring unit used for SALGC-I is V-shape feeder with a two-inch horizontal opening at the end of the feeder. The lemongrass feed to the cutting unit by placing them to this opening one by one. The SALGC-II uses conveyor unit with cleated belt to transfer lemongrass simultaneously toward cutting unit.

2.3 Prototype testing

The testing was carried out at Politeknik Tuanku Sultanah Bahiyah, the existed lemongrass on the field are used. For testing the prototype in the field, many independent parameters are determined to show the operating performance of the machine under different conditions.

2.3.1 Transfer rate

For calculating the transfer rate, the following equation can be used:

$$T = \frac{Td}{Gc} \times 100$$

Where:

T   =   Transfer rate (%)
Td =   No. of transferred plants
Gc =   No. of harvested plants   (Chams & Singh, November, 2006.)

However, in the case of SALGC, Td = Number of well-cut stalk and Gc= number of stalks in each trial.

2.3.2 Cutting trial

The fresh hand-harvested lemongrass was cut using both SALGC machines. The cutting trial is based on the harvesting trial of lentil (Sidahmed & Jaber, 2004) that perform to measure the time and efficiency of the machine to cut lemongrass. Cut lemongrass were compared based on number and precision of cutting edges.

3. RESULTS AND DISCUSSIONS

3.1 Distribution

This section discusses the results obtained from the SALGC-I and SALGC-II study in cutting trials and their results.

3.1.1 Cutting Trial

The general harvest performance of the prototype was tested in the field and shown in figure 10 and 11. There are two variables used to rate the performance of the SALGC machine; numbers of well-cut lemongrass and cutting rate. The measurements were taken based on one minute working time of the machine.

3.1.2 Harvesting performance

The machine was tested and the results listed in Table 1. Each trial used 40 lemongrasses freshly pulled from the ground right before the cutting process. The lemongrass then separated and shook to remove extra soil on the root. The well-cut product was counted for each stalk and the average values for SALGC-I and SALGC-II are 23.666 and 37.333 respectively, with standard the same standard deviation of 2.0816. There is an increase of 36% when using SALGC-II compared to version-I. This is due to the change in the transfer unit which makes cutting process easier. In case of SALGC-I the lower number of harvested plants does not affect the cutting process but the plant root and leaf caused some obstacles during the harvesting operation.

Figure 10 : Lemongrass cutting trial of SALGC-I

First, the lemongrass will be put inside hopper of the machine which to be cut.

The lemongrass that been cut will come out from the slide of the machine.

The lemongrass that cut out form the machine was not precise

The lemongrass will be cut by the circular knife blade.

Figure 11 : Lemongrass cutting trial of SALGC-II

First, the lemongrass will be put on the conveyor belt

After cutting and washing the lemongrass will delivery out from the machine and drop on the sliding net.

The lemongrass that cut out from this machine more precise

The lemongrass delivery through the cutting process. The cutting process will cut off the leaf and stalk of lemongrass systematically.
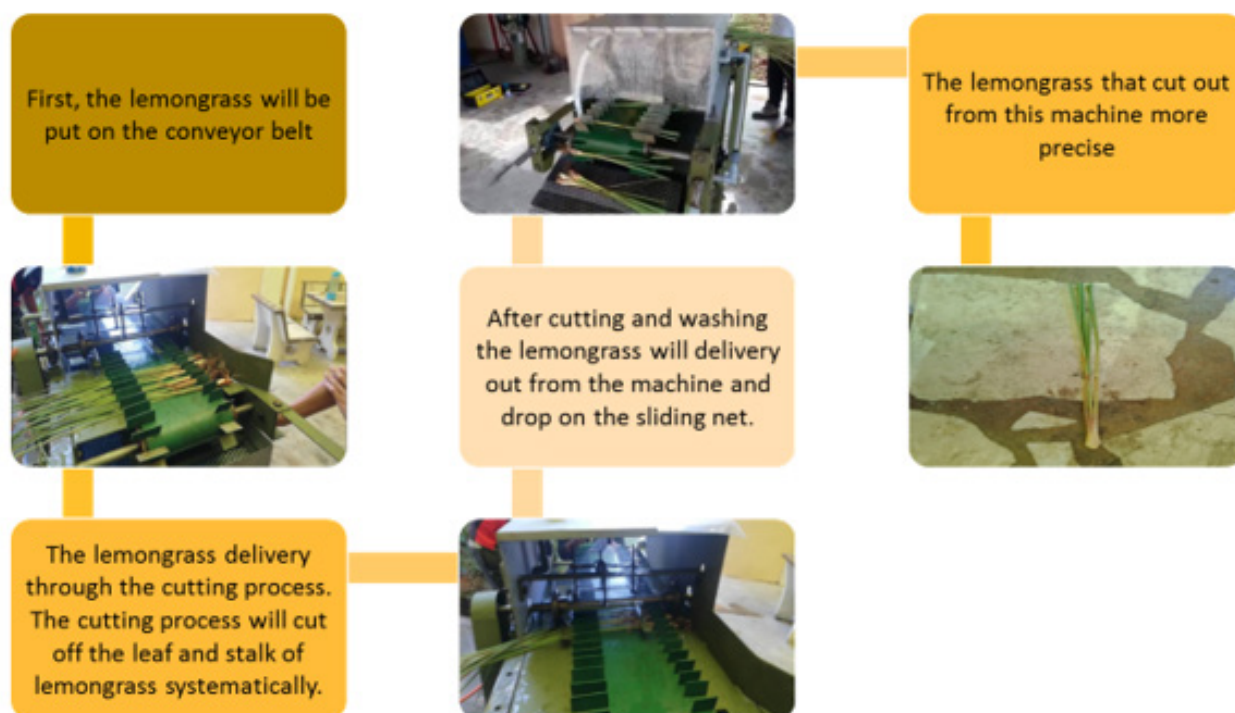
Figure 10 shows the stalks after the cutting process using SALGC-I and SALGC-II. The edges of lemongrass cut using SALGC –II is more accurate in terms of stalk cleanliness, where the root was well-cut.

Figure 12 : a) cutting on SALGC-I are rough   b) cutting on SALGC-II more accurate

a   b

Table 1: Data of Lemongrass trial cut using SALGC-I and SALGC-II (Funk & Walker, 2009)

	Trial	Well cut stalks	Transfer rate (%)
SALGC-I	1 2 3	22 26 23	55 65 55
Mean		23.666	58
Standard deviation		2.0816	
SALGC-II	1 2 3	38 35 39	95 88 98
Mean		37.333	94
Standard deviation		2.0816	

4. CONCLUSIONS

As a conclusion, this study have found that the overall of the Lemongrass Cutting Machine Version II was better and more suitable than the Version I Machine. From the development of the machine, the design for version II was more suitable in cutting the lemongrass with help the conveyor system. Moreover, the cutting rate of lemongrass was more than the version I machine which can increase the production and save time. Furthermore, the cutting process of lemongrass is more easy compare to a version I machine with the help of systematic processing. To enhance the portability of the machine, the size of the machine will be compact to a hand-carry size and the system of the machine will be upgraded so the system will be easier for the farmer.

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REPELLENT ACTIVITY OF PLANTS EXTRACTION AGAINST COCKROACHES (PERIPLANETA AMERICANA, BLATELLA GERMANICA)

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ABSTRACT

Cockroaches have the potential to mechanically carry and transmit bacteria and viruses. Chemical control (such as Naphthalene) is commonly used against cockroaches. However, the use of chemical based product effects in human health and the environment. This study was conducted to evaluate the repellency of two plants extraction from commercial plant species Citratus flexuosus (Lemongrass) and Pandanus amaryllifolius (Pandan Leaves), and naphthalene as a control, against two cockroach species Periplaneta americana and Blatella germanica under laboratory conditions using food as bait. The weight of the food is weighed and placed on the filter paper in the test container. 25 drops of plant extraction were drop surround the food. 20 cockroaches were released freely in the container and left for 24 hours. The weight of the food is weighed after the test ends and the weight differences is taken into account. The plant extraction derived from Citratus flexuosus showed the best repellency over Pandanus amaryllifolius. It showed the higher repellency (among the extraction tested) of about 12.5% weight loss. However, Pandanus amaryllifolius showed the lower repellency with 32.5% of weight loss. An evident proved that Lemongrass (Citratus flexuosus) is capable to repel the cockroach because it contain stringent substances such as Graminae.

Keywords: Plants Extraction, Repellency, Cockroaches

1. INTRODUCTION

Cockroaches are among the most common pests in many buildings and the most voracious species in Southeast Asia was Periplaneta americana and Blatella germanica [1]. Both species was known vector for many pathogens that threaten human livelihood [2].

Cockroaches may become pests in homes, schools, restaurants, hospitals, warehouses, offices and virtually in any structures that has food preparation or storage areas. They contaminate food and eating utensils, destroy fabric and paper products and impart stains and unpleasant odor to surface they contact [1]. They have the potential to mechanically carry and transmit many pathogens [2]. In one study, allergic reactions to cockroaches was second only to house dust mites in asthmatics [3]. Twenty percent of homes without visible evidence of cockroaches had detectable levels of cockroach allergens in dust samples [4]. Because of their economic or medical importance all three of these groups of insects are the targets of frequent pesticide applications.

Concern over health implications from the use of residual and broad insecticidal spray treatments has been impetus for research on alternative methods. Repellents may play a very important role in some situations or in some special space where the insecticides are not able to use [5]. Moreover, highly repellent insecticides, such as pyrethrum, can be useful when used to detect infestations in areas where visible inspection is limited [6] and one of the methods to assess relative abundance of cockroaches (flush and count) [7].

Many essential oils have been screened for repellent activity against cockroaches and some of them possess potential to be developed as natural repellents. In this study, an attempt has been made to evaluate the repellent activity of essential oils extracted from 2 plant Citratus flexuosus (Lemongrass) and Pandanus amaryllifolius (Pandan Leaves) against American and German cockroaches.

Despite the potential substances for controlling both American and German cockroach population have been confirmed from essential oils, there is still lack of information regarding the efficiency in Malaysia. Hence, this study was carried out to determine the effectiveness of essential oil from Lemongrass and Pandan leaves against both (Periplaneta americana and Blatella germanica) cockroach population.

2. METHODOLOGY

2.1 Oil Extraction

Oil extractions from plants was carried out by mean of steam distillation methods. A bunser burner with contain enough fully gas are required to heat the pressure cooker from below. The pressure cooker are filled with approximately 1kg of chopping Citratus flexuosus and Pandanus amaryllifilious and leaves to heat for approximately 2 h and 45 min which than produced of 853 grams of oils.

2.2 Cockroach Rearing Process

All cockroaches (Periplaneta americana and Blatella germanica) were reared in the Wood Laboratory, Civil Department, Polytechnic Premier Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Selangor, Malaysia according to the established protocol. The rearing room was maintained at temperature and relative humidity of 26 ± 2°C and 70 ± 5%, respectively with photoperiod of 12:12.

2.3 Repellence Test

Approximately 25 drops of plant extraction was drop surround the food. The cockroaches was released in the container and left for 24 hours. The food was then reweighed and recorded.

2.4 Analysis of Data

Analysis of variance (ANOVA) at 95% confident level ($P ≤ 0.05$) were used to analyse the collected data by using Statistical Package for the Social Sciences (SPSS) software.

3. RESULTS AND DISCUSSION

The percentage of weight loss was showed in Figure 1. Percentage of weight loss for control test (2.50%) is lower than T2 and T3 tests. It clearly shows that the efficiency of good mothballs cannot be denied. Instead, T2 as extractive from pandanus (Pandanus amaryllifolius) leaves shown its effectiveness through the diagram which is least effective compared to T2 and control.

Figure 1: Percentage of Weight Loss
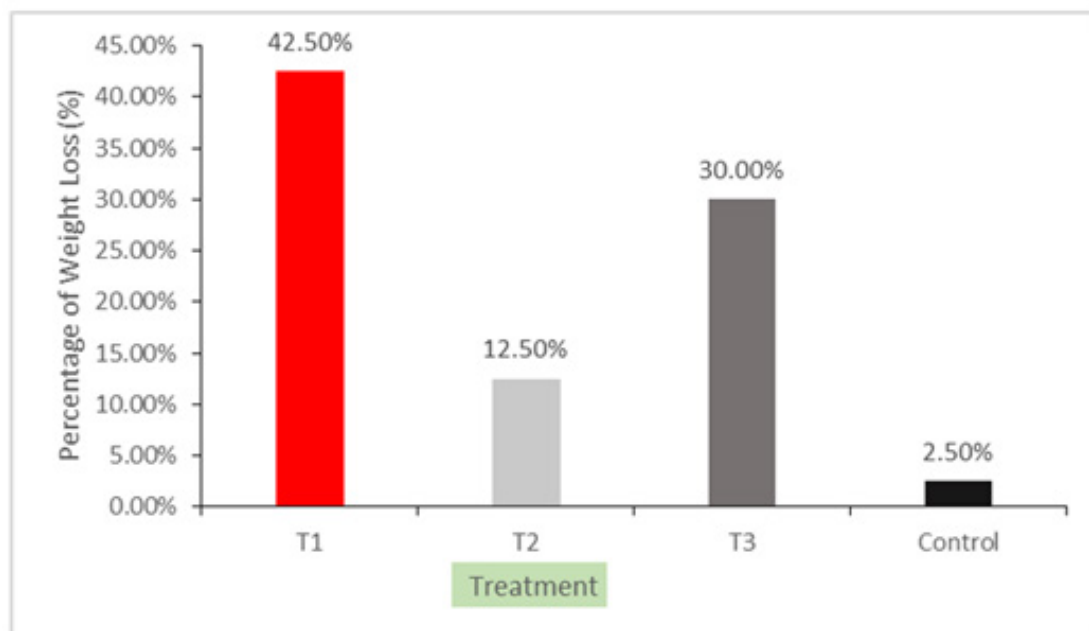
This is because the percentage of weight loss for Pandanus amaryllifolius (30.00%) is higher than lemongrass (Citratus flexousus) extraction (12.50%) and naphthalene (2.50%), so it is caused by the insufficient repellent smell produced from pandan (Pandanus amaryllifolius) against cockroach or can be material.

Based from the experiments, it has been shown that control is the most effective repellents against cockroaches compared to T2 and T3. This has been shown by the results contents. Between from the two plants extraction, lemongrass (Citratus flexousus) is more efficiencies on repel the cockroach than pandan (Pandanus amaryllifolius).

4. CONCLUSIONS

Based from our result, we can conclude that the extraction plant (PE) from lemongrass (Citratus flexuosus) are more affective for cockroach repellent compare to the Pandan leaves (Pandanus amaryllifolius) because of the such thing as lemongrass contain substance as geranial and especially Citronella as insects spray. As we can see that plant extraction from organic material able to be a great rival as well that has been previously commercialized chemical repellent, a mothball, to be an affective repellent agent to the cockroaches.

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MANAGEMENT OF FOREST : THE EFFECT OF GLOBAL WARMING TOWARDS INSECT FAUNA ON FOREST AREA

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ABSTRACT

Study of insect fauna on forest area was conducted from July to August 2019 to determine the diversity and abundance of beetle fauna at Burni Geureudong Forest, Takengon, Central Aceh. The study was conducted at two sites namely trail I and trail II. The beetles were sampled using 2 light traps, 2 malaise traps and 20 pitfall traps. Total of 219 beetle specimens comprising of 67 species from 24 families were collected. Light trap collected the most number of beetles (N=117) and Margalef index showed that the most abundant beetle was collected by light trap (Margalef index: 27.551). Shannon-Weiner index shows that the most specious beetle was caught by light traps (4.399). The most abundant family caught was Staphylinidae (Margalef index: 2.667) and specious beetle family caught was the Chrysomelida (Shannon-Weiner: 1.846) followed by the ground beetle family Scarabaeidae (Shannon-Weiner: 1.828). Result of this findings showed that Burni Geureudong Forest is an undisturbed forests and has been preserved well.

Keywords: Beetle, Diversity, Abundance, Margalef Index, Shanon Weinner

INTRODUCTION

Tropical rain forests are one of the most species-rich and functionally important terrestrial ecosystems supporting over half of global biodiversity (Myers et al., 2000). Although rain-forest modification and conversion has generally a strong negative effect on biodiversity, responses to anthropogenic disturbances vary between taxonomic groups (Lawton et al., 1998; Schulze et al., 2004). The loss of biodiversity is not only a conservation issue but also can have important ecological consequences. For example, a decline in species richness can negatively affect ecological services such as pollination and the natural control of pests (Klein et al., 2002; Klein et al., 2003). Therefore, studies on the response of functional groups, which provide important ecosystem services to anthropogenic disturbance, are urgent when aiming to maintain a high sustainability of tropical land-use systems.

Forest management in temperate and boreal regions is often based on a strong foundation of applied ecological research. Increasingly, this has allowed the needs of dead wood associated insects to be addressed. However, there has been very little equivalent research in tropical forests, where insect faunas are likely to be much richer and where forestry is usually subject to weaker environmental controls. As in temperate regions, tropical beetles are likely to be highly specious, and to exhibit a wide range of life-histories. Coupled with their relative ease of capture, storage and identification (compared to many other invertebrates), these attributes make beetles potentially valuable in detecting impacts of tropical rainforest management that should equally be felt by many other groups of more cryptic forest-dwelling organisms sharing an association with the mature timber habitat (Simon Grove, 2001).

Insect plays significant role in ecosystem dynamics such as at forest, freshwater lakes, ponds, rivers, mountain and agricultural and also in our life. Tropical forest insect dominate the number of described and estimated species on earth. Understanding the degree of insect specialization to vertical zones, host plants and other resources within tropical forests is of central importance to global species richness estimates (Erwin, 1982; Stork, 1988; Hammond, 1995; Odegaard, 2000; Novotny et al., 2002). Tropical beetles are likely to be highly specious, and to exhibit a wide range of life-histories. Coupled with their relative ease of capture, storage and identification (compared to many other invertebrates), these attributes make beetles potentially valuable in detecting impacts of tropical rainforest management that should equally be felt by many other groups of more cryptic forest-dwelling organisms sharing an association with the mature timber habitat.(Grove, 2001). Beetles are well represented in all terrestrial habitats by many species, genera, and families, which are often used as indicators of environmental change because of their great habitat specificity (Forsythe, 1987; Lovei and Sunderland, 1996). Due to their small length, diversity and sensitivity to environmental stress have been considered as good indicators of habitat heterogeneity.

The tropical forest is one of the richest habitats for plant and animal diversity (Prance, 1982) and some simple but informative work can be undertaken comparing animal or plants diversity across different habitats especially for habitat was disturbance cause of deforestation, agriculture, plantation or climate change. A study on abundance and diversity of beetles Burni Geureudong forest was conducted to determine that the beetles have not been affected by disturbed environment caused by global warming.

MATERIAL AND METHODS

Study area and sampling duration

The study area is located in at Burni Geureudong forest area, about 50 km east of Takengon city. The margins of the park are characterized by a mosaic of near-primary forest, human-modified forests, forest gardens and plantings of lemon grass, coffee and few vegetables, as the most important crops (Gerold et al., 2004). The study sites are located in at Burni Geureudong forest area (4°48'51.8"N 96°48'54.2"E) In the period June 2018–July 2019, precipitation at forest area was 1889 mm y−1, mean daily temperature, relative humidity, wind speed, and global radiation were 23.60C, 82.0%, 0.92 ms−1and 17.7 MJm−2, respectively (BMKG Stasiun Melikul Saleh, unpublished data). Samplings were made at two sites namely trail I and trail II area.

Figure 1 : Location of study
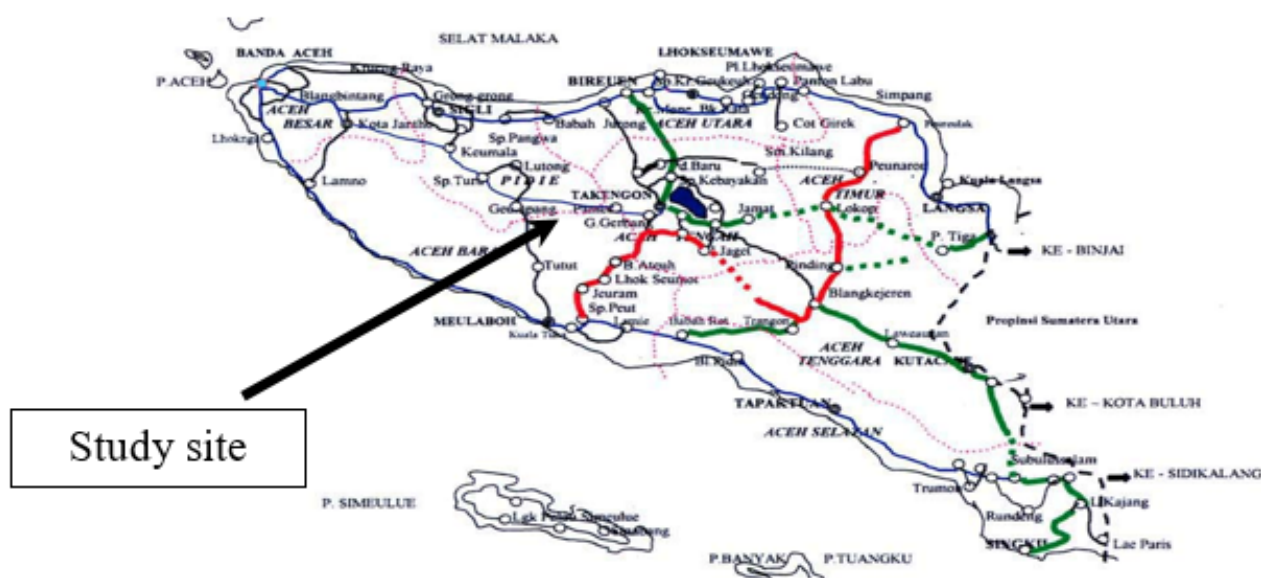
Sampling methods

To ensure maximum assemblage, several methods of collection were employed following Fauziah and Ibnu Sina (2009). Throughout the expedition, a total of four malaise traps and five pitfall traps were set up in the morning at 0800 for 24 hours at each sampling site in total of 3 days sampling. Six light traps were set up before nightfall and generator was switched on at 1900 to 2400 to collect beetles attracted to light.

Figure 2 : Set Up Pit Fall For Each Trail (Fauziah et al., 2008)
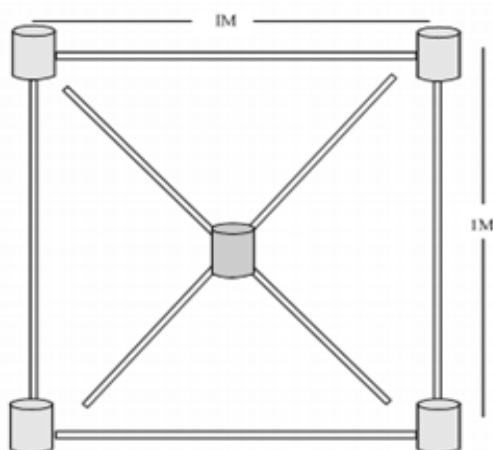
Figure 3 : A malaise trap set up one meter froum ground (Fauziah et al., 2008)
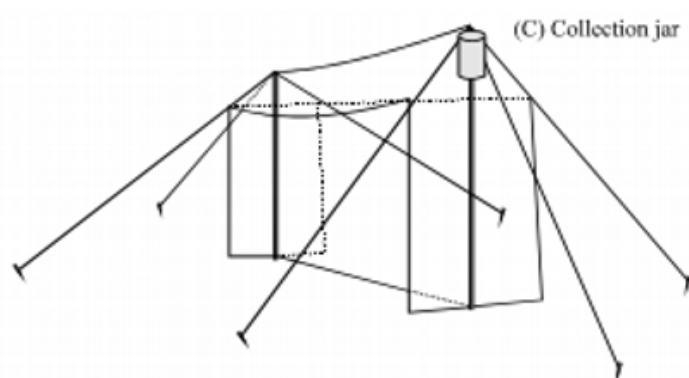
Sorting, preservation and identification

Specimens were sorted to family level according to Borror and Delong (1974) and Triplehorn and Johnson (2004) and the specimens were preserved in 70% alcohol in scintillation vials. The specimens were brought back to Jakarta, pinning and drying in oven. The beetle species were identified using key identification (Borror and Delong, 1974)

Figure 4 : Sorting Beetle Into Families, Genus And Species Level
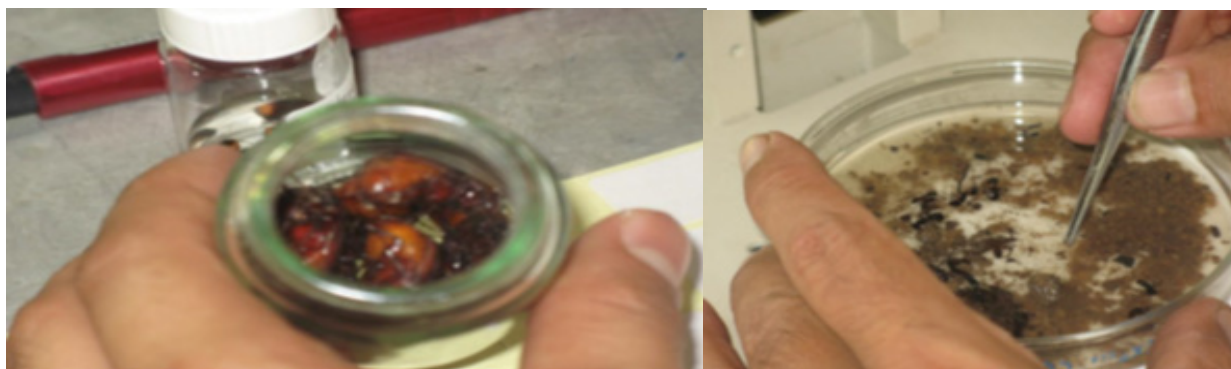
Ecological indices calculation

Species richness and abundance of beetle fauna were determined using Margalef index and the diversity was calculated using Simpson index and Shannon-Weaver index.

$$R = \frac{S-1}{\ln N} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

S: the number of species recorded in a sample; with that of sample size N (Waite, 2000).
Abundance increased proportionately with the value of Margalef index.

The diversity of each different family of beetle and the overall for Coleoptera was determined using Shannon-Weaver Index given in equation 1,

$$D = 1 - \sum_{i=1}^{N}(Pi)\square^2 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

This index assumes that each species was represented in each sample and that there was random sampling of individuals from an infinitely large population. Diversity increases with the increase in the value of the index. Shannon-Weaver index has a maximum value of 5.

Based on the probability that two unrelated strains sampled from the test population will be placed into different typing groups. This probability can be calculated by Simpson's index of diversity, which was developed for the description of species diversity within an ecological habitat. This index can be derived from elementary probability theory and is given by the following equation:

$$D = \frac{\sum n(n-1)}{N(N-1)} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

RESULTS

A summary of beetles sampled at Burni Geureudong forest is given in Table 1. Total of 219 beetle specimens comprising of 67 species from 24 families were collected. The checklist of the beetles collected at Burni Geureudong forest shown in Table 2. The beetles were abundant at all trails locations as shown by the values of Margalef index (Table 3). Light trap collected the most number of beetles (N=117) and Margalef index showed that the most abundant beetle was collected by light trap (Margalef index: 27.551). Shannon-Weiner index shows that the most specous beetle was caught by light traps (4.399). The results showed that the most efficient trap was light trapping. Trail I has the most abundance (Margalef Index: 18.572) but trail II was the most specious (Shannon Weiner Index: 4.176) beetle fauna, whereas trail II has the least abundance (Margalef Index: 17.295) and Campsite has least diverse (Shannon Weiner Index: 3.769).The most abundant family caught was Staphylinidae (Margalef index: 2.667) and specous beetle family caught was the Chrysomelida (Shannon Weiner Index: 1.846) followed by the ground beetle family Scarabaeidae (Shannon Weiner Index:1.828).

Table 1 : A summary of beetles collected from three study sites in Burni Geureudong Forest

Sites	Individual	Family	Species	Margalef index	Shannon Weiner index
Trail I	102	11	28	15.145	0.938
Trail II	117	13	39	16.573	0.954
Total	219	24	67	31.718	0.958

Table 2. Checklist of beetles at Burni Geureudong forest and value of ecological indexes according to family.

Family	Morpho-sp	Ind	Margalef Index	Simpson Index	Shannon-Weaver
Index					
Anobiidae	Ano A	1			
Anthribidae	Litocerus deyrol	1	1,442695041		0,69315
	Litocerus payiei	1			
Bostrichidae	Sinoxylon conigerum	1	1,442695041		0,69315
	Bost B	1			
Byrrhidae	Byrrhus sp	1	1,442695041		0,69315
	Byrr B	1			
Carabidae	Brachinus sp	7			
	Clivina sp	15	0,943973941	0,4565	0,91797
	Nebria rufescens	1			
	Adelioides sp	1			
Cerambycidae	Pterolophia sp	1			
Chrysomelidae	Ochrales nigripes	3			
	Nodostoma sp.	2			
	Smaragdina sp	1	2,502194349	0,0909	1,84622
	Chrysolina sp	2			
	Phratora sp	1			
	Luperus sp	1			
	Chry F	1			
Cicindelidae	Cicindela versicolor	1			
Cleridae	Cle A	1	0,910239227	0,3333	0,63651
	Cle B	2			
Coccinelidae	Cocci A	2		1	
Curculionidae	Cucu A	1			
	Curcu B	2			
	Curcu C	2	2,055593369	0,0952	1,54983
	Curcu D	1			
	Curcu E	1			
Dystiscidae	Dys E	1			
Elateridae	Alaus nubilus	1			
	Monocrepidus paradigophorus	1			
	Ela C	1	2,164042561		1,38629
	Ela D	1			
Erotylidae	Megadolacne sp	1			
Hydrophilidae	Merosternum species	1			

Family	Morpho-sp	Ind	Margalef Index	Simpson Index	Shannon-Weaver
Index					
Lampyridae	Photinus sp	1			
Lucanidae	Lucanus sp	1			
Lycidae	Lygistopterus sanguineus	1			
Nitidulidae	Carpophilus sp	1	1,442695041		0,69315
	Niti B	1			
Platypodidae	Platypus linearis	15		1	
Scarabaeidae	Anomala cusripes	1			
	Anomala sp	1			
	Anomala sp2.	1			
	Oryctes sp	1	2,652462272	0,1428	1,82884
	Phyllopaga sp	3			
	Scara F	1			
	Scara G	5			
	Scara H	1			
Scolytidae	Xyleborus affinis	11	0,306927676	0,4923	0,68127
	Xyleborus sp	15			
Staphylinidae	Paederus sp	66			
	Orphnebius sp	5			
	Acylophorus sp	2			
	Eleusis kraatzi	7			
	Bledius sp	1			
	Orphnebius bakerianus	1	2,660246896	0,5323	1,18264
	Lispinus sp	3			
	Pachycarimus sp	1			
	Philontus ventralis	1			
	Paederus sp	1			
	Stenomastax sp	1			
	Tachnimorphus fulvipes	1			
	Staphy M	1			
Tenebrionidae	Eucyrtus pretiosus	2			
	Melanimon tibialis	1	1,242669869	0,2	1,05492
	Alobates sp	2			
24	**67**	**219**	**12,24700715**	**0,1087**	**3,14954**

Figure 8 : Number Of Individual Of Each Family Of Beetle Sampled At Burni Geureudong Forest
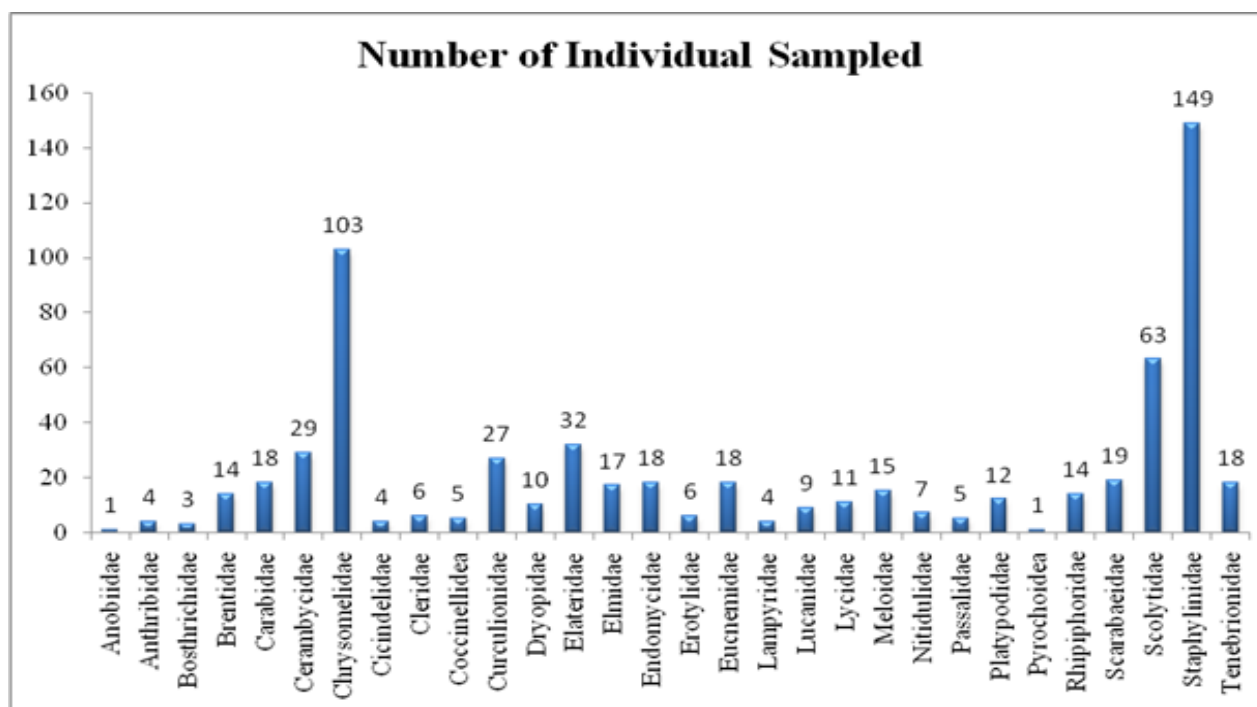
Figure 9 : Number Of Species Sampled From Each Family Of Beetle At Burni Geureudong Forest
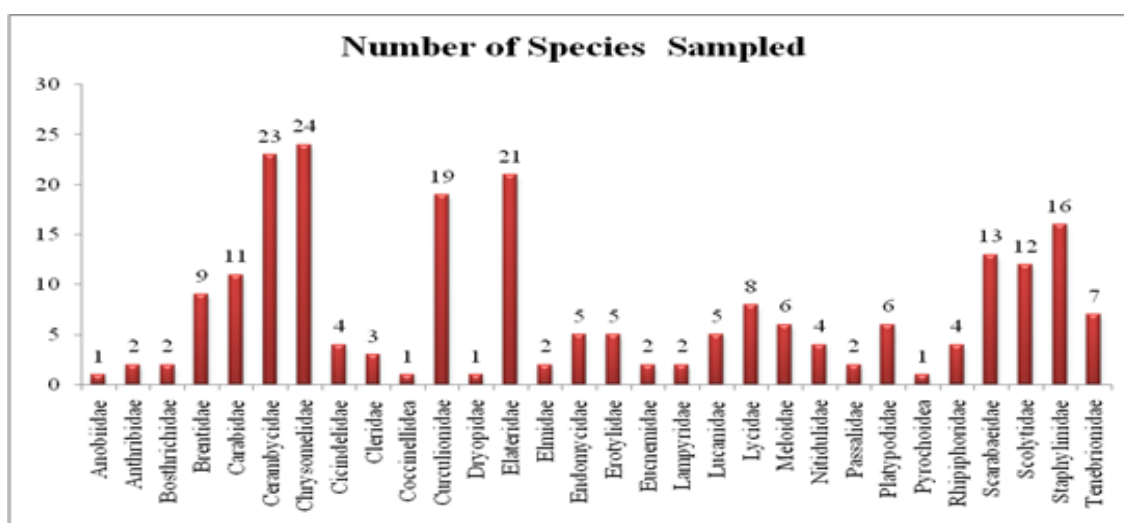
Figure 9 shows that most of the beetle specimens collected belongs to family Staphylinidae (N=149) followed by Chrysomelidae (N=103) and Scolytidae (N=63). Figure 3 gives the number of species collected from each beetle family. The most number of species collected were from family Chrysomelidae (N=24) followed by family Cerambycidae (N=23) and Elateridae (N=21)

Figure 10 : Number Of Species Sampled Using Different Traps Between Sites At Burni Geureudong Forest
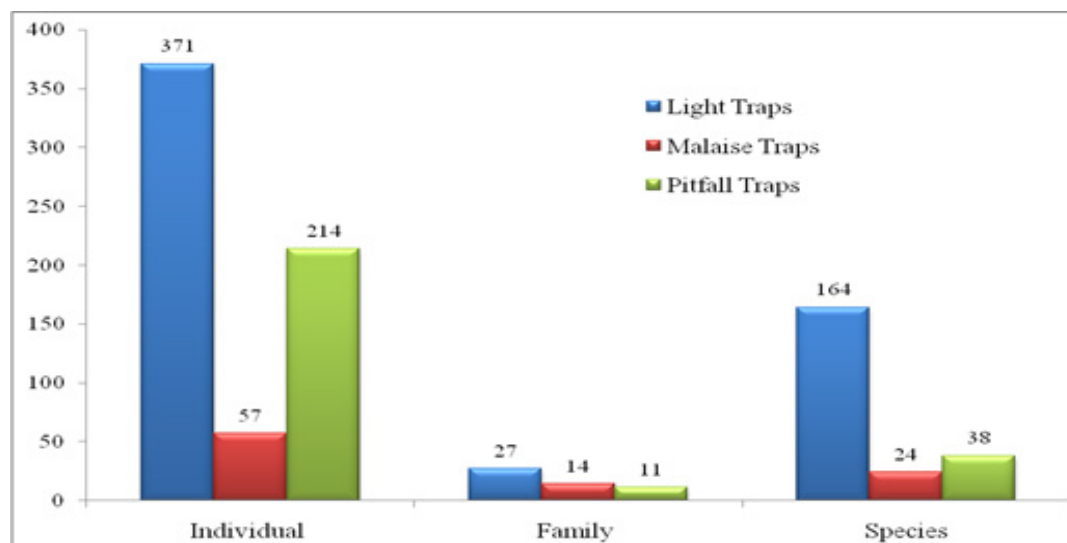
Figure 10 shows that the highest number of beetle family (N=29) collected was from trail I followed by the sampling from Site II (N=26) whereas the least number of beetle family sampled were at trail I (N=23). Figure 11 shown that, number of species sampled using different traps between sites. Light trap collected the most for individual, species and family compared to malaise trap and pitfall trap.

Figure 11 : Poecilips varabilis
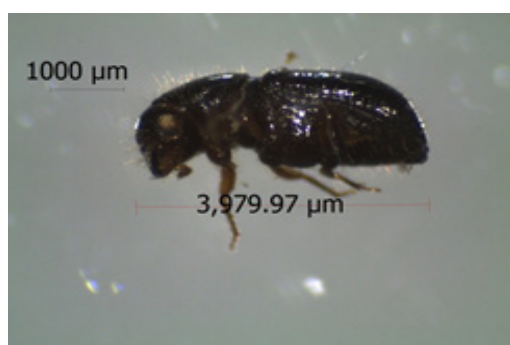
Figure 12 : Brachypeplus orientalls
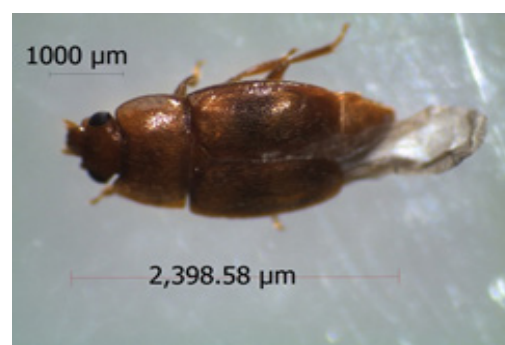
Figure 13 : Byrrhinus sp.
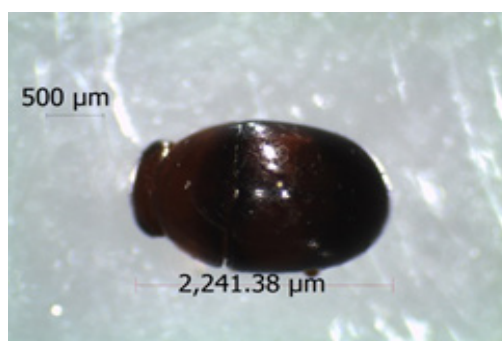
DISCUSSION

Combining all study sites, there was a high abundance (Margalef index 33.885) and high diversity (Simpson diversity index: 0.968: Shannon Weiner index: 4.534) of beetle fauna sampled at Burni Geureudong forest, Central Aceh. This is because the forests were still intact with no human activities no development.

The findings of this study shown that, the most efficient trap was light trapping. Light trap method used light as an attraction to the insect approaching. According to Melbourne (1999), vegetation structure influences trap capacity to capture insects.

The most abundant and specious beetle family caught was Cerambycidae (29 individual from 23 species, Margalef index: 6.533; Simpson diversity: 0.953; Shannon Weiner: 2.994) followed by the click beetle family Elateridae (32 individual from 21 species, Margalef index: 5.771; Simpson diversity: 0.967; Shannon Weiner: 2.913). Dagobert et al. (2010) reported family Chrysomelidae are the most abundant family followed by Cerambycidae cause of this family are phytophagous and are generally found on the foliage.

Result of this findings show that Gayo Lues forest is an undisturbed forests which have been preserved well. Tropical rainforest are home to a rich diversity of plants, birds, insects and other animals and they also play an important role in our global climate and provide aesthetic, recreational and medical benefits. For these reasons and others, it is critical that we understand how these forests generate and sustain their diversity and what we can do to help conserve them.

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DEVELOPMENT OF RFID STUDENT CALLING SYSTEM

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ABSTRACT

Abstract: Recently, the disappearance students either on their way home from school or while playing is one of a big issues. With a focus on disappearance students on their way home from school, a system has been developed to reduce the problems. Therefore a project named RFID Student Calling System was developed as an attempt to ensure that students are in safe and controlled area, and indirectly will reduce the kidnapping or disappearance children issue in this paper. Radio Frequency Identification (RFID) technology is used because it can detect students' identities and thus ensure their presence within the school. This system is a combination of software and hardware components using Arduino programming methodology. The special of the project is the designed call system concept which it can save parents' or responsible person's time when fetch students after school session. As soon as the card is touched on the RFID reader, the system will detect the name of the student and the speaker will be activated. So, the name of the student will be called. At in same time, Global System for Mobile Communication (GSM) will active and send a notification to parents for verification. This project also can record the history of incoming and outgoing students at the school. For market validation, this RFID Student Calling System have been conducted with several lecturers by touch or swap the identity card on RFID reader to check on the functionality of the product. The impact of the project is having a system that automatically calls student names when students are in the school area, to record the history of incoming and outgoing students during school session and to safe parents' waiting time when fetching their kids back from school. Thus, this can give benefits to teachers, parents, and students.

Keywords: kidnapping, RFID, Calling System, touch, identity card of RFID

1. INTRODUCTION

Kidnapping or disappearance children issues at school are increases every year. According to the Royal Malaysia Police data based statistic, a total of 9781 children below 18 years old missing between 2011 until November 2015 [1]. These cases could happen while the children come or when they return from school. One of the method to control these situation is identify the presence of kids when they comes and while they returned home by records their movements in and out from school automatically. Also, to overcome this problem, kids or students are not allowed to hang around at outside of the school until they invited by their family or the party authorized by the family. However, the problem is the parents or those in charge will look after their children during the process of taking their children because their children are not out of the fence when they finish schooling. This will waste the parents' time.

To assists the parties to resolve the issues, one system that can improve the security system at school named as "RFID Students Calling System" have been created. Every parent or the authorized party must have at least one RFID tag which have their different identity number. Once parent touch the card, the system will call the students name. So that, their child will know their parents are coming to the school and they can back home safely. This system also will record all the history or data of student for reference.

Therefore, the objectives of this study are to develop a project that can automatically call student names when students are in the school area, to record the history of incoming and outgoing students during school session and to safe parents' waiting time when fetch their kids back from school.

Usually, in a RFID system, the tool called RFID tag or transponder which contains information stored electronically, is used to store and retrieve data remotely without direct contact. For identification purposes, the RFID system is widely used due to its advantages that it may be installed on or in a tool, product or any living thing. [2].

After identifying the advantages of RFID system, a project name as RFID Calling System have been developed. This RFID System not only can detect and punch the attendance, but it also can record the movement of the student while come or return back from school. It also have voice calling system to call the students' name when they invited by their parents at the end of their school sessions.

The product is suitable with suggestion from Zhang Yuru, Chen Delong and Tan Liping to combine the actual state of the college student class attendance system with a student presence system project based on the RFID concept. Researchers have used three parts of the system namely RFID tag, RFID reader and database system. From the result, it is found that the designed system not only enhances the efficiency of work, but it also saves time and manpower, align with other RFID system [3].

Arulogun at el. and Basheer & Raghu [4, 5], have used the concept of RFID flexibility automatically to record student attendance. The results of this study have shown great success in using this system in the faculty with accurate and fast data recorded. Priyanka Sahare et al. [6] also proposes the use of RFID technology in building a system of attendance at its institution. He found that while providing a fast process, RFID technology also has many benefits that could be expanded. However, one of the challenges of developing this technology is to convince firms involved in applying the technology due to cost constraints.

2. METHODOLOGY

2.1 System Architecture

There are several modules and devices used in developed the RFID calling System. The module included in the system architecture are Arduino Uno Microcontroller (Atmega328), RFID Reader, RFID tags, MICROSOFT VISUAL STUDIO and speaker.

Based on the datasheet, Arduino Uno used is ATmega328P microcontroller board. This ATmega328P has 14 pin inputs and 14 pin outputs. Where 6 pins are used as PWM output, 6 pin inputs are analogous pins, 16 MHz quartz crystal, pin for USB connection, power jack, ICSP header and reset button [7].

The RFID Reader module is a tool that can read serial numbers on cards or RFID tags near them. However. There are various tag transponder packages where each tag has a distance between each other between 10% based on the different package. In this project, researcher used MCR522 RFID Reader.

This RFID tag is also known as a transponder. That is the origin of the term transmitter and responder. The RFID tag has the data that will be sent to the reader when the tag is near by the reader. The most basic and most commonly used tags are comprised of integrated circuits with the memory of which is a microprocessor chip.

Table 1: Types of RFID Tags features [6]

Features	Type of Tag	
	Passive	**Active**
Read Range	Short (up to 10 m)	Long (up to 100 m)
Lifespan	Up to 20 years	Between 5-10 years
Battery	No	Yes
Cost	Cheap	Very Expensive
Availability	Only in field of Reader	Continuous
Storage	128 bytes read/write	128 Kbytes read/write

The RFID card or tag can be divided into two types namely passive and active tag [8]. Tags that are initiated by the reader are known as passive tags while those that do not require external initiation are called active tags. Each tag type has a different characteristic of the one described in table 1. Based on the more practical and inexpensive features, researchers choose passive cards for the development of this project.

For programming purposes the Microsoft Visual studio are used in this project. Microsoft Visual studio is not just a programming language but it is also an Integrated Development Environment or IDE that is easy to use by the user interactively. Especially for building a graphical interface ("GUI = Graphical User Interface") and linking it to the handling of functions provided by the application. With the advantages available, it is capable to developing computer programs, as well as websites, web applications, web services, database and mobile applications. It can be used to maintain console and GUI applications together with Windows Forms applications, web pages, web applications, and web services in both the original code and managed code for all platforms supported by Microsoft Windows, Windows Mobile, .NET Framework.

Various process needs to be done according to proper procedures to ensure that the projects will be success are Research, Collection of Data and Information, Analysis of Project, General Studies, Procedure/ Step of Work, Flow Chart of Project and Gantt Chart.

Figure 1: Prosedure Process
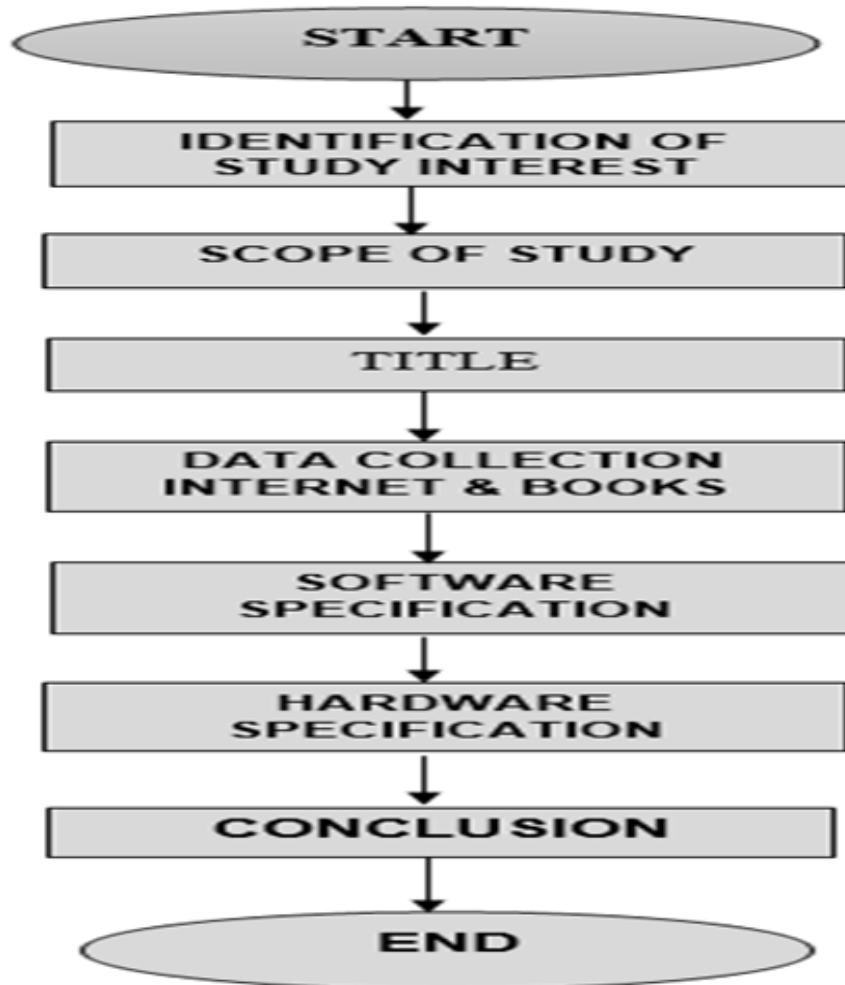
This RFID Students Calling System can also act as an automatic attendance calling system. Its primary components consist of Arduino Board as microcontroller, databases, RFID tag and a RFID reader.

2.2 Conceptual Framework

To developed the system, there are 3 phases involved. First phase is to interface RFID reader by using Arduino micro controller. The second phase is to transfer a data from RFID tag to RFID reader. And then the data will be displayed on the Arduino serial monitor. Third phase is to interface data logging and sound system with Arduino.

The conceptual framework design and development of The RFID Calling System is shown at figure 2 below.

Figure 2: Overall Block Diagram of The RFID Calling System
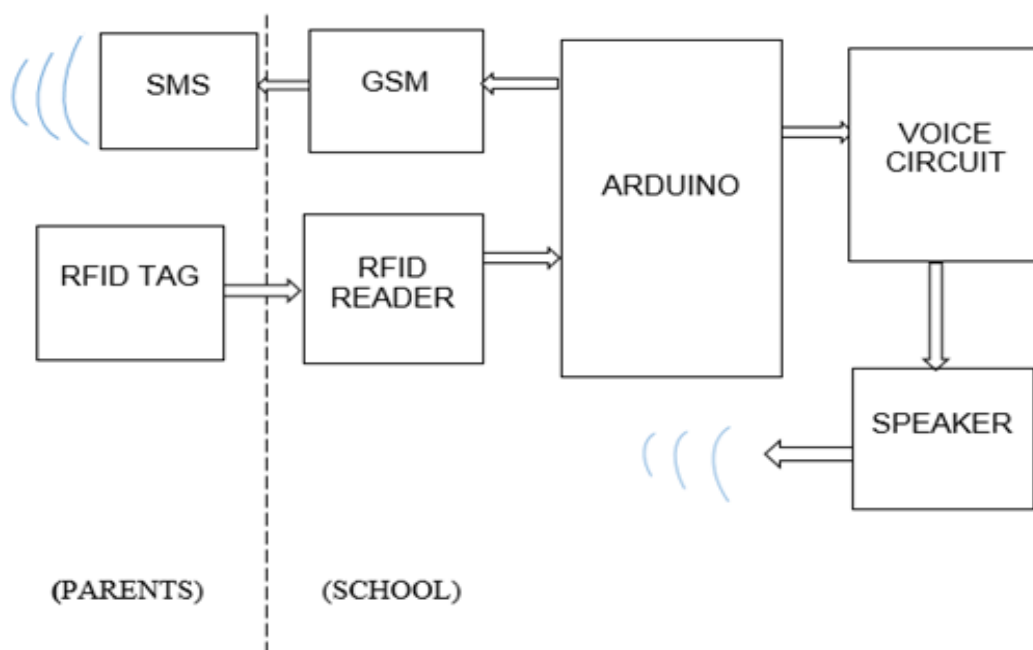
It consist of main circuit which used Arduino Nano microcontroller system to control all the system. Others parts are RFID tags, RFID reader, GSM900A, voice circuit and speaker are attached to the completed the system.

Detailed study had been made to build the smart monitoring and sound system to monitor the attendance of the students and call the student's name while return back from school. Microsoft Visual Studio software had been used to develop graphical user interface (GUI) by integrating with RFID system to capture and record students information.

Figure 3: Operation Flow Chart Process
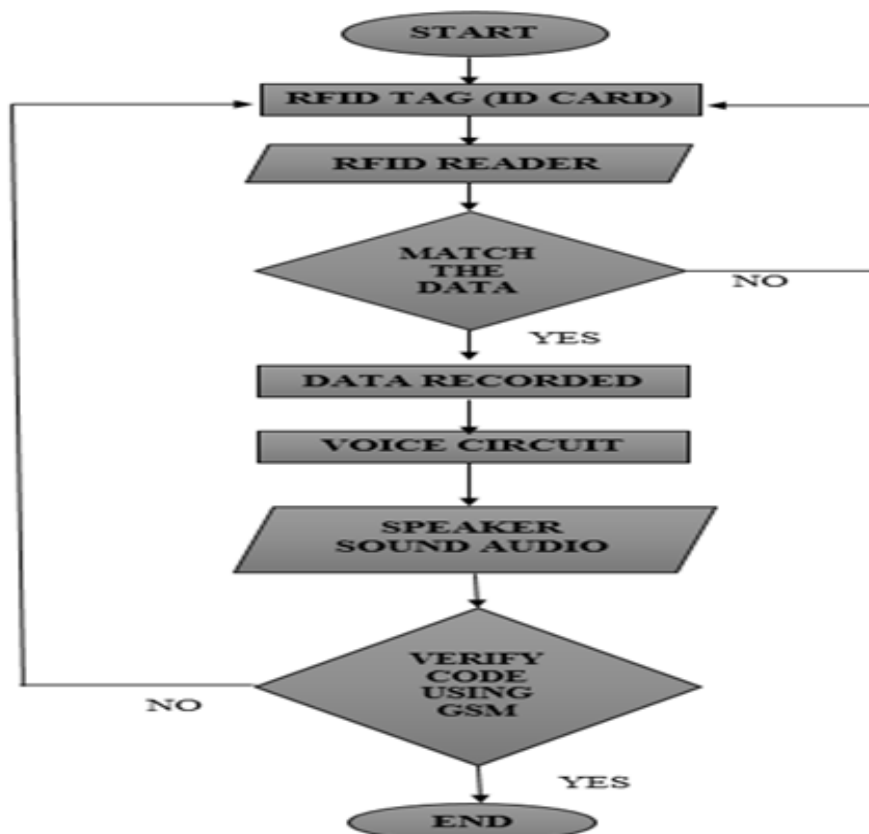
Figure 3 below shows is a flow chart process of the system operation. When the RFID tag or card placed near to the RFID reader, the RFID reader will read the information of the student and send the data to Arduino programming. If the data can read by the system, it will be record the information such as name, class and time. Otherwise, if the system cannot read the data, the administration of the system will review whether the card is working properly or not and the maintenance process will be carried out. When returning from school session, the student's name will be announced through loudspeakers to avoid long waits parents of students' out of the classroom. It is because, to avoid the kidnapping or disappearance, students not allowed to hang out outside of the school.

The RFID system uses electromagnetic fields to identify and track tags attached to objects automatically. The tags contain electronically stored information. Passive tag used to collect energy from a nearby RFID reader's interrogating radio waves while active tags have a local power source and may operate hundreds of meters from the RFID reader. The tag need not be within the line of sight of reader, to be embedded in the tracked object.

As shown at block diagram below, the RFID tag that is also known as ID card that has a record of identity of all students. This RFID tag need to scan by RFID reader that will send a voice message to the speaker in the school area. The voice message received the data and send the information to the speaker in the school area by using PCB that has a voice circuit.

At the same time, the school will send a SMS to the parents for verify using GSM through hand phone. Then, the school will let the students go to their parents after the parents send the correct verification code to the institution.

3. RFID DEVELOPMENT

The development of the product involves software and hardware processes. For software, it included the preparation of student databases and Arduino programming. While for hardware process is involves connecting the Arduino Uno Module, voice circuit, GSM module and jumper wire.

The first step was designed a database in Visual Studio. Since, the database was built using Microsoft Access, so the data sources should be Microsoft Access Database File.

Then, RFID Reader should connected to Arduino Uno Collecting Parts such as Arduino Uno, MFRC522 module and jumper wire as shown in Figure 5.

Figure 5: Connecting the Component
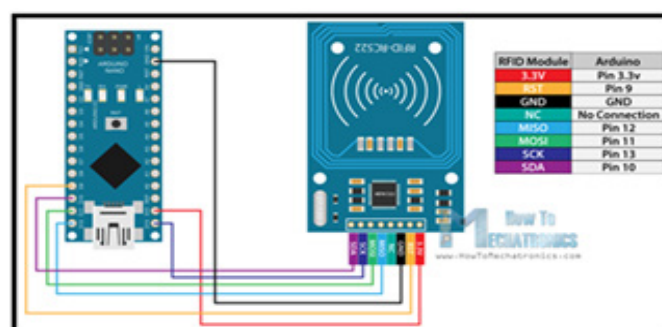
RFID is one of the member in technologies and also referred as Automatic Identification and Data Capture (AIDC) [9]. AIDC methods identify objects, collect data about them automatically [10]. With the use of radio waves, all the data will be transfer directly into computer systems with less or no human intervention.

RFID system is build in from three components that is RFID tag (smart label), RFID reader and antenna RFID tags which is contain an integrated circuit and antenna are used to transmit data to the RFID reader (also known as interrogator)[9]. The function of the reader is to convert the radio waves to a more usable form of data. All the collected information data that stored in the database is then transferred to a host computer system through a communications interface to be analyze.

RFID Reader or MFRC522 is a highly integrated IC reader/writer for contactless communication at frequency of 13.56 MHz. The MFRC522 reader supports ISO/IEC 14443 A/MIFARE and NTAG. The MFRC522's internal transmitter is designed to drive a reader/antenna without the aid of additional active circuit to communicate with ISO/IEC 14443 A/MIFARE cards and transponders. The receiver module provides a robust and efficient implementation for demodulating and decoding signals from ISO/IEC 14443 A/MIFARE compatible cards and transponders. The digital module manages the complete ISO/IEC 14443 A framing and error detection (parity and CRC) functionality. The MFRC522 supports MF1xxS20, MF1xxS70 and MF1xxS50 products. The MFRC522 supports contactless communication and uses MIFARE higher transfer speeds up to 848 kBd in both directions [11].

Setup RFID library from the Library Manager will open a list of libraries that are already installed for installation.
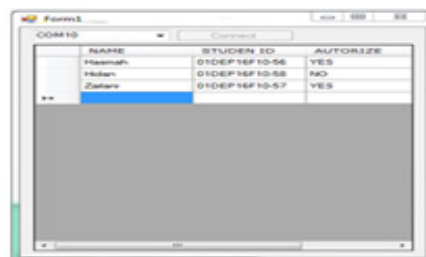
To set up for RFID Tag (Card), plug an Arduino into the computer and then select the correct board and com. After that verify and upload the sketch, open up serial monitor and set baud to 9600 baud. In order to start the project, install the Arduino Software. Search The Serial Monitor Port and scan the card. Open The Microsoft Visual Studio Software. After Connect the com port, then connection is successful [12]

After Arduino IDE is installed on the computer, connect the board with computer by using USB cable. Then open the Arduino IDE and choose the correct board by selecting Tools>Boards>Arduino/Genuino Uno, and choose the correct port by selecting Tools>Port. Arduino Uno is programmed by using Arduino programming language based on wiring[13].

4. RESULT

Figure 6 below show the databased of the students after the RFID tag or card touch to the reader.

Figure 6: Student's Information

Figure 7 : The Complete Project Developed

From the Figure 7 above, this is the complete project of RFID Student Calling System block diagram. The RFID tag that contains electronically stored information will attach to an object which is RFID Reader that will automatically identify the record of the student. When the student enters the main school entrance, their parents or the person who responsible to send the children must sweep or touch the tag that given to the RFID antenna, and the RFID reader will read the student ID. Then, information about the student such as time in to school will be recorded to data based and the SMS system automatically sends to their parent's mobile to inform that the children arrived at school safely. While at end of the school session, parents will sweep the tag again, the RFID reader will find the data of the tag and the student's information will show up to the screen. The voice that we apply into the Arduino Uno will announce the name of the student. When the id card is compatible with the information in the databased, GSM will send a notification to the parent phone that has been registered for verification purposes. As soon as parents provide verification, the name of the student will be called through the speaker and then the return record of the student will be recorded in the system as shown in the figure 8 below.

Figure 8 :   Record of student's attendance

5. CONCLUSIONS

Based on the results, the "RFID Student Calling System" has been successful to achieve the objectives of allowing detailed students' attendance status, reduce human labor in data collection and tracking, and safe parents' waiting time when fetching their kids back from school. Besides, the designed system enhances the efficiency of work and saves time. This is because it has met the requirements of the objective which the project can automatically call student names when students are in the school area, manage to record the history of incoming and outgoing students during school sessions and had real-time process information.

However, for future work, this research should be extended with some studies on product durability, electronic parameter stability, safety and also consumer or parents, school management and teachers' satisfaction in using this product.

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TOOLBOX WITH FLIP-ABLE WORKBENCH (FLIP-BOX)

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ABSTRACT

FLIP-BOX is a combined innovation of workbench and tool carts to help users perform work more effectively. This product starts with the development of a tool cart for storage of workshop tools and workbench that connects to function as a work desk. Workbench when not in use will be folded in the top of the tool cart. Today's market is an individual tool cart or toolbox only where when users need a table to perform work, users are forced to find a suitable place. This tool cart has 3 tool storage drawers where the top for light storage, second drawer for intermediate heavy equipment and lower drawers are set to hold heavy equipment. It is also equipped with four wheels with two of them locked. Each drawer comes with a rubber mat to ensure the equipment does not slip when moving. This product is used during work; it is advisable not to put heavy objects on the workbench to ensure the workbench legs can accommodate the weight of the load. This product is expected to help users keep the device neatly and at the same time the user can use the work desk while using the tools taken from the storage drawer. As a result, this product can shorten the time for users to complete their work by combining workbench and toolbox together. It should also be a place of storage to ensure that the tools are properly maintained.

Keywords: Workbench, Tool Carts, Flip-Box

1. INTRODUCTION

Toolboxes can also be known as toolkits, toolbars or workbox. The main purpose of box equipment is to store or control the owners of tools and equipment to their workplace. Toolbox is a container shape used to store tools. A tool is a device used in its function to accomplish a task. Different toolboxes have different storage capabilities that the tools can be store in. Working as a technician or engineer in the aviation industry, there are many jobs that use so many different types of tools. From this, the use of equipment boxes in industry, work stations, hangars, workshops and so on is very much needed. The tasks and areas where users work can determine what kind of toolbox they need. The contents of the toolbox vary by owner.

The more tasks you have, the more tools there are, the more difficult it will be for them to carry. Difficulty is also found to perform work or inspection on aircraft without a workbench. Along with technology, the creation of toolboxes is essential to make everything easier for users.

If an owner wants to bring a job that requires the use of multiple types of toolbox, they must select a tool cart that is a large enough for him to put all the tools. The tool cart must also be of high strength as it must withstand the weight of the equipment. Tool cart need to provide better space and properly organized tools. The tool cart is designed to make it easy for users to carry all the tools to move around a hangar or other workplace. Workbench additions are also important for users to perform inspections or other work such as marking, soldering, rivets and so on.

2   LITERATURE REVIEW

The toolbox also has to be easily maneuvered (Eric. B, 1993). When it's heavy, it's difficult for the owner to carry it. To solve this problem, a tool cart comes with wheels for easy movement. The tool can also be put into small boxes that are known as drawers if the task requires heavy maintenance. Tool cart materials should also be appropriate for the type of tools. It must be strong, corrosion-resistant, free of hazards such as chemicals that can react with other substances, without affecting the health of the owner and the environment. Improvements to the tool cart should be appropriate for the various types of tools in use and for the quality of work performed.

The integration of the toolbox is made easy by adding improvements to the tool cart. There are hundreds of tools and permutations specific to each industry. Aviation maintenance tools include drills, drivers, adapter sets, box wrenches, socket sets, tie guns, crimpers, blind riveters and more.

Figure 1: Images of Aviation Tools

Source: https://www.indiamart.com/sh-industrial-needs/aircraft-tools.html

Nowadays, technology is growing rapidly. There are so many products that have been created to copy function toolboxes but only slightly different names and functions as well as tool cart. The research has been made with reference to the types of material on toolboxes, tool carts and workbench.

Figure 2: Toolbox materials: PVC, wood and metal

(i)   (ii)   (iii)

Sources :
i.   http://www.meghtools.in/
ii. https://www.pinterest.com/pin/715931671985259731/
iii. https://toolguyd.com/facom-cantilever-5-tray-tool-box/

Figure 3: Various types of tool cart

Sources :
i. https://pennyless.com.au/product/tool-cart-3-tier-parts-steel-trolley-mechanic-storage-organizer/
ii. https://www.lelong.com.my/7drawer-tool-cart-roller-cabinet-tool-chest-tools-trolley-id31349-knightauto-214597679-2020-08-Sale-P.htm
iii. https://sites.google.com/site/bestwardrobestorageaczo/best-deal-foxhunter-mobile-work-shop-3-compartments-chest-trolley-cart-storage-tool-box-plastic-toolbox-with-drawers-wheel-black-and-orange-new

Figure 4: Workbench materials: wood and metal

Source:
i. https://www.amazon.com/UltraHD-Adjustable-Height-Heavy-Duty-Workbench/dp/B071VFXPFB
ii. https://www.homedepot.com/p/Borroughs-34-in-x-72-in-Heavy-Duty-Adjustable-Height-Workbench-with-
   Stainless-Steel-Top-2018-WB105SS-EC/305234838

2.1 Objectives

The project has been developed to achieve a few objectives as below:
1. to design an easy-to-carry toolbox with a flip-able workbench
2. to build a toolbox with a low cost and high quality materials
3. to develop a toolbox that can make tools are easy to find

2.2 Comparison Between The Project With Other Design

Comparison with existing designs helps to develop with a better product as shown in Table 2.1.

Table 2.1: Comparison of Project with Recent Design of Toolbox

ASPECTS	PROJECT	RECENT DESIGN
DESIGN	Simple	Complex
SIZE	Small spaces	Big spaces
WEIGHT	Light	Heavy
MATERIALS	Aluminium plate &frame, pvc plate, recycled item & material	Steel casing, solid beech wood Expensive, high grade materials
COST	Low	High
LOAD	15-20kg	30kg

Compared to the recent product of toolbox this projects design is very simple. That toolbox is complex compared to this project. The design of this project is smaller in sizes and it can be flipped. It also has space at the top of it when the workbench is opened. The space can be filled with tasks cards, manuals or any other documents.

The main difference between the projects toolbox and the recent product is the material listed above. Our toolbox use hollow aluminum as frame and aluminum plate as the skin as well as PVC plate as the workbench. We intend to use as much recycled item as possible. Different from the commercial product as it used steel casing and solid beech wood as workbench material. Judging based on the material alone; the cost can be deduced that our product will have low cost compared to the other product. One minor limitation is the load of our product is less than that of the commercialized product.

Figure 5: Recent design in industry

Source: https://www.maribestonestop.com/7drawers-steel-metal-service-tool-cart-utility-tool-trolley

3. METHODOLOGY

From the literature review, improvements have been made to the toolbox with a combination of tool cart and workbench to facilitate and help users perform tasks more efficiently and effectively. When working especially with aircraft, it is difficult for users to find and go to the workbench and return to continue their work. The fastest way to solve this problem is to do this on the floor because they do not want to walk around the table. This is not the right way because when working on the floor it is likely that the worker will cause the floor to clutter with equipment and will disturb the workers who need to pass through the area. Area constraints also play a role in working.

Overall Material models have been designed and fabricated in as shown in Figure 6 and 7.

Figure 6: The side view combination of workbench and toolbox

Figure 7: The fabricated of toolbox with flip-able workbench

Compared to the recent tool cart product design this project is very easy. The design of this project is smaller in size and wooden table can be flipped. It also has space on top of it when the workbench is opened with the additional of a large workspace. The space can be filled with a task card, manual, or other document. (Figure 6 and 7)

The design of this project also comes with four wheels for maneuver-ability. The back wheel can be locked to ensure safety during jobs on the workbench. The back wheels can be locked and rotate 360o whereas the front wheel is static, Figure 8. The drawer of this project also is simple and efficient (Figure 8).

Figure 8: Maneuver ability and drawer
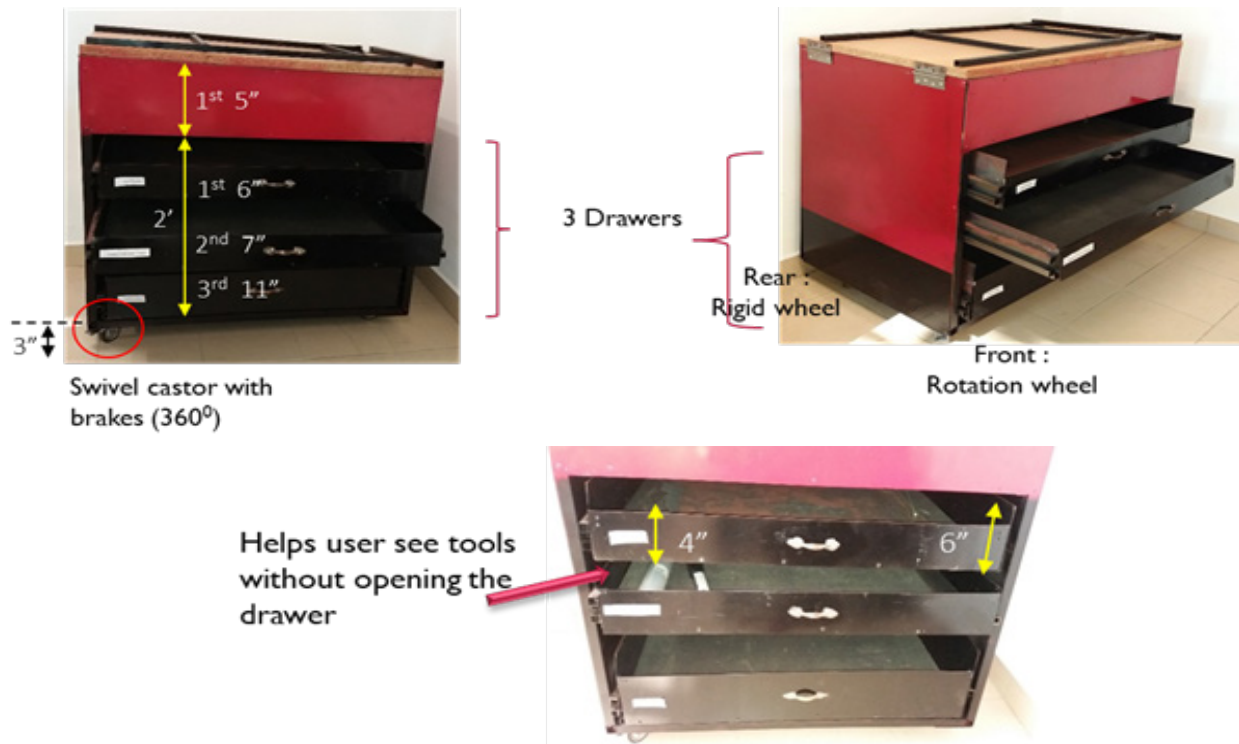
Our toolbox use hollow aluminum as frame and aluminum plate as the skin as well as PVC plate as the workbench, different from the commercial product as it used steel casing and solid beech wood as workbench material.

3.1 Product Description

This design combines the two most important types of engineering or maintenance related workbench and tool cart. The result is a well-designed, well-functioning box with workflip that has both a working workbench and tool cart. The product comes with 3 drawers and is designed to be a heavy duty tool.

Figure 9(a): The finished product extend

Figure 9(a): The finished product extend
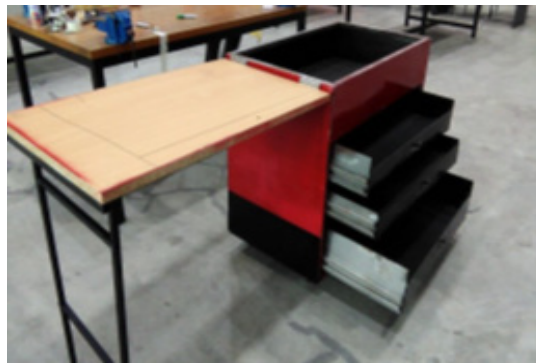
This product is fully operational as normal as the workbench and tool cart are operated. The custom tool cart can be driven to the desired job and locked with a lockable wheel. The flipping of the workbench is also by hand. The workbench is fitted with heavy duty hinges to make sure it is durable and moving well.

In addition, the drawer comes with 2 steel bars as railing and another steel bar is mounted on the frame tool cart where it will slide to move. Tool cart drawers are fitted with rubber mats to ensure that the tool inside the drawer remains fixed while the tool cart is moving. It ensures that the appliances don't end up crumbling and neat in the drawer

Figure 10(a): Product dimension at side view
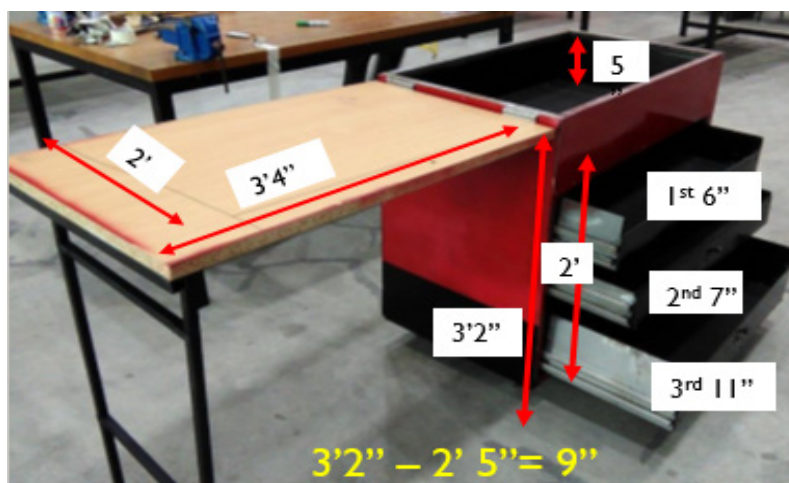
Product 10(b): Product dimension at rear view

4 RESULTS AND DISCUSSIONS

4.1 Product Functionality & Application

The tool cart is created as a combination of toolboxes and workbench. It is designed for easy retrieval when working at the workbench for users working in the field. This product comes with 3 drawers, and flip-able workbench made of wood. The flip-able workbench are mounted on the top and fitted with a hinge and when used will be made to stand next to the tool cart, at the same time display space connected under the initial working position.

Drawers shall be filled with lightweight tools such as rivets, screws, bolts and others in the first drawer while the second drawer for light and medium tools. The last and bottom drawers will be loaded with heavy equipment. It has 2 fixed wheels at the front and 2 wheels that can rotate 360o on the rear. The rear wheels have locking mechanism to keep the tool cart stationary and stable during operation. Tool cart are painted in red and black for easy identification and warning.

The limitation of this product is the weight of the entire product itself at about 35 kg without the tool. If the tool is added, it can reach a maximum of 50 kg. It makes the tool cart movement a bit difficult because of the weight acting on the wheels.

Figure 11: Product's component and origin
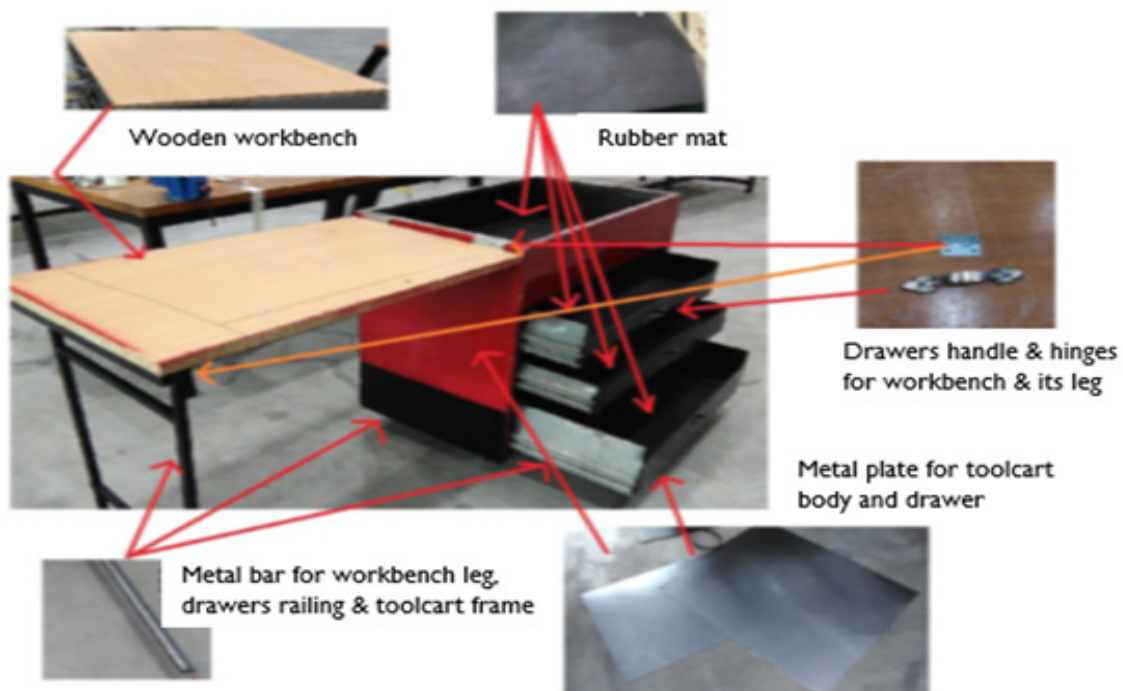
5   CONCLUSIONS

Tool cart design solutions that solve the problems faced by many users around the world such as heavy equipment, remote workstations and more. The literature review of this study has been built around the project plan and includes research on the various toolboxes in the market as well as the types of workbench available.

This design also contributes and helps users to ease their workload. The proximity between the workbench and the toolbox should reduce the time it takes for the user to complete the task. Tool cart for organizing, carrying and protecting the owner's tools.

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DEVELOPMENT OF DATA CENTRE DESIGN BY IMPROVING ITS COOLING PERFORMANCE

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ABSTRACT

Data centre are rooms or facilities used to house and protect computer systems and vital information that being stored on servers located inside the main 'hall' of data centre. Research was conducted in the purpose of taking a measurement to see on how to make an improvements to its cooling performance. The research site with existing condition of 100m2 facility consuming 1900MWh of electricity per annum and retrofitted original office space with no changes to existing façade or building cooling system. The method used was to improve heat-transfer performance by increasing the log-mean temperature difference (LMTD). LMTD describes the difference between the temperatures of the air passing across the coil fins and the water flowing through the coil tubes. Based on the data taken using a vane anemometer to measure the flow and temperature of the CRAC unit, the results indicates that by plotting a graph of log mean temperature difference versus variation of temperature, the result intersect at LMTD of 7.3. Data also indicates that, the key to designing a data centre are dependent on business model and the availability or uptime that we can get from dividing the Mean Time Between Failures (MBTF) with Mean Time Between Failures (MBTF) + Mean Time to Repair (MTTR). Using this formula, in maintaining the availability, redundancy and fault tolerance must be taken into account. Based on the Log-Mean Temperature Difference versus variation of temperature result, it proofs that by improving the data centre room conditions would have higher potential of increasing the cooling performance than the improving of HVAC unit.

Keywords: Data Centre Design, Data Centre Availability And Reliability, Space And Design Consideration, Energy Efficient Design

1. INTRODUCTION

Since the advent of the first computer, everyday life has become ever reliant on this technology to automate and make day to day tasks easier. In fact, data centres have become so integrated into society they have become invisible to the user.

When thinking about where computers are used, it can be seen that most activities do have a computer system somewhere in the process. Tasks such as making a purchase at the local supermarket using EFTPOS; or making a telephone call; then again, using the internet to find out what news is occurring around the world.
Each of these activities uses, in the background, a computer infrastructure called a DATA CENTRE.
The data centre is the core of all financial, telecommunications, and internet organisations to name a few. Without the data centre, these organisations would not be able to provide the services that their clients have grown accustomed to.

The data centre is a specialised facility in which computer systems are housed. It is not enough to just provide a standard building. Essentially, personal details and potentially sensitive information is stored in data centres. The organisations which hold this information should have a duty of care to their clients and users to securely hold and maintain their records and information. As such the data centre facility must be secure.

It is also important that the computers housed in the data centre be available at any time of the day. This is so clients and users can have access to their information where ever and whenever they need it. Therefore, to provide this 24/7/365 service, the data centre cannot just rely on the electricity company to prove an uninterrupted power supply. As part of our studies in the design and development of data centres, the task of testing was undertook on an existing facility of 100m2 facility consuming 1900MWh of electricity per annum and retrofitted original office space with no changes to existing façade or building cooling system at Victoria University's Footscray Park Campus and to take measurements of the temperatures and air velocities at a number of key location within the facility.

2. LITERATURE REVIEW

The trends which will influence data centre design will come though the changes in technology and the demands on businesses to provide a level of service to their clients.

In a white paper by Emerson Network Power , it suggests that there are 4 main trends which will influence the design and management of data centres in the future. These are:

1. Rack Density,
2. Facility Availability,
3. The ability to make changes, and
4. Visibility and control of the infrastructure

Current web data centre case study
Name: Google centre

Figure 1 : Google Data Centre <http://www.youtube.com/watch?v=1SCZzgfdTBo>

This web data centre is used by Google to store part of the information found on the internet. It is a very efficient centre with a PUE to match the benchmark data centres from around the world. This particular centre also incorporates green building design. Sustainability is the current trend for most engineering designs to follow. This centre uses an onsite dam and recycled water for water components and a wind farm to generate green electricity for the centre. This particular centre also has very heavy security to protect the facility, and client information.

Implemented security measures are:

- Physical barriers and fencing
- Constant security presence
- Linking interface with local police
- Video monitoring and video analytics
- Data server protection (crusher and shredder)
- Hard drive life cycle management
- Fire detection and suppression
- Thermal cameras
- Protocol not to allow public site visits and tours

From the substantial amount of security at this site it is clear how important that the data centre is constantly kept operational. If something were to happen to a web data centre it could have a major impact on society, problems that could occur if a web data centre goes down or is infiltrated are:

- Loss of internet search abilities
- Loss of online shopping
- Loss of online banking
- Card transactions may become unusable
- Loss of contact, emails for example
- Companies loose websites
- Credit card details could be stolen
- Identity fraud
- Money stolen
- Leaked personal information

From the descriptions of the types of data centres in this section, the impact that they have on modern society becomes apparent. They are a vital part of our lives even though most people do not even know they exist. The problems that can arise from data centres becoming inactive indicate why so much money and resources are spent on reliability, redundancy and availability. To ensure these problems do not occur, companies will go to extremes in their data centre designs to facilitate access to emergency services, protect the integrity of public networks and enable interoperability of voice telephony services .

Common Cooling Design Flaws

Today there are three main categories of air cooled distribution systems which provide cooling into a data centre facility. They are:

- Flooded (e.g. Room Cooling)
- Targeted (e.g. Row Cooling)
- Contained (e.g. Rack Cooling)

Each of these types of cooling has advantages and disadvantages depending upon the way it has been implemented. If these are not implemented correctly, they can result in an inefficient and costly data centre. Common flaws, consequences and improvements for these cooling systems are listed in the following table

Table 4: Summary of rack airflow design flaws with consequences

DESIGN FLAW	AVAILABILITY CONSEQUENCES	TOTAL COST OF OWNERSHIP CONSEQUENCES	SOLUTION
• No blanking panels • Equipment on shelves • Use of 23 inch racks without rail brushes	• Hot spots, particularly at tops of racks	• Electricity costs • Reduce CRAC capacity • Humidifier maintenance • Water consumption	• User blanking panels • Do not use shelfs • Use racks that have no open space outside the rails • Add brushes on wide racks
• Under rack wire openings without brushes	• Hot spots, particularly at tops of racks • Loss of static pressure in raised floor • Loss of cooling redundancy	• Reduce efficiency of CRAC	• Use gaskets or brushes around openings
• Glass doors • Doors with low ventilation	• Overheating • Amplification of problems relating to blanking panels	• Decreased space and rack utilization	• Use fully vented front and rear doors
• Shallow racks	• Cable obstructions cause overheating	• Decreased space and rack utilization	• Use racks with enough depth to allow free air around cables
• Uncontained hot and cold isle	• Cause hot spots and overheating	• Electricity costs • Reduced CRAC capacity • Reduced efficiency of CRAC	• Contain hot or cool air streams • Use blanking panels

METHODOLOGY

The experiment was conducted in Victoria University Footscray Park Data Centre. Figure 1 shows the layout for the present study. The floor area is 42m², equipped with 33 heat-dissipating racks, 4 CRAC units, and 3 UPS units. Table 1 describe the experimental conditions; heat loads in different racks and air velocity from different CRAC units supply. Three CRAC units are active during the experiment that supplies downward cooling airflow through the raised floor plenum acting as one big CRAC units to cool down the entire facility.

Figure 1: VU Footscray Park data centre floor layout
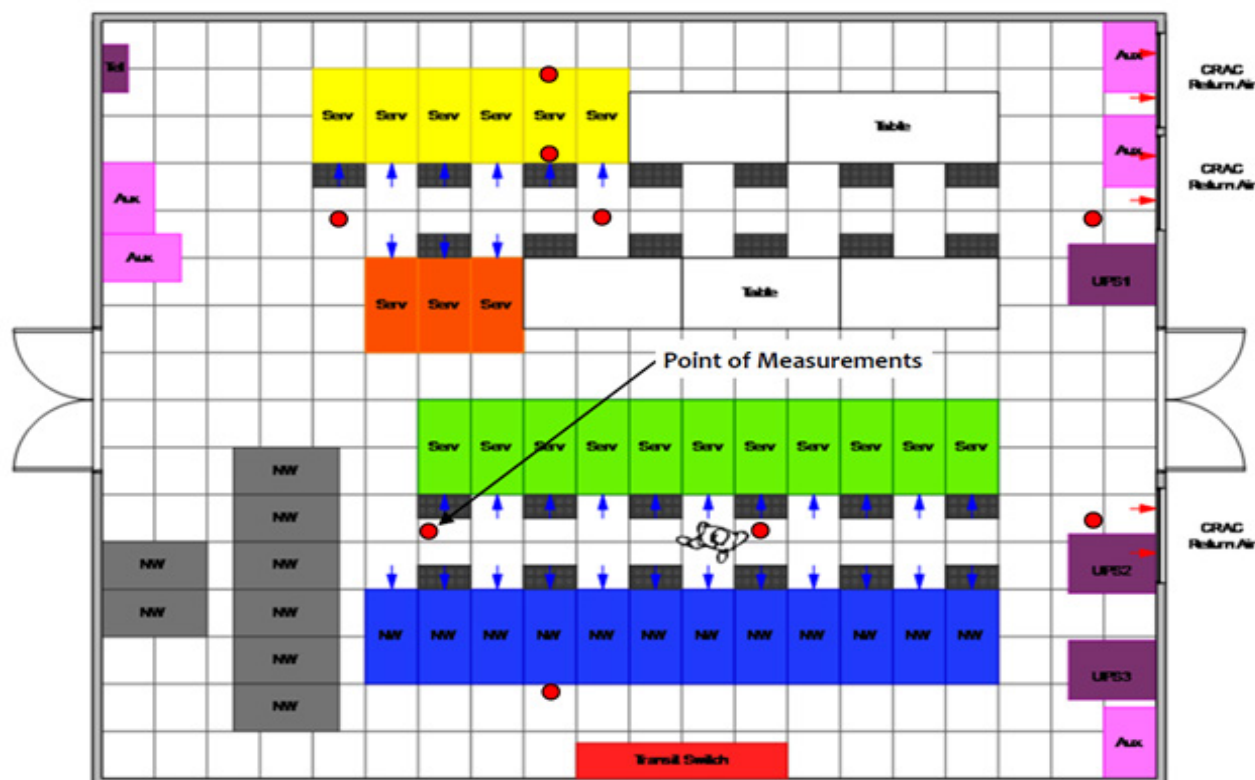
The dotted points are where all the measurements are taken during the experiment.

EXPERIMENT METHOD:

Figure 2: Thermocouple-based temperature measurement grid. All units are in mm
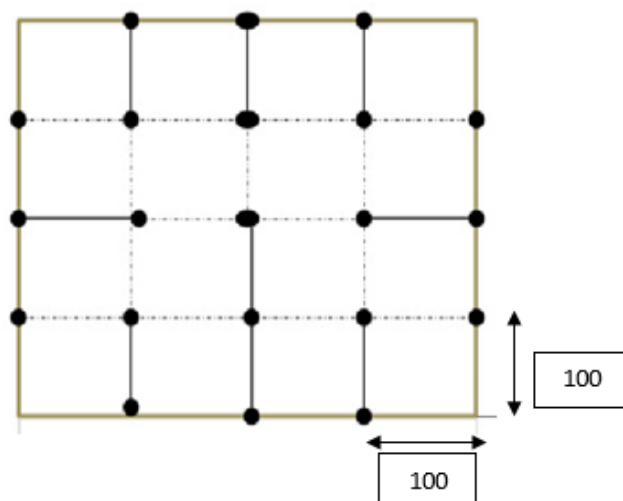
1. The ambient temperature was measured in the middle of the room.
2. The temperature   from the CRAC supply was measured from a three different spot.
3. Measured return grill temperature at three different spot.
4. Placed the layout grid at the designated racks. Take the measurement based on the grid.
5. Take air velocity for each racks and each point taken in process number 1 to 3.

3. RESULTS AND DISCUSSIONS

Table 1: Return Air Temperature for Experimental Condition

RETURN AIR TEMPERATURE

RETURN AIR GRILL	TEMPERATURE (ºC)
R.A-1	22.0
R.A-2	22.1

AMBIENT TEMPERATURE AT ROW D

SECTION	TEMPERATURE (ºC)
COLD AISLE	21.9
HOT AISLE	25
MIXING	22.5

Table 2: Underfloor / supply measurement taken

ROW B				ROW D		
PLACEMENT	**SECTION**	**TEMPERATURE (ºC)**		**PLACEMENT**	**SECTION**	**TEMPERATURE (ºC)**
FRONT OF SUPPLY	TOP	10.9		FRONT OF SUPPLY	TOP	14.2
	MIDDLE	10.9			MIDDLE	12.7
	FLOOR	11.1			FLOOR	15.6
AIR VELOCITY		5.7 m/s		AIR VELOCITY		6.0 m/s
PLACEMENT	**SECTION**	**TEMPERATURE (ºC)**		**PLACEMENT**	**SECTION**	**TEMPERATURE (ºC)**
MIDDLE OF SUPPLY	TOP	16.9		MIDDLE OF SUPPLY	TOP	19.7
	MIDDLE	17.2			MIDDLE	19.7
	FLOOR	15.6			FLOOR	18.9
AIR VELOCITY		3.4 m/s		AIR VELOCITY		4.0 m/s
PLACEMENT	**SECTION**	**TEMPERATURE (ºC)**		**PLACEMENT**	**SECTION**	**TEMPERATURE (ºC)**
FARTHER OF SUPPLY	TOP	14.6		FARTHER OF SUPPLY	TOP	21.0
	MIDDLE	14.5			MIDDLE	20.8
	FLOOR	15.1			FLOOR	20.6
AIR VELOCITY		2.8 m/s		AIR VELOCITY		3.3 m/s
READING AT THE FRONT OF THE RACK				READING AT THE BACK OF THE RACK		
SERVER RACK D3				SERVER RACK D3		
PLACEMENT	**SECTION**	**TEMPERATURE (ºC)**		**PLACEMENT**	**SECTION**	**TEMPERATURE (ºC)**
FRONT OF SUPPLY	TOP	23.3		FRONT OF SUPPLY	TOP	25.7
	MIDDLE	23.2			MIDDLE	26.1
	FLOOR	23.2			FLOOR	25.9
AIR VELOCITY		1.5 - 2.0 m/s		AIR VELOCITY		
READING AT THE FRONT OF THE RACK				READING AT THE BACK OF THE RACK		
COMMS RACK A9				COMMS RACK A9		
PLACEMENT	**SECTION**	**TEMPERATURE (ºC)**		**PLACEMENT**	**SECTION**	**TEMPERATURE (ºC)**
FRONT OF SUPPLY	TOP	22.7		FRONT OF SUPPLY	TOP	23.5
	MIDDLE	22.5			MIDDLE	23.9
	FLOOR	22.5			FLOOR	24.2
AIR VELOCITY				AIR VELOCITY		

RESULT ANALYSIS

Dynamic of Heat Transfer

The performance of current cooling system was measured by the application of the Log-Mean Temperature Difference (LMTD) value. LMTD describes the difference between the temperatures of the air passing across the coil fins and the water flowing through the coil tubes.

The following equations quantifies the heat-transfer process:

$$Q = U \times A \times LMTD$$

Where,
Q = amount of heat transferred, (W)
U = heat-transfer coefficient, (W/m2. $^{\circ}$K)
A = effective surface area for heat transfer, (m2)
LMTD = log-mean temperature difference across the coil surface, ($^{\circ}$C)
The most effective way to improve heat-transfer performance is to increase the log-mean temperature difference (LMTD).

LMTD = (TD2 – TD1) / Ln . (TD2 / TD1)

Where,
TD1 = leaving-air and entering-water temperature difference at the coil, ($^{\circ}$C)
TD2 = entering-air and leaving-water temperature difference at the coil, ($^{\circ}$C)

Table 3: Room Condition

ENTERING AIR TEMPERATURE (RETURN AIR) (oC)	24
LEAVING AIR TEMPERATURE (SUPPLY AIR) (oC)	10
ENTERING WATER TEMPERATURE (CHILLED WATER) (oC)	6
LEAVING WATER TEMPERATURE (HOT WATER) (oC)	12

Figure 3: Graph result by improving data centre room condition
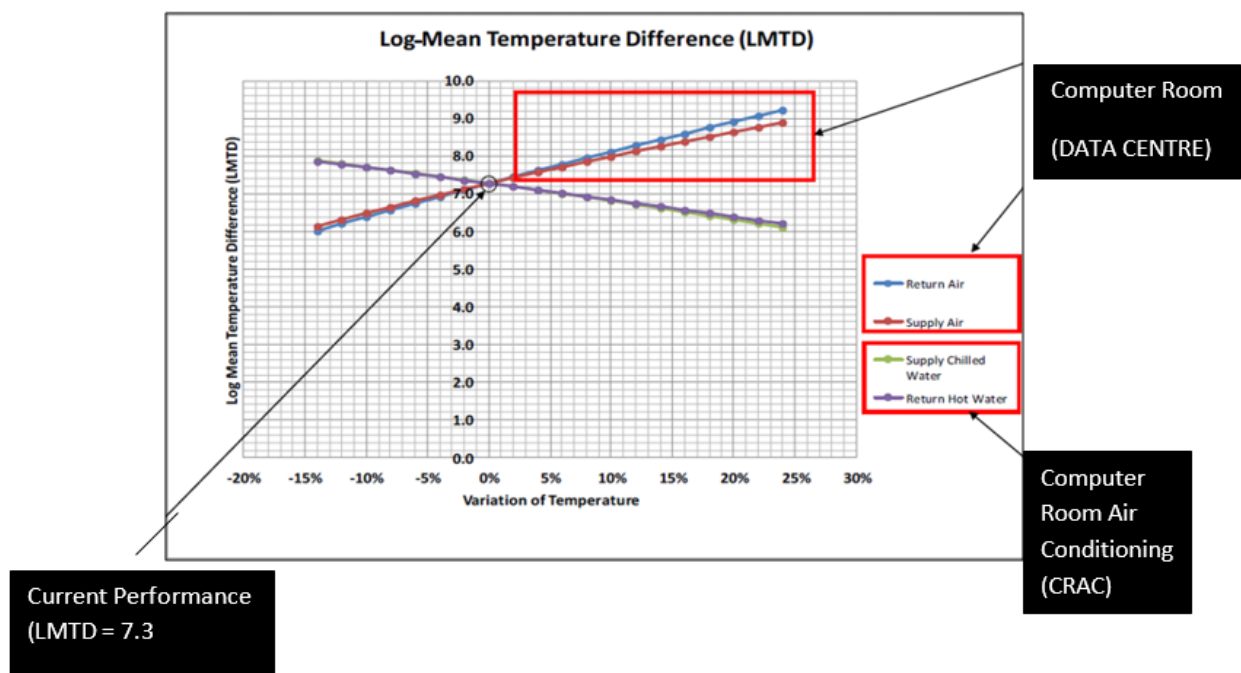
Summary
The graph proofs that improving the data centre room conditions would have higher potential of increasing the cooling performance than the improving CRAC unit.

Cooling design improvement

The way in which the air cooling system can be improved for an existing data centre facility such as this one at Victoria University Footscray Park Campus would be to use a cold aisle containment system.

The possible in way in which this could be achieved is by modifying the rack layout to provide four equal rows of racks ensuring that there are two cold aisles. With this arrangement made, install a containment system around the cold aisle. The following figures shows a possible arrangement of the existing equipment found in the Footscray Park data centre facility to provide two cold aisle which can be contained.

Figure 4: 3D Perspective of Modified Footscray Park Campus Data Centre – Cold Aisle Containment

3D Perspective of Modified Footscray Park Campus Data Centre - Cold Aisle Containment
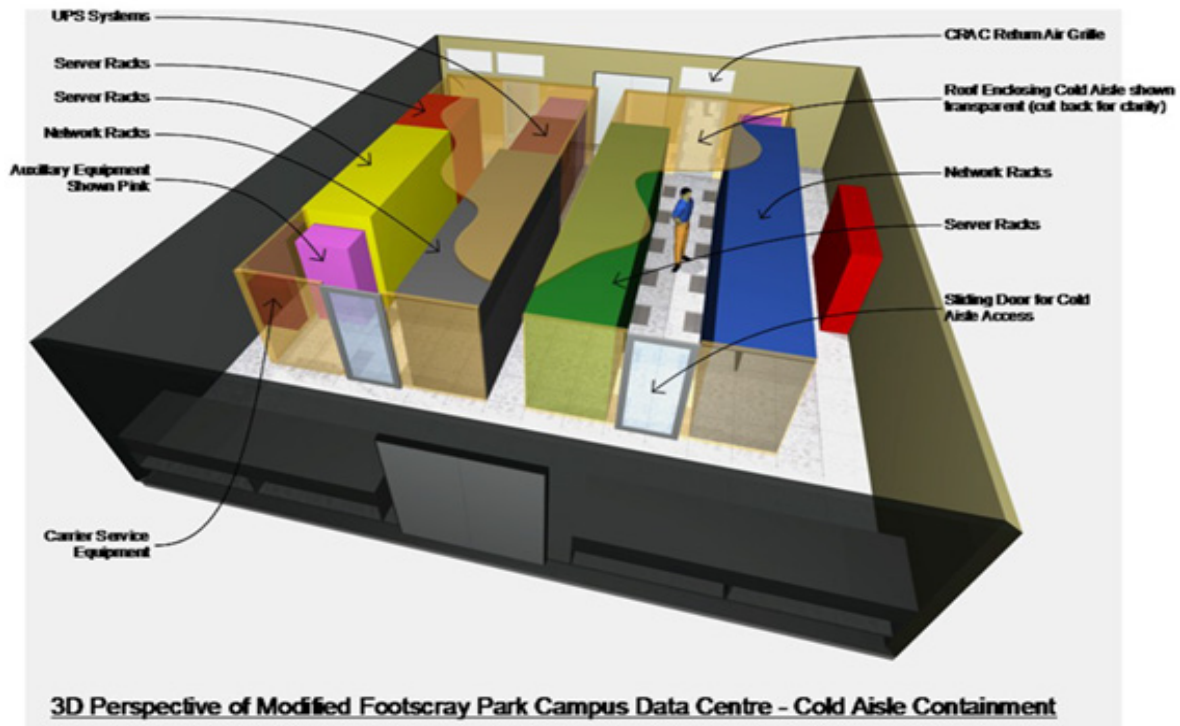
The benefit of the arrangement over the existing are outlined as follows:
- No mixing of hot exhaust air with cold supply air eliminating the requirement to over specify CRAC unit capacity.
- Temperature difference between hot return air and cold supply air greater in a contained system which assists the CRAC unit becoming more efficient.
- Can provide a higher supply air temperature reducing chiller operation time.

4. CONCLUSIONS

Overall, this research has provided an overview of requirements that must be considered at an early stage of design. It is clear that, when it comes to building a reliable data centre and maximising the investment, various design issues must be studied and resolved early in the building development process. The process should involve coordinated efforts across a number of areas of expertise including mechanical, electrical, architectural and other building services.

To achieve satisfactory outcomes, each of the components of the data centre and its supporting systems must be carefully planned, designed and implemented to work together to ensure reliable performance of discrete data centre resources while also taking into account future requirements and provision for expansion. Neglecting any aspect of the design can render the data centre vulnerable to cost failures, early obsolescence, and intolerable availability. There is no substitute for careful planning and the following the guidelines set in the specified standards.

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THE DEVELOPMENT OF 3D-ANIMATION MODEL AND
APPLICATION INTERFACE FOR MOBILE-APPLICATION LEARNING SYSTEM

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ABSTRACT

The use of mobile application in an education are proved by the researcher as the method convey with a more diverse form of information. Learning in medical electronic field require students to understand specific terms and definitions concerned with the lessons that sometimes are confusing and need another approach in order to make them understand regarding the lessons. Medical Electronic students who are basically learning the medical equipment need to understand these terms and interpretation as preparation for their industrial training and work environment. There are several medical equipment that are provided for students to familiarize them with the real equipment. However, some equipment are very expensive and rarely found in school or university. The purpose of this study is to design and develop a mobile application that is supported by a learning system that uses 3D animation video for medical equipment to give students the opportunity to learn about it without need it physically. The method used to develop this application is by using Autodesk Inventor Professional 2016 software to create 3D animation and Appy Pie to create mobile application software. The use of 3D animation are a huge help in presenting the information in a form that is easy to understand and way more clear. Apart from its easy-to-understand features, it is also attractive form of presentation information which can encourage students to learn more about the lessons. Hence, the use of technology in delivering the information and lessons are helping students and also helps boost their achievement in their studies.

Keywords: Mobile Application, 3D Model, Mobile Learning, Application Interface

1. INTRODUCTION

The potential benefits of using 3D content in supporting students to understand difficult concepts have not yet been fully realized across all subject disciplines, although there are some which are actively engaging their students in 3D content and it is certainly a growing interest area. Now imagine, if this learning is applied for the medical field. For instance, take a look at medical devices such as Defibrillator and Non-Invasive Blood Pressure, these devices probably easy to find and most of the educational institutes in Malaysia might have it. However, some machines that are expensive are rarely found in school or university. So, the idea of making these machines and devices in 3D model animation is to give an opportunity for students to learn about it without having it.

Furthermore, the first step in understanding on how students learn is to agreed that every human being are born with different ability to receive and express the information and how do they prefer on learning new information. The term "learning styles" speaks to the understanding that every student learns differently (V. Aravinthan & J. Worden, 2010). An individual learning styles depend on cognitive, emotional and environmental factors, as well as one's prior experience. 3D modeling is the process of creating a 3D representation of any surface or object by manipulating polygons, edges, and vertices in simulated 3D space. Modern technologies and computer programs allow creating the models of varying complexity and size, testing the created prototypes and making both technical and design changes in the model. The use of the 3D modelling is almost everywhere (H. Matsuda & Y. Shindo, 2016). Moreover, 3D models are used in medical field to create human organs such as heart and lungs. This is to be used for educational purpose which helps in understand clearly how human organs function. Besides that, they also used the function of 3D to create interactive representations of human anatomy. A wide number of 3D software are also used in constructing digital representation of mechanical models or parts before they are actually manufactured. CAD/CAM related software are used in such fields, and with these software, not only can you construct the parts, but also assemble them, and observe their functionality (M. F. Daud, J. M. Taib, & R. S. Sharifudin, 2012).

Just as medical animations are effective tools for educating patients, they can also play a role in the education of medical professionals at all levels as well as the training of new employees. Educators can use this tool to explain a broad range of topics to students (A. Çalışkan & U. Çevik, 2017). It's useful for explaining medical equipment such as the right way of using the medical equipment, the processes on how to maintain the equipment based on the error, and the effects to humans if the equipment is wrongly used. It can also

provide a visual demonstration of an equipment mechanism of action, or how it affects the body and produces a response, so that they can better understand how the equipment works (Denis Bobylev, 2017). This is important because, with many procedures, medical professionals need to have an in-depth understanding of them before they perform them. As compared with standard operation videos, dynamic 3D videos are way better in explaining the processes and operation of the medical equipment.

As the popularity of the 3D animation model increases, the mobile application also contributing as a way of delivering as information due to its portability and easy to handle. However, creating a mobile application requires software of application maker, or a web-based software. There are many method and options of software to create mobile application. There are software which need developer to create mobile application by writing codes in certain language while there are also software which allow beginner to create mobile application with just using simple drag-and-drop concept (B. Jalender, 2010).

2 METHODOLOGY

The method used to develop this application is by using several software to create 3D model design, android application etc. The software that has been used is Autodesk Inventor Professional 2016, which is used to create the 3D model design for medical devices. Appy Pie is the website-based software used for creating an Android application without the unnecessary use of coding. The concept of 3D modelling is used to visualize the medical equipment graphically. The 3D model then is made into video as an animation whether to show the procedure of using an equipment or an instruction on how to do maintenances based on Standard Operation Procedure (SOP) that has been set. Other than that, the application also provides Plan Preventive Maintenance (PPM) procedure for the devices. The applications also contain the procedures in text form to provide a user with an alternative option other than the videos itself.

Figure 1: Process of creating a model
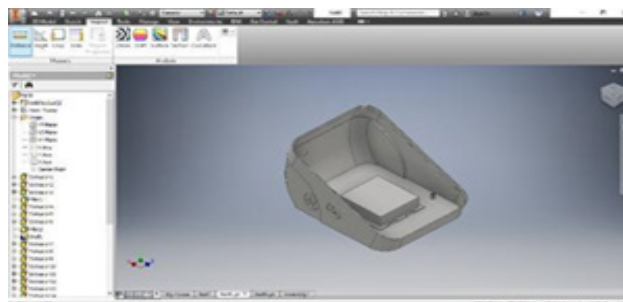
There are several steps in developing the 3D model. These steps are to ensure that the finished model is in good shape. The 3D model starts with the sketch of the desired model. There are eight steps in creating a perfect 3D animation model and skipping any of these steps causing the final result of the model is not in excellent form. The sketch is the initial description of the model and it is to create the first shape of the model. Then, the sketches are added with dimensions and constraints to get a good outline and shape (R. H. Shih, 2016)8. After that, the sketch then can be turned in to 3D form. The feature referring to the action that can be performed in the workspace. The process then goes to bodies joining steps which allow the 3D parts to be merged together to form one bodies or a complete model. This process will add all related part of the model that has been created in the early steps from the sketch.

Next, some 3D CAD software will allow the user to naturally form and sculpt models in a much more natural way. With forming features, basic 3D objects, like a sphere, cube, or prism, can be shaped by dragging and sculpting the shape's faces, edges and vertices instead of editing and manipulating precise dimensions for shapes drawn in a sketch. This allows for the creation of much more natural objects; using forming tools making realistic looking faces, animals, and smooth, curved surfaces. Then, the process of assemblies took part. Assemblies are 3D files that contain multiple parts or other assemblies. In assemblies, all parts can be connected together with mates or constraints to build up a 3D model of an entire system. Assemblies allow designers to visualize how the entire product will fit together once it is fully assembled.

Finally, the appearance and rendering process is the final process in designing the 3D model. The aim of this process is to change the appearance and material properties of the model to simulate a specific material. Besides, it is also to generate a high quality, good looking image of the designed model, complete with adjustable lighting, backdrops, and views.

Figure 2: The Appy Pie
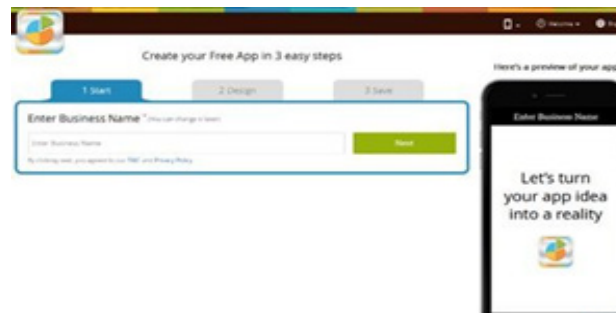
The first step in creating an android application is to have a name for the application. The first layout of the application maker shows the blank space for the creator to enter the name or title of the application. The name then will be displayed in the user interface of the application. However, the creator still can make an adjustment to the title if it there is any change throughout the project.

The next step is to set the categories of the application. There are many categories provided by software such as fashion, education, health, and information. The categories then will suggest the next user interface of the application. For instance, the "health" category has been chosen because the application is made to fill information related to medical field. This layout also can be change later if the creator want to choose other categories, the categories can be match with the type of application that are developed.

After that is the customization features of the application. There are many features provided and the software itself recommended the creator depending on the chosen category on the earlier step. As for this project, there are 3 features that are planned to be inserted in the application which is about, video and text-based SOP. All the information that has been created such as 3D model animation, videos, SOP of the maintenance and guidelines on how to use the equipment are inserted into each feature.

After all the process in customizing the application finished, the application is finally done and the application is compiled which then sent to the email of the creator. The application is then can be tested to see in the application fulfills the feature characteristics desired by the creator. If the application is good to go, it is then going through post-data evaluation to see if the application really helps the industrial students and educators in improving the students' understanding.

3   RESULTS AND DISCUSSIONS

A.   3D Model Design

The 3D model design is created using Autodesk Inventor Professional 2016. The model of medical equipment is first created using the same dimension of the real device. The processes are slow because the model cannot be created as the whole object but it one part after another. The parts then are combined or called assemble which put together all created parts to form one solid object.

Figure 3: Completed 3D model of the NIBP

This is an example of the complete 3D model design after going through the eight steps of creating the model. All the parts are drawn separately and follow the precise dimensions as the real product. These parts are then assembled on another page and the new process took part. The next process is .the model checked again to make sure the joining of the model parts are fit together and no miscalculated happen. The process of creating an animated video took place after the model is completely correct and in the right position. So, the process of creating a 3D model takes quite some time to complete it and to get a perfect model of the created model. However, the existing of such software as Autodesk Inventor is a huge help as it provides many features to ease the creation of a model.

B.   The Application Interface

The application is consists of two components which are the videos on how to use and how to do the maintenance for the medical equipment and text-based information of Standard Procedure Operation (SOP) on how to do maintenance based on the problem/error of the equipment. There are 6 content sections of the application which are the Introduction, SOP, Maintenance, Error Code, Picture, and Video. These sections contain different content for example the SOP, Maintenance, and Error Code shows the text-based information in written format while the Video displays the videos of the equipment and the Picture section displaying the pictures of several models of the equipment.

Figure 4: . Layout of the Application

4. CONCLUSIONS

In conclusion, this development of 3D animation model and application interface is to complete the mobile application learning system for the use of biomedical students particularly. The discussed method of creating the 3D animation model and the development of the application interface going through several important steps and processes to get the completed final outcome for the project later on. Significantly, the combination of 3D animation model and mobile application is mainly to help in creating a better understanding of biomedical students regarding the medical equipment in terms of how to use and doing maintenance. The method of delivery medium such as text- based information, 3D animation model and videos are combined together to maximize the delivery of knowledge more effectively. From the result, the figure of the equipment is clear and also precise which means that the detail of the project is taken into account to ensure that the objectives of the project are achieved. The results of the pre-questionnaire survey are also taken into consideration as the respondents are the user-to-be for the final product later.

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THE DEVELOPMENT OF INTRAVENOUS DRIP DETECTOR BASED ON WIRELESS APPLICATION

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ABSTRACT

Development of Wireless Application Intravenous (IV) Drip Detector (WAivD) is a device in nursinghouses or hospitals used for delivering Sodium Chloride solutions for IV therapy. The development of this device may assist nurses to manage the IV infusion process by integrating hardware devices, which includes a load cell sensor and Android Studio software. The idea of this development is integrated from the problems encountered by nurses during the therapy. Nurses tend to spend extra time to monitor patients who receive IV therapy because nurses need to frequently walk around IV therapy patient to check the balance of IV drip. To overcome the problem, one of the objectives of WAivD is to design a wireless IV drip detector by using Android Studio software system with alarm notifications. Thus, it can help nurses in monitoring their patients. The method used in this project is a combination of hardware devices and software systems. A Nodemcu ESP 8266 based microcontroller is used as a platform to connect a bar load cell sensor. The bar load cell sensor transforms a tension, pulled by a drip-bag, to weak the electrical signal. The electrical signal is amplified and fed into a 16-bit A/D converter. Therefore, the weight data that has been converted will send data on application software through Wireless Fidelity (Wi-Fi). The flow rate will be displayed on users' electronic devices. As an output for this development, the hardware system will show an exact amount of IV drip left on OLED. Meanwhile, the application software will show date, name of the patient, starting time, remarks and also the amount of fluid so that nurses can easily read patient's IV infusion information and it will help to reduce nurse time which nurses take in monitoring the IV infusion.

Keywords: Intravenous Infusion, Monitoring System, ESP 8266-based Microcontroller, Load Cell Sensor, Android Studio

1. INTRODUCTION

application intravenous drip detector (WAivD) is the device and application to help monitoring and notifying user by using load cell sensor [1], wireless connection and Android Studio software [2]. This device is monitoring system that automatically monitors all patients IV therapy as long as a drip bag is hung on the scale module of the system. The scale module is used to measure the weight of a drip bag continuously[3] and the weight data will be shown on nurses' electronic device such as a tablet.

Information technology plays an important role in many fields including the healthcare field. A hospital needs doctors, nurses, nutritionists and other staff to work together for caring patients [4]. There should be information technologies or tools to help the nurses work easily, safely and comfortably. Intravenous (IV) fluid drips deliver saline solution through a small catheter and tubing directly into the bloodstream. In hospital, intravenous therapy is an important therapy for patients [5]. A nurse sets an IV infusion device up according to the doctor medical order. The IV infusion rate needs to be adjusted with a designated IV infusion rate and it needs to take follow up nursing work.

Most of the problems happen towards patient is when during the IV therapy, the user or nurse is not alert if the solution entering into patient is not enough. So, once the status of the solution is about to finish occurs, an alarm will be issued to the nurse in charge. The objectives of this project are to monitor the volume of IV drip bag during patient IV infusion by using load cell sensor [1][6]. Besides, this device can also display the accuracy of quantity IV drip bag left using Arduino system and design a wireless IV drip sensor by using Android Studio software with alarm notifications. This project is divided into two parts that are hardware and software. The method to develop this project is by using load cell sensor which is to identify the quantity of the solution left. Moreover, wireless connection will help to connect between the device and the software which is in users' mobile phone. Furthermore, Android Studio will develop application and will be installed in user mobile phone to monitor the IV drip bag from afar. Last but not least, as an output of this project it will show number of quantity left and alarm notification will be send through user mobile phone to notify. In other words, nurses just hang a drip bag onto the load cell and the system will run automatically.

Intravenous therapy (IV) is a therapy that delivers liquid substances directly into a vein [7]. The intravenous route of administration can be used for injections with a syringe at higher pressures or infusions typically using only the pressure supplied by gravity [8]. Intravenous infusions are commonly referred as a drips. The intravenous route is the fastest way to deliver medications and fluid replacement [5] throughout the body, because the circulation carries them. Intravenous therapy may be used for fluid replacement such as correcting dehydration, to correct electrolyte imbalances, to deliver medications, andfor blood transfusions[9]. Patient might need IV therapy to rehydrate after becoming dehydrated from illness or excessive activity. Moreover, it can also treat infection that is using antibiotics and for cancer treatment through chemotherapy drugs. IV therapy is important to humans, one of the reasons is IV can decrease time spent at clinics or hospitals. It allows patients to return to work or school with a decreased risk of infections. Besides that, IV therapy can prevent negative side effects that occur if the fluids were administered orally. It also can cure from hangovers. Hangovers can result in severe dehydration. If instant action is not taken, it can cause irreparable damage to the body. An IV therapy is the best cure for hangovers as it can quickly restore the fluid imbalance.

Along with the technology nowadays, one of the companies has made new invention on IV drips. The company has created a monitor device called DripAssist Infusion Rate Monitor[10]. This device was created to measure flow rate, drop per minute and total volume. DripAssit was a good invention but unfortunately the price is expensive and not everyone can afford and willing to buy. Based on paper entitled Intravenous Infusion Monitoring System Based on Wireless Sensor Network, IV monitor device is designed. They used ZigBee-based RF communication as microcontroller. Wireless sensor network (WSN) [11] technology which is based on novel sensor and RF communication technology provides a low-cost, easy to deploy and flexible method for reality perception and data acquisition as well as transmission. The paper shows the progress and velocity of droplet through droplet monitoring. Establishing an IV line has become routine in pre hospital intervention for seriously ill or injured patients. Many studies have been done of local and systemic complications resulting from IV therapy begun in the hospital [4]. Complications were classified as either local or systemic. The nursing staff was notified if complications developed in any patient. Fluid overload is frequently found in acute kidney injury patients in critical care units. In critically ill patients, fluid overload is related to increased mortality and also lead to several complications like pulmonary edema, cardiac failure, delayed wound healing, tissue breakdown, and impaired bowel function. In other way to prevent the liquid overload, invention of Wireless application intravenous drip detector (WAivD) will help user by monitoring the liquid left and notifying user through software application.

2. METHODOLOGY

Method that was used to deliver this device using hardware and software methods for assisting nurses on monitoring the progress and status of intravenous therapy of all patients. The delivering method can be described as WAivD is composed of two components which are an IV infusion data collector hardware and an IV infusion monitoring application software. The IV infusion monitor application is executed on a handle electronic device for nurses to be use [12]. Nurses can directly check and monitor the IV infusion status of patient on the table or mobile phone[13]. An IV infusion status is designed as a numerical form for quickly checking the IV infusion status. This can help nurses to easily check the IV infusion status at a glance. Before using the application, user need to register few of information about patient such as name of the patient, date, starting time and remarks as a notes about patient. All the IV infusion status and information are gathered in mobile phone application software.

NodeMCU ESP 8266-based microcontroller as the single chip microcontroller[14]. This components will act as microcontroller board. Pairing with Wireless Fidelity (Wi- Fi) as a platform to connect with monitor such mobile phone from far with certain distance. NodeMCU is an open source development board and firmware based in the widely used ESP8266 -12E WiFi module. It allows to program the ESP8266 WiFi module with the simple and powerful LUA programming language or Arduino IDE. Arduino provides C/C++ programming language and a PC-based development environment. It provides an input and output interface with analogue and digital simultaneously. Also there are many extensions, function shields, in the market. In the system, Arduino functions as an integrator of different data and bag weight. Arduino send the integrated data via the wireless communication module to mobile phone. With its USB-TTL, the nodeMCU Dev board supports directly flashing from USB port. It combines the features of WIFI access point and station + microcontroller. These features make the NodeMCU extremely powerful tool for Wi-Fi networking. It can be used as an access point and/or station, host a webserver or to be connected to the internet to fetch or upload data.

Load cell designs can be distinguished according to the type of output signal generated from pneumatic, hydraulic and electric or according to the way they detect weight like bending, shear, compression and tension, etc[15]. Load cell is a type of transducer which performs the functionality of converting force into an electric output that can be measured. This type of transducer is highly accurate[3] when is properly designed an

used. Load cells are used in a variety of industrial weighing system[16]. There is a constant need for knowing the exact weight of many items such as for, ingredients for production, pharmacology, chemistry, technology, etc. Load cells are applied in several different fields, usually for weighing measurements. The load cell converts pulling stress to tiny electrical current, the more stress the more electrical current[17]. S-type load cell is used to measure the weight of the hanged drip bag. This straight bar load cell (sometimes called a strain gauge) can translate up to 3 kg of pressure (force) into an electrical signal[18]. Each load cell is able to measure the electrical resistance that changes in response to, and proportional of, the strain (e.g. pressure or force) applied to the bar. It has four lead wires which can be connected to HX711 A/D Pressure Sensor[19].It is easy to use with driving voltage 5-10V and produce the output voltage as per the force changes over it. An electronic weighing machine uses a load cell to measure the load or pressure produced by the load, here most load cells follow the method of the strain gauge, which converts the pressure (force) into an electrical signal, this load cells have four strain gauges that are hooked up in a Wheatstone bridge formation. When apply to load the strain gauge resistance will change and hence the output voltage from the load cell get changes by the way so it can measure the load value.

Android Studio is the official integrated development environment (IDE) for Google's Android operating system [2], built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems. It is a replacement for the Eclipse Android Development Tools (ADT) as the primary IDE for native Android application development. Android Studio was announced on May 16, 2013 at the Google I/O conference. It was in early access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8 which was released in June 2014. The first stable build was released in December 2014, starting from version 1.0. The current stable version is 3.3, which was released in January 2019. Android Studio supports all the same programming languages of IntelliJ (and CLion) e.g. Java, C++, and more with extensions.

Figure 1: Modulated Diagram of project for every layer
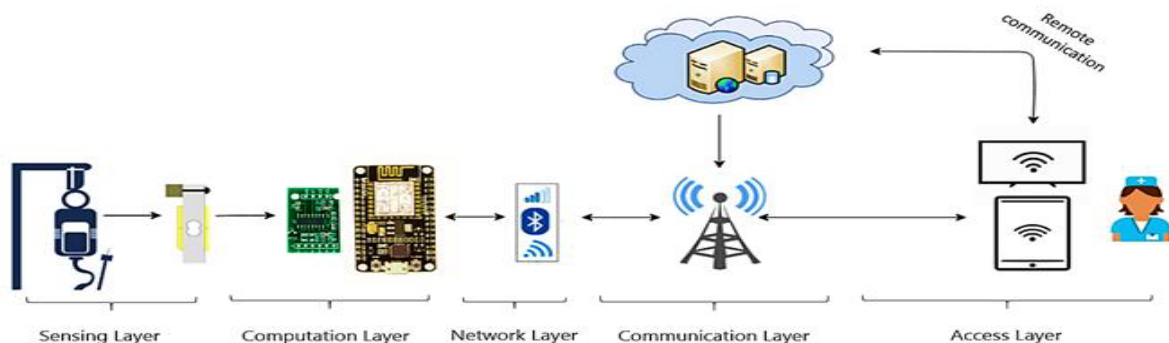
Figure 1 shows modulated diagram of the device. It will started with the sensing layer where the sensor will sense the weight of the solution bag. Secondly, it continues to computation layer where the Nodemcu ESU 8266 will act as microcontroller board to computed and process the data of the weight of the solution bag from analogue data to digital data. Thirdly, in network layer will take action. For this device, the use of WiFi is chosen compared to Bluetooth. Then, in communication layer WiFi will take the data and passed it to user through local communication and last but not least in access layer the user will use the application in their mobile phone to collect the data from the sensing layer.

Modulated layer for the project will begin with patient drip bag weight and it will show status indication and status notification at monitor of application. The function of modulated layer can be explained. Firstly, at sensing layer patient drip bag weight is to collects all drip-bag weight from patients. Second, at computation layer, patient drip bag weight data dispatching is to process the data that collects all drip-bag weight from patients. Later, at network layer data that has computed will be sent through WiFi connection at communication layer. Lastly, at access layer IV infusion status indication is a software application that deliver to the electronic device that shows all patients dripping status in graphic and text. Patient IV Infusion Monitor is a background thread that checks the status of all IV infusion. Access layer or available status notification is called as alarm, handles events between the system core and the mobile app. It orders nurses handle all events and log actions and results.

3. RESULTS AND DISCUSSIONS

This section discusses about the expected result. Every minute per drop were depends on type of drop sets. There divided into four types of drop sets which are 10 gtt/ml, 15 gtt/ml, 20 gtt/ml and 60 gtt/ml. For 60 gtt/ml is using different type of drip set which is used mini drip or called as micro-drops set while the rest is using macro-drops. For this device, it was used 20gtt/ml type.

Figure 2: Example of calculation has made based on formula

$$\frac{Volume \text{ x } Drip\ Factor}{Time\ in\ minutes} = \frac{gtt}{min}$$

$$\frac{500ml \text{ x } 20gtt}{60min} = 166.67 \frac{gtt}{min}$$

❖ 15gtt = 1ml

$$= \frac{166.67}{15}$$

$$= 11.11 \frac{ml}{min}$$

Based on the figure 2 calculation, the quantity of IV drip bag used is 500 ml. For drop factor (gtt/ml) type of drop used is 20 gtt/ml while time selected is an hour or 60 minutes. To get the drop per minute, the volume will multiply with drop factor and divide with times selected. So 500ml is time with 20gtt/ml and divide with 60. It will get 166.67 gtt/ml. Based on information given in figure 6 below, known that 15 drops (gtt) is equal to 1 milliliter (ml). From 166.67 gtt/ml need to divide with 15 to get how many milliliters for 166.67 drop per minute, as from figure above about 11ml to 12ml per minute.

Figure 3: Conversion reference between gtt and ml from journal A. Health and M. Supplement, "Appendix A — Conversion Units Appendix B — Conversion Units Worksheet," no. cc, pp. 78–80.

Volume

1 liter (L)	=	1,000 milliliters (mL)	=	1,000 cubic centimeters (cc)
1 milliliter (mL)	=	1 cubic centimeter (cc)	=	15 or 16 drops (gtt)
1 quart (qt)	=	2 pints (pt)		
1 pint (pt)	=	2 cups	=	16 ounces (oz)
1 glass or cup	=	8 ounces (oz)		
1 ounce (oz)	=	2 tablespoons (T)	=	8 drams (dr)
1 tablespoon (T)	=	3 teaspoons (t)		
1 teaspoon (t)	=	1 dram (dr)	=	60 drops (gtt)

Based on figure 3 shows, it is a reference of conversion between drops(gtt) and milliliter(ml) [20]. From the table, it can be understood that 1 ml is equal to 15 to 16 drops (gtt)

Table 1: Theoretical data that have calculate using formula

Time	IV Level
4.00pm	500ml
4.01pm	488.89ml
4.02pm	477.78ml
4.03pm	466.67ml
4.04pm	455.56ml
4.05pm	444.45ml
4.06pm	433.34ml

Table 2: Experimental data that have collected during testing

Time	IV Level
4.00pm	500ml
4.01pm	485.83ml
4.02pm	476.95ml
4.03pm	467.12ml
4.04pm	453.63ml
4.05pm	443.84ml
4.06pm	436.65ml

From the result table 1 and 2, both are not the same value. For table 1, it is theoretical result that followed the formula in figure 5 and has been calculated. While for table 2, the data is collected during testing. In table 2 result, most of the results are slightly different from table 1 about ± 3 ml tolerance.

4. CONCLUSIONS

This device was designed to implement the IV infusion monitoring system to help nurses monitor patient drip status. The core component is a hardware composed of NodeMCU ESP 8266 based microcontroller, and a load cell sensor. A nurse hangs a drip bag onto the WAivD and the system periodically reads the weight. The bar load cell sensor transforms a tension, pulled by a drip-bag, to weak electrical signal. The electrical signal is amplified and fed into a 16-bit A/D converter. Therefore, the weight data that has been converted will sent on application software through Wireless Fidelity (Wi-Fi) and displayed on user electronic devices. As an output for this development, the hardware system will show exact amount left of the IV drip on OLED, while for application software will show date, name of patient, starting time, remarks and also amount so that Nurses can easily read patient IV infusion information.

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THE INFLUENCE OF H2SO4 CONCENTRATION AND SAMPLE WEIGHT ON ALUM PRODUCTION USING USED ALUMINIUM CANS

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ABSTRACT

Inorganic waste originating from cans of used pocari sweat soft drinks, the aluminium content can be used as a raw material for the production of potassium aluminium sulphate dodecahydrate alum or aluminium alum. Aluminium alum can be used as a coagulant in the water purification process. The research of aluminium alum making from used cans was conducted to determine the effect of H2SO4 concentration and sample weights and to find the optimum conditions. The raw material was cleaned using sandpaper and then cut to a certain size. The next process is to dissolve aluminium with KOH to form potassium aluminate KAl(OH)4, reacted with H2SO4 to form alum sulphate dodecahydrate aluminium potassium with the chemical formula KAl(SO4)2.12H2O. H2SO4 concentration variations were added by 6M, 7M, 8M and sample weight variations of 1 gr, 2 gr and 3 gr. From the results of the study using 2 grams of sample and the addition of 8 M H2SO4 the optimum yield was 99.69%. Aluminium alum obtained from the results of the study was used for wastewater treatment with 337 NTU (Normal Turbidity Unit) turbidity after a purification process using aluminium alum coagulant, the turbidity of the water dropped to 21.8 NTU.

Keywords: Inorganic waste, used cans, aluminium, aluminium alum, water purification

1. INTRODUCTION

Can is a place to store or pack food, drinks or other products made of thin metal. Cans are made from a variety of metals that are safe and do not react when used to store food or drinks. In order for food or drinks to be safe for health, coatings are usually used to prevent reactions with packaged material. The use of cans as packaging has several advantages including being not easily damaged during transportation, storage and when food is sterilized, easy to carry, practical and can be decorated with various images so that it looks attractive. Some of the advantages of using cans are that they can be packed with food, drinks and other things. The disadvantage of using cans as packaging is that cans are one of the inorganic wastes that need special handling to avoid environmental pollution caused by metals contained in cans and metal corrosion that can disturb soil fertility and contaminate water if it enters water sources.

Waste generated from human activities consists of organic and inorganic waste. Organic waste can naturally be decomposed by bacteria while inorganic waste such as metal-containing can take years to be decomposed in the soil. The best way to deal with metal waste is to recycle it so it can be reused.

Used cans which are widely used for packaging food, drinks or other products mostly contain aluminium. Aluminium in used cans can be made into aluminium alum with special processing using chemicals in order to remove aluminium contained in cans. The aluminium alum produced can be used as a coagulant in the water purification process. The water purification process consists of 3 important stages. The first stage is the filtration process which aims to separate impurities by means of filtering, the second stage is the coagulation process using a coagulant substance that aims to remove colloidal particles, and the third stage is disinfection which is adding disinfectants to kill pathogenic bacteria.

Coagulation is the process of agglomerating colloidal particles due to the addition of coagulant chemicals. Coagulant chemicals help colloidal particles that float to form flock or become larger particles (flocculation processes) so that they can descend graphitatively, settle to the bottom and are easily separated from their clear solutions. Some coagulants that can be used in the water purification process are alum sulphate, ferrous sulphate, Ferries sulphate, Poly aluminium Chloride (PAC) and Ferro chloride. The coagulant that is often used in water purification is aluminium alum because aluminium alum is easily available in the market; its storage is easy and most economical.

Based on the background that has been submitted, the research was carried out by using the basic ingredients of used cans containing aluminium for aluminium alum manufacturing. The method used in this research is destruction using potassium hydroxide (KOH) and sulphuric acid (H2SO4). The variable used is the variation of sulphuric acid concentration and sample weight to obtain optimum conditions. This research is expected to reduce environmental pollution caused by aluminium can. Waste processed into aluminium alum is useful in the water purification process and has economic value. The theoretical basis of the influence of h2so4 concentration and sample weight on alum production using used aluminium cans research comes from a literature review on:

a. Can Packaging.

Can packaging is a packaging technology for food products, beverages or other products that are widely used compared to other packaging. Cans can also be recycled so they are environmentally friendly. The advantage of can packaging compared to packaging from other materials is that it has quite high mechanical strength, can protect the product from environmental influences, its surface is ideal for design and can be recycled so it is environmentally friendly (Prasetyo, 2013). According to Wijayanti, T. (2012) the functions of packaging are to safely transport and store the products and also to provide information about products and to attract consumer interrest.

Cans used as packaging for soft drinks, milk, biscuits and others are usually made of aluminium. Aluminium cans are designed to store beverage or food ingredients so that they can last a long time and usually the surface is decorated with various attractive paintings as a promotion of a product. The definition of packaging according to the Big Indonesian Dictionary (KBBI) is the protector of merchandise that results from packaging activities. Drinks cans that have been produced as much as 75% are made of aluminium, the remaining 25% are made from tin-plated steel (Putri, 2016). Canned Asian drinks are mostly made from aluminium alloys as much as 92.5-97.5%, manganese 1%, 0.4% iron, silicon 0.2% and copper 0.15%. Meanwhile, for the United States and Europe, it was mostly made of 55% steel mixture and 45% aluminium. The inside of the aluminium can is coated to keep aluminium from oxidizing. Even though the inside of the can is coated, a small portion of aluminium can be degraded. This is influenced by several factors such as storage, storage temperature and solution composition. The chemical used as an inner coating material for beverage cans can be in the form of epoxy resin (M.K. Miller, 1989). The number of used beverage cans causes landfill which can be a problem for the environment. The cans of used drinks can be utilized by extracting the aluminium content into alum which can then be used to purify water.

b. Aluminium

Aluminium is the third most elements in the earth's crust after oxygen and silicon. Aluminium is produced from bauxite which is aluminium oxide hydrated water (Oxtoby, 2003). Aluminium is a metal that has the advantages of being lightweight, hard, resistant to corrosion, easily formed; tasteless, non-toxic, strong, small density can hold gas in, good conductor of electricity and can be recycled. These advantages make aluminium widely used in industry, so that used aluminium can be reused as an alternative to overcome the problem of environmental pollution, aluminium scarcity and save natural resources (Mulyadi, 2014, p. 68)

c. Potassium Hydroxide (KOH)

In trade, there are two types of KOH, namely KOH p.a (pro analyst), which is expensive because the levels are high and technical KOH is cheaper because the levels are lower. KOH is a chemical in the form of solid, white and hygroscopic (attracts water)

Chemical Properties:
i. Is one of the strong bases and dissolves easily in water
ii. With CO_2 in the air it reacts to K_2CO_3 and water
iii. Is reactive to acids for salt
iv. Forms water-soluble AlO_2- when reacting with Al_2O_3

Physical Properties:
i. Shape: Solid
ii. Color: White or yellow
iii. Molecular Weight: 56.10564
iv. Melting Point: 360 ^{0}C
v. Boiling point: 1320 ^{0}C
vi. Density: 2,044 g / cm3
vii. Water solubility: 1100 g / L (25 ^{0}C)

d.   Sulfuric Acid (H_2SO_4)

Sulfuric acid is a type of strong acid that is corrosive to metals and is a polar compound that can be used as a solvent for organic compounds.

Chemical Properties:
i.   Are very corrosive
ii.   Is irritative of the respiratory tract
iii. The reaction with water is exothermic so that it produces heat

Physical Properties:
i.   Shape: Thick liquid like oil
ii.   Color: Colorless
iii. Molecular weight: 98.07 0C
iv.   Melting point, 0C: 10.49 0C
v.   Boiling point, 0C: 340 0C
vi.   Density, g / ml: 1.84 g / ml

e.   Alum

Alum is a hydrated double salt in the form of octahedral crystals or cubes and isomorphs. Alum crystals dissolve easily in water, and their solubility depends on the type of metal and temperature. Aluminium alum with the trade name alum and the chemical formula KAl (SO4)2 .12H2O (aluminium potassium sulphate dodecahydrate) are acidic, and soluble in water (Syaiful, 2014). The chemical formula of alum is M+ M3+ (SO4)2 .12H2O. Where M monatomation is univalent, it is usually (Na, K, NH4) while M3+ is usually (Al, Fe, Cr, Ti, Co) (Cotton, 2007). Aluminium alum is made from K+, Al3+ and SO42- in aqueous medium (Ikhsan, 2014: 3)

Physical and Chemical Properties (Anonim, 2018):
i.   Appearance: Crystal clear or colorless white.
ii.   Molecular Weight: 474.37 g / mol
iii. Boiling point: 330 °C at 760 mmHg
iv.   Melting point: 92 0C
v.   Solubility with water at 20 0C as much as 140 grams / liter
vi.   Storage temperature: Room temperature

Alum is one type of coagulant such as poly aluminium sulphate which is used to clear water because it can reduce the filter load by accelerating and increasing depositional efficiency (Notodarmojo, 2005)

f. Alum Making

Alum production can be carried out by dissolving material containing Al_2O_3 in sulphuric acid solution. One source in nature is found in kaolin rock. The reaction between kaolin and sulphuric acid will produce aluminium sulphate. Solid alum is obtained from the crystallization process of saturated aluminium sulphate solution (Jalaluddin, 2015 p.1). According to alum, alum can be made from bauxite and sulphuric acid. Bauxite contains approximately 50% Al $(OH)_3$ (Desviani, A., 2012).

The process of making alum uses the principle of crystallization. The first step is to dissolve the solid, then the solution is heated to boiling, filtered with a buchner filter in a hot state, then the filtrate is cooled to form a precipitate, the precipitate is filtered with filter paper, then the precipitate is dried (Khamidinal, 2009 p. 38).

The manufacture of alum from used beverage cans requires potassium hydroxide (KOH) and sulphuric acid (H_2SO_4). When KOH is added and heated, the reaction produces heat or is exothermic. The purpose of heating is to accelerate the reaction and dissolution of used cans, because the solubility will be greater if it expands the surface of the substance (reducing the size) and raising the temperature (Purnawan, 2014). The reactions that occur are:

$$2\,Al_{(s)} + 2\,KOH_{(aq)} + 6\,H_2O_{(l)} \longrightarrow 2KAl(OH)_{4(aq)} + 3\,H_{2(g)}$$

Dissolution of aluminium with KOH solution is an oxidation-reduction reaction. At the time of heating out the smoke, hydrogen gas bubbles arise which indicate the withdrawal of aluminium cautions from the cans, the solution turns black and forms a precipitate. After all the aluminium was reacted the gas bubbles will disappear. The occurrence of black color in the solution and the formation of sediment derived from plastic residues and decomposition of paint as can impurities (Syaiful, 2014). After that the addition of H_2SO_4 was done. The reactions that occur are:

$$2KAl(OH)_{4(aq)} + H_2SO_{4(aq)} \longrightarrow 2Al(OH)_{3(s)} + 2H_2O_{(l)} + K_2SO_{4(aq)}$$

The above reaction is an acid-base reaction, where the H + ion from sulphuric acid is neutralized with $Al(OH)_{4-}$ to form $Al(OH)_3$ (Mariam, 2013). $Al(OH)_3$ deposits are white in color and produce heat, to form aluminium alum, excessive H_2SO_4 is needed which will dissolve $Al(OH)_3$ to $Al_2(SO_4)_3$.

The reactions that occur are:

$$2\ Al\ (OH)_{3(s)} + 3H_2SO_{4(aq)} \longrightarrow Al_2(SO_4)_{3(aq)} + 6H_2O_{(l)}$$

$Al_2(SO_4)3$ formed reacts with K_2SO_4 to form a white $KAl(SO_4)_2.12H_2O$, (Sitompul, 2017). The reaction that occurs is :

$$Al_2(SO4)_{3(aq)} + K_2SO_{4(aq)} + 24\ H_2O \longrightarrow 2\ KAl(SO_4)_2.12H_2O$$
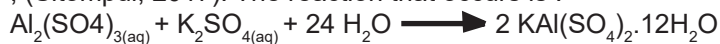
2. METHODOLOGY

a.   Tools and materials

This study used cans of Pocari Sweat soft drink, 30% KOH, H2SO4 with a concentration of 6 M, 7 M, 8 M, 50% alcohol, ice cubes. The instrument used were sandpaper, scissors, analytical balance, Erlenmeyer 250 mL measuring cup 50 mL, glass cup 500 mL, hot plate, stirring rod, funnel, No. filter paper. 41, oven, turbid meter, pH meter (Purnawan, 2014)

The stages of the process of making alum from used cans are as follows:

i.   Preparation
At this stage of preparation used aluminium cans are cleaned using sandpaper, then cut into small pieces of a certain size.
ii.   Dissolution
This process was carried out to dissolve aluminium in used tin waste with a 30% KOH solution of 50 mL. Waste cans that have been cut, weighed 1 gram, 2 grams and 3 grams. Dissolution was carried out above 90 0C until the gas bubbles and the smell disappeared. The solution formed was allowed to cool and then filtered using Whatman No. filter paper. 41.
iii.   Precipitation of Alum
The filtered solution was added with H2SO4 6 M, 7 M and 8 M as much as 30 mL to precipitate alum
iv.   Washing
To speed up drying, wash using 50% alcohol.
v.   Drying
Alum drying is done in an oven at 50 0C to dry.

Figure 1. Flow Chart of the Process of Making aluminium Sulphate Potassium Alum
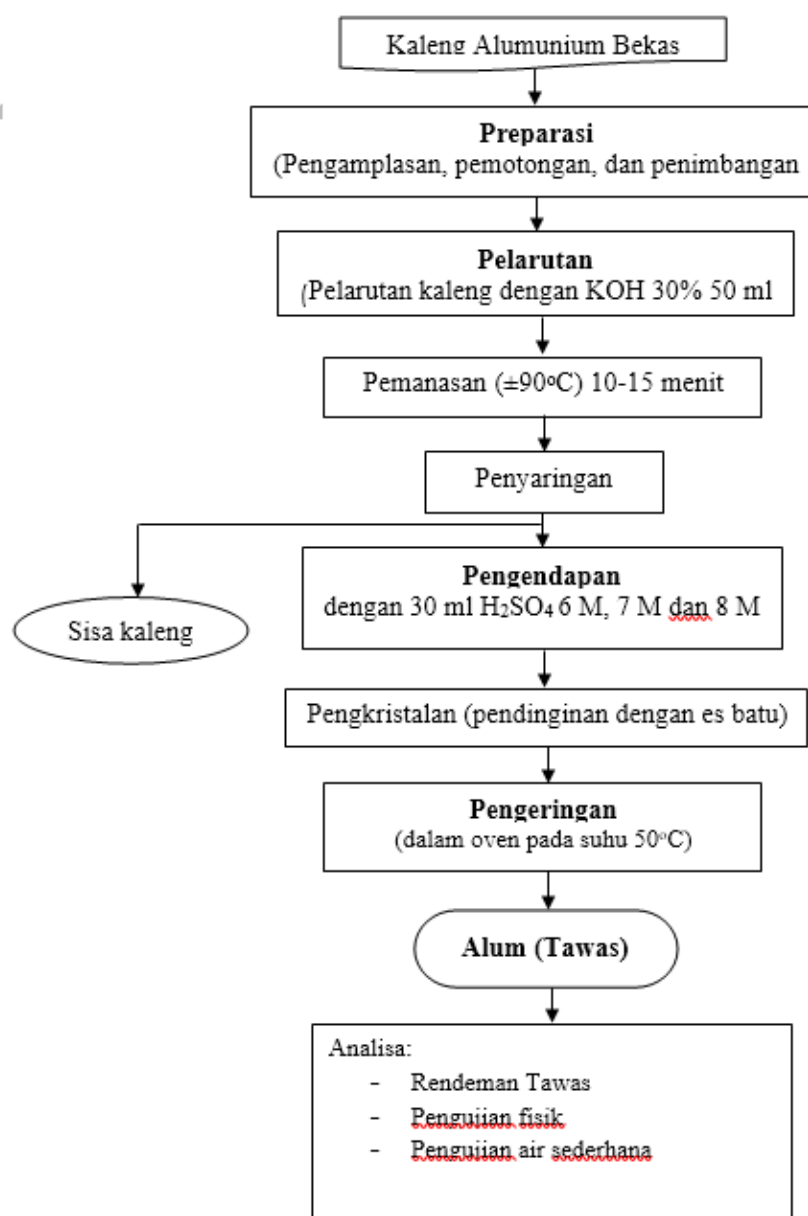
b. Analysis Method

The calculation is carried out on the yield of alum obtained. Then the qualitative test is carried out first by looking at a physical examination, as well as simple water purification testing (Purnawan, I., 2014).

i. Alum Yield
The most important parameter to determine the economic value and effectiveness of the product is the percent yield. The yield value can be calculated based on the percentage ratio of the final weight to the initial weight in a process. If the yield is high, the economic value of the product is high, and vice versa, if the yield value of the product is low, the economic value or the effectiveness value of a product is low (Mathlubi, 2006).

The amount of product produced from a chemical reaction is the reaction yield. Theoretical yield is the maximum amount of product that can be produced perfectly in an effective reaction. In fact, most reactions do not work perfectly, the actual yield of the reaction is usually less than the theoretical yield. Calculation of the yield percentage with the formula:

$$\% \text{ yield} = \left(\frac{bobot\ hasil}{bobot\ teoritis}\right) \times 100\% = \left(\frac{bobot\ hasil}{bobot\ teoritis}\right) \times 100\%$$

Reaction:
$$2Al + 2KOH + 4H_2SO_4 + 22H_2O \longrightarrow 3H_2\uparrow + 2KAl(SO_4)2.12H_2O$$
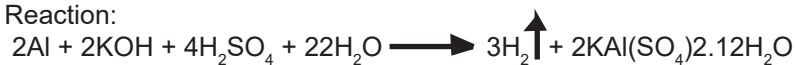
Based on the reaction, the theoretical yield is obtained from:

$$Rendemen\ Teoritis = \frac{Bobot\ kaleng \times \%\ Al \times Mr\ KAl(SO_4)_2.12H_2O}{Mr\ Al}$$

ii. Physical examination
Physical examination is in the form of crystal alum, white and almost odourless.
iii. Simple water purification test
Ways of working:
1) 2500 ppm alum was made using alum results at optimum conditions.
2) Measure the pH and turbidity of the water sample.
3) Take a 90 mL water sample and add 10 mL of 2500 ppm alum.
4) Stirring using a stirring rod 1 minute and allowed to stand for 10 minutes.
5) Measuring the pH and turbidity of the purified water sample

3. RESULTS AND DISCUSSIONS

a. Characterization of Used Drink Cans

As an initial step in Putri's research (2016), metal content analysis was carried out on several beverage cans. The analysed Metals were aluminium (Al), Iron (Fe), Magnesium (Mg), Manganese (Mn), Silicon (Si), and Copper (Cu).
The metals were analysed using Atomic Absorption Spectrophotometer (AAS). Samples of used beverage cans analysed in the form of used soft drink cans, namely:
A = used can of Pocari Sweat brand
B = tin cans from the Cap Kaki Tiga Solution brand
C = used brand of Greensands
D = used can of the brand Coca-Cola
The results of the analysis of the metal content in used beverage cans are shown in table 1 below:

Table 1 : Metal Analysis Results in Used Cans

Metal	Canned Code			
	A (%)	B (%)	C (%)	D (%)
Aluminium	96,38	89,7	90,87	93,28
Magnesium	1,14	3,28	2,25	1,17
Mangan	0,75	1, 93	1,21	1,04
Iron	0,51	1,79	1,52	1,72
Silicon	0,19	0,88	1,33	0,68
Tembaga	0,19	2,36	1,92	1,26

b.   Effects of H2SO4 Concentration and Weight of Samples on Alum Production

H_2SO_4 concentration was varied 6M, 7M, 8M and the weight of used tin samples was varied to 1gram, 2 grams, 3 grams and in the previous study the optimum KOH concentration was 30% (Purnawan, 2014) and the KOH volume was set to 50 mL so that in this study using KOH 30% as much as 50 mL

Figure 2 : Graph of Result Data of % Alum Yield
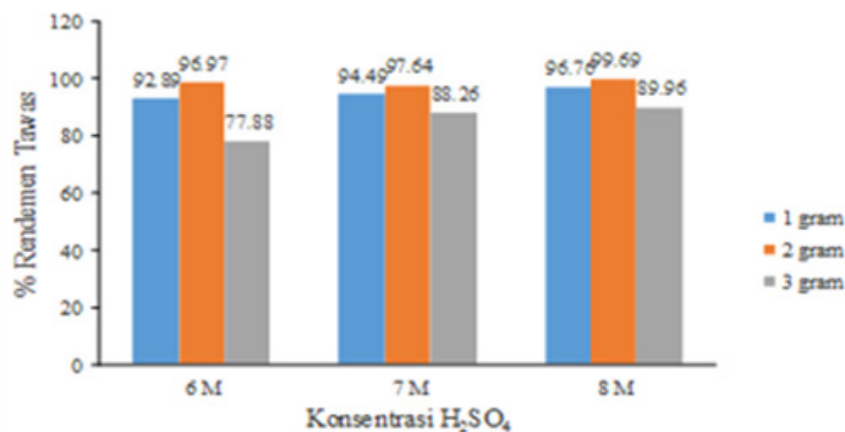
From Figure 2 it can be seen the effect of variations in sample weights and H2SO4 concentrations on alum manufacturing, namely:

i.   Percent yield of alum produced from ± 1 gram sample weights with different H2SO4 concentrations (6 M, 7 M, 8 M), the largest yield was obtained from 8 M H2SO4 concentrat gram sions of 96.76%.
ii.   At ± 2 gram sample weights with different H2SO4 concentrations, the greatest yield was obtained from 8 M H2SO4 concentrations, namely 99.69%.
iii. Whereas at sample weights of ± 3 gram with different concentrations of H2SO4, the greatest yield was also obtained from 8 M H2SO4 concentrations, as many as 89.96%.

The yield of % alum yield obtained from the sample ± 3 grams and the addition of 8M H2SO4 is lower than the sample weights ± 1 gram and 2 gram. This is due to the process of dissolving aluminium from used cans by a 50 mL KOH solution of 50 mL, at ± 3 grams sample weights, not all aluminium in the can completely dissolves into Al(OH)3, so to dissolve aluminium from 3 grams sample weights it must be use even more volume of solvents. Then it can be concluded that the 2 grams sample weight is the optimum weight needed to make alum aluminium cans with a concentration of 30% KOH as much as 50 mL.

c.   Water Analysis Results

On the addition of H2SO4 with varying concentrations of 6 M, 7 M, 8 M obtained the highest alum yield % of each concentration was 96.97%, 97.64% and 99.69%. This alum as much as 2500 ppm is used for the water purification process and compared with alum in the market from PT. Indonesia Acid Industries. Wastewater used comes from the aluminium coating process on vehicle lights.

Table 2 : Results of Water Analysis

Parameter	The Results				
	Before Clarifying	After Clarifying			
		Alum 96.97%	Alum 97.64 %	Alum 99.69 %	Alum in the market
Smell	Smelling	Smell a little	Smell a little	Smell a little	Smell a little
Color	Murky	Colorless	Colorless	Colorless	Colorless
pH	6.68	6.44	6.46	6.35	6.41
Turbidity (NTU)	337	34.3	29.9	21.8	30.4

From the data in table 2, the results of the analysis of wastewater samples are obtained, namely dark grey turbid, after adding alum and stirring it is formed slowly and then settles flock. This shows that the alum produced has the ability to clear wastewater. Based on the analysis of turbidity values (NTU) in wastewater samples using alum with a yield of 99.69% can reduce the turbidity value from 337 NTU to 21.8 NTU.

Figure 3 Purification Results with alum of 99.69%
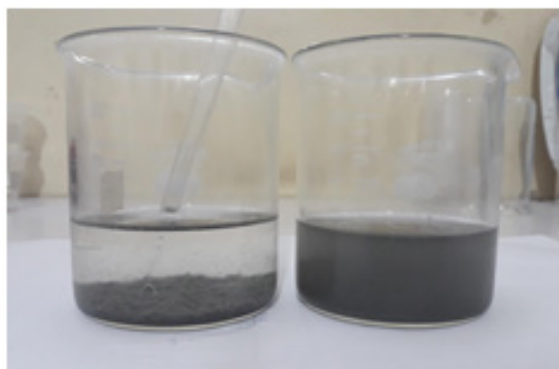
Figure 4 Purification Results with alum in the market
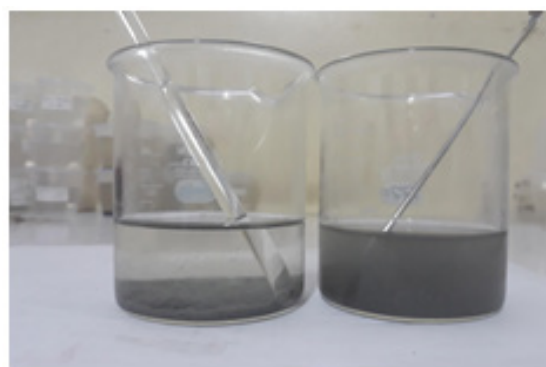
4. CONCLUSIONS

After conducting research into the production of aluminium potassium alum from beverage cans, the conclusions are as follows:

a. In the experiment of alum making, with a sample weight of 2 grams and 8 M H2SO4 concentration, the highest yield of alum was 99.69%,

b. In water purification experiments using alum, the higher the percentage of alum yield, the higher the turbidity reduction. With a percent yield of 99.69% alum can reduce water from 337 NTU to 21.8 NTU.

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EFFECTIVE APPROACH FOR EMERGENCY EXIT ROUTE IN A BUILDING

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Politeknik Sultan Salahuddin Abdul Aziz Shah

ABSTRACT

Every country has their own standard s and regulations for fire safety practise in a building. The purpose of fire safety standard and regulation is to prevent death during fire. In case of emergency, it also ensures building occupants able to evacuate from the building. Generally, despite the fact that we have guideline for the fire safety standard s and regulations, people's awareness towards the route is still lacking. Hence, in the research of effective approach for emergency exit route in a building, the awareness of people needs to be clarified then the approach can be evaluated. This research use descriptive research design with quantitative dominant research, explanatory sequential mixed- method design with three instruments. The total of response rate from the total sample is 80%. Pilot study has conducted for 30 respondents before distribution to government-operation building. Based on the result, building occupants did aware of the emergency exit route in the building but they need more information regarding emergency route in the building. The contribution of this study is to give awareness of the emergency exit route approach in the building.

Keywords: Emergency Exit Route; Fire Safety; Awareness

1. INTRODUCTION

Death caused by fire and burns from fires and burns are the third leading home injuries even though every building is equipped with fire safety equipment such as sprinkler, fire hose reel, fire extinguisher, heat and smoke detector, alarm bell and break glass, as well as emergency lighting, yet it is still not enough to prevent fatalities and injuries in fire (International Association for the Study of Insurance Economics 2009

Included in one of the esential accommodations in a building, emergency exit route will help the building's occupant to evacuate from the building in case of emergency which is mostly fire case. The importance of having emergency exit route is very critical as it is under regulation of Uniform Building by Law (UBBL) by means the emergency exit route should be provided in a building. Moreover, under standard law of Bomba Malaysia (Act 341) also stated that there are regulations regarding the safety element in a building that connected to the safety equipment which are:

"fire-fighting equipment or fire safety installation" means any equipment or installation for-
a) Extinguishing, fighting, preventing, or limiting a fire;
b) Giving warning of a fire;
c) Providing access to any premises or place or any part thereof for the purpose of extinguishing, fighting, preventing, or limiting a fire;
d) Providing emergency power supply in the event of normal power failure;
e) Providing emergency lighting for purposes of escape from buildings;
f) Giving direction towards an escape route or place of refuge; or
g) Providing adequate, safe egress for the purpose of evacuation or
h) Exit of occupants in the event of fire;

That means, these regulations are to provide a safe environment for the building's occupant in case of fire emergency. It is an important element that should be highlighted as it will influence the safety of human life and to prevent death in case of fire. The aim of this research is to produce alternative solution to approach building occupant towards emergency exit route in the building. In order to achieve the aim, an objective is developed which to determine building occupant's level of awareness for emergency exit route in a building.

3.0 PROBLEM STATEMENT

August 2016, Department of Fire and Rescue Malaysia reported a case of fire when 6 workers jumped from second floor of building to escape the fire. The action was taken because they were afraid for their life. All the victims experienced waist and leg injuries caused by free fall from the second floor. According to Subang Fire and Rescue Second Senior Officer, Hazinan Md Yusof, the victims were asleep in the premises when they realized the fire but they ignored the emergency stairs behind the building and decided to jump from the second floor window.

At Johor, Director of Malaysia Fire and Rescue Department Johor, Datuk Ab Ghani Daud stated that from 8,643 premises that were inspected, a total of 2,434 compounds were given under surveillance for the Section 8 Bomba Services Act (ACT 341) due to non-compliance to the law. The premises owners act were such a thoughtless and irresponsible since they put other's life in danger for the sake of their business operation.

From above statement, that building's occupants are lack of awareness of the emergency exit route in a building. Even though, the implementation of fire safety awareness has been reinforced by law but awareness among the occupant still a huge concern that need to be focused on.

3.1 Research Objective

To determine building occupant's level of awareness for emergency exit route in a building

3.2 Research Question

What is the level of awareness for occupant towards the plan?

4.0 RESEARCH METHODOLOGY

This study employs explanatory sequential mixed methods that gives opportunity to approach quantitative analysis as the main study and supported by the qualitative analysis. A set of 476 questionnaire related to the objective of this research have been created to collect data from the respondents which are the staff in the building. Selected buildings are buildings in Klang Valley, Malaysia. In this research the buildings will be referred as building A and building B. Both building are under government operation. This is to avoid bias while giving perspective during the analysis. By using the SPSS software version 24.0, a very high response rate was achieved of 95.7%. The researcher decided to use two types of instrument in order to collect data in this research. The instruments are questionnaire and interview.

5.0 DATA ANALYSIS & DISCUSSION

5.1 Data Analysis

The questionnaires were distributed to both buildings at the same date and collected four weeks after the distribution date. From 234 questionnaire distributed to building A, 196 usable questionnaires were received meanwhile for building B, 209 out of 242 questionnaires were received back. Analysis of this research is conducted by Statistical Package for Social Sciences program (SPSS) for data analysis and generating essential result in order to achieve this research aim and objective.

Table 5.1 (a) Descriptive Statistics of finding in Section A questionnaire

Building	A		Building	B	
	N	Mean		N	Mean
Follow ERT instruction	196	3.46	Follow ERT instruction	209	3.50
Awareness of ERT	196	3.16	Awareness of ERT	209	3.22
Accident & risk consideration by ERT	196	3.16	Involve in fire drill	209	3.22
Understanding plan and emergency procedure	196	3.13	Accident & risk consideration by ERT	209	3.19
Implementation of ERT	196	3.01	Understanding plan and emergency procedure	209	3.13
Involve in fire drill	196	2.92	Implementation of ERT	09	3.01

In section A, the highest mean for both building s are the awareness to follow Emergency Response Team (ERT) instruction as the occupant of the building trust the team's skills on handling fire cases. Table 5.1 shows the lowest mean for building A is involvement in fire drill with a score of 2.92 as per stated the building A did not conduct any fire drill in the past two years to be experienced by the respondent. As for Building B, the lowest mean score for implementation of ERT with mean of 3.01. ERT implementation should be practiced because they are the competent personnel to explain fire emergency procedures to the occupant due to safety issue s in the building and to increase awareness. If the building does not perform any fire drill for its occupant, it does not help the occupant to picture the real situation of fire emergency. During the fire drill, standardize procedures that follow Standard Operating Procedure (SOP) of Emergency Response Team (ERT) is run to ensure the safety of the occupant and also the building

Table 5.1 (b) Descriptive Statistics of finding in Section B questionnaire

Building	A			B
	N	Mean	N	Mean
Occupant follow exact safety procedure	196	3.37	209	3.42
Awareness to use exact route for evacuation	196	3.36	209	3.35
Occupant secure of the emergency procedure in building	196	3.19	209	3.26
Awareness of received sufficient information for emergency route	196	2.66	209	2.72
Tendency to immediately move than following fire marshal instruction	196	2.32	209	2.36
Tendency to use alternative method for evacuation	196	1.77	209	1.61

For Section B, it evaluates awareness of the occupants towards emergency exit route that analyze their tendency of action and awareness towards emergency exit route. From Table 5.1 (b), it shows that the lowest mean scored to tendency of using alternative method for evacuation for both buildings. This shows positive level of awareness towards emergency exit route whereby the occupant may not want to take action by themselves due to lack of knowledge about the fire emergency. This action somehow lead to the highest mean that goes to the occupant will follow exact safety procedure in the building in case of any emergency case happen with the mean score of 3.37 for Building A and 3.42 for Building B.

Researcher discloses that lacking of knowledge in fire safety increases the awareness of the occupants to follow the exact safety procedure. Some of the occupants may never experience any fire drill or real fire case before that makes them unsure of the right action to be taken during the emergency. This behaviour somehow is a good practice because it is safer to follow the instructions from the Emergency Response Team (ERT) rather than making self-decision during the emergency. The occupant knows that lack of knowledge and experience can bring harm to the occupant, people around them and also to the property. In the future, every company should provide fire safety training to their worker s to improve their response level towards emergency case.

Table 5.1 (c) Descriptive Statistics of finding in Section C questionnaire

Building	A		Building	B	
	N	Mean		N	Mean
Occupant aware the location of assembly point	196	3.19	Occupant aware of all indicator used for emergency exit route in building	209	3.24
Occupant aware of all indicator used for emergency exit route in building	196	3.16	Occupant aware the location of assembly point	209	3.20
Awareness of emergency route signage visible & clearly indicated	196	3.06	Exit route in the building clear & not obstructed with anything	209	3.17
Exit route in the building clear & not obstructed with anything	196	3.06	Awareness of emergency route signage visible & clearly indicated	209	3.10
Sufficient exit route signage indicated	196	3.01	Sufficient exit route signage indicated	209	3.09
Emergency route layout plan visible & clearly indicated	196	2.98	Emergency route layout plan visible & clearly indicated	209	3.07

The scale: 1 (Strongly disagree) 2 (Disagree) 3 (Agree) 4 (Strongly agree)

Table 5.1 (c) shows the mean of awareness of the occupant towards way finding as a provided factor by researcher to effective emergency exit route in a building. The occupant in building A feels that the emergency route layout plan is not visible and clearly indicate as the mean level are at the lowest level.

In Malaysia, there are numbers of law that related to fire safety that has been established and used as standard requirements for all buildings in Malaysia. According to Department of Occupational Safety and Health (DOSH) official website, Uniform Building By-Laws (UBBL) 1984, Occupational Safety and Health (OSHA) 1994 and Fire Service Act 1988 are one of the previous law that enforced fire safety. All the building s built by the developer must comply with this act in order for the building to be awarded with Certificate of Completion and Compliance (CCC). From the questionnaire result (Section C) shown that the emergency layout plan is visible and clearly indicated had scored the lowest mean point. This can be assumed that the plan may be placed at non-strategic location. Researcher also has a point of view whereby that the occupant of the building does not know the meaning of the plan that management try indicates. Even though the plan usually comes with legend of the symbol but mostly the occupant does not understand the real meaning of each of it. This may lead to misinterpreting data information that may bring harm to the occupant.

6.0 CONCLUSION

Based on the research question 'what is the level of awareness for occupant towards the plan?' that derived the research objective which is to determine building occupant's level of awareness for emergency exit route in a building, it can be stated that the occupant really aware about the exit route in both building A and building B. It then gave clear and positive views to researcher that the occupant notices the implementation of the emergency exit route in both building too. Through the interview, a positive feedback of ERP towards occupant from both respondent of the building A and building B was given.

According to Zahari, et. al. (2014) fire drill is one of the step s to mitigate the risk of fire emergency in a building especially in high-rise building. The training demonstrates method of evacuation for occupant from the building ensuring all of the occupant aware their own role and responsibilities during the emergency of fire, During the fire drill, the occupant will be exposed to the fire risk and what should be taken into consideration to save lives. As an occupant of a building, preparedness with basic knowledge is important to confront the fire emergency even though not appointed as one of the ERT member s. This is to make sure the safety for people surrounding know the evacuation plan. However, instruction from professional personnel in evacuation is the best action. This is because they know best practice on how to handle the fire emergency procedure in terms of evacuation of occupant s and the protocol related to the building.

As a conclusion, the objective of this study had been achieved and indirectly impact was given to the building awareness towards emergency exit route in a building. A new perspective for effective approach for emergency exit route in a building that need cooperation from building occupants, management and owner as their power and responsibility towards the issue is crucial also has been discovered throughout the study. This study conducted not only helps in building awareness but also in researcher view on the awareness for emergency exit route approach in a building.

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ANALYSIS ON FINGER MOVEMENT PATTERN OF CURRENT THERAPY AND HAND GESTURE DEVICE FOR APHASIA

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ABSTRACT

Aphasia is a type of language impairment. As the language is a root of communication, speech disability people usually used sign language to interact. This paper deliberates on the fingers movement pattern of current therapy and hand gesture device assessment. The data that has been collected was obtained by doing a pilot test on a normal person to measure their fingers movement pattern when using the hand gesture device. The hand gesture device is a glove with the flex sensors attached to the all five fingers. When a specific sign language is gestured, the hand gesture device calculated the resistance to differentiate each syllable and change it into audio. The result shows that every syllable (A, B and C) has a difference resistance on each finger. This indicates that the finger movement pattern analysis has proved that the hand gesture device to be useful for aphasic because they can utilize this device to communicate in daily life.

Keywords: Aphasia, fingers movement pattern, sign language, flex sensor

1. INTRODUCTION

Aphasia is language impairment. It can affect many aspects of communication including speech, writing, reading, gesture and understanding. The common cause of aphasia is stroke but there are few other causes such as head injury and tumors[1]. Aphasia can be classified into few types which are global aphasia, isolation aphasia, transcortical motor aphasia, Wernicke"s aphasia, transcortical sensory aphasia, conduction aphasia and anomic aphasia[2].

Deficits that occurred after stroke are classically attributed to focal damage[3]. When left intra-hemispheric connectivity of the brain was damage, this will lead to the language deficits. Language disorders can arise not only from pure disruption of language processing, but also from disruption of bilaterally distributed support processes including auditory processing, visual attention as in reading, and motor planning for speech[3]. Damage to any of these structures can affect the communication and function of the language system.

1.1 Current Treatment for Aphasia

For individuals with aphasia, gestures have been examined as a modality to promote recovery of communication skills[3]. Individuals with left hemisphere brain damage often develop limb apraxia [4], an impairment of limb movements, which can weaken the ability to use gestures effectively to communicate. Thus, gestures are often the target of treatment in clinical interactions with individuals with aphasia, both to improve the quality of gestures as a compensatory communication modality and to facilitate recovery of language skills, in particular word retrieval[3].

Stimulation response or direct retraining of deficit is still used nowadays. But a newer technique has been introduced called MIT (Melodic Intonation Therapy) which is a neuro-behaviorally based[5]. MIT consists of intoning normal language with exaggerated rhythm, stress and melody. Other than that, Computerized Visual Communication (C-VIC) was designed as an alternative communication system for patient with severe aphasia[5]. Pictures and icons are used to represented meaningful concepts or things and this system is used as an alternative way to communicate for aphasic.

1.2 Current Treatment for Stroke (Fingers)

Stroke is a common health problem globally and a leading cause of impairment. Unfortunately, majority of the stroke patient has an incomplete recovery of motor deficits despite intensive rehabilitation[6]. Stroke related motor deficits affect independence doing activities of daily life.

The concept of Constraint-Induced Movement Therapy(CIMT)[7] consists stretching, orthotics and positioning. Numerous form of intervention are available that are thought to influence tone and reduce spasticity. These include stretching, mobilization, casting, splinting, orthotic and posture management. One of the exercise used squishy ball. Patient used the ball to exercise their fingers. This exercise includes stretching and posture management.

2. METHODOLOGY

The project consists of idea of the device, design consideration of hardware, software implementation and the block diagram for methodology. Communication is a challenge for people with aphasia. As per the convenience for the user, the communication is achieved by using Arduino Nano as the processor and LED as an indicator of the success rate of the exercise.

3.1 Hardware and Sofrtware

This device will be using flex sensors as this component"s features are suitable to recognize the hand gesture because it is physically bendable. Other than that, Arduino Nano also will be used in this device as this microcontroller board contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started.

This device is visualized to be look like a glove. Each finger of the glove will be fitted with a flex sensor so the data input will be receiving resistance of the particular movement. The data then will be encoded into the Arduino and check over the comparison of each letters to get into the array needs stick it. The encoded data will recheck with database which of storage of alphabets has encoded for the particular resistance. After that, it will be extracted the results through audio.

3. RESULTS AND DISCUSSIONS

Result for this project is obtained by bending the flex sensors to the desired position. This product used flex sensors that were attached along the five fingers to measure the resistance produced when the user gesture a sign language. The flex sensors which connected to the processor, Arduino Nano had been programmed. Each gesture of the sign language has it own threshold. This threshold is used to reduce and limit the amount of deflection of each syllable in sign language. Therefore, the redundant signal will be reduced.

Figure 1 : End product.

For „B", the threshold for the flex attached to the thumb was set >60 and the rest is set <50.

Figure 2 : Significant pattern for alphabet B
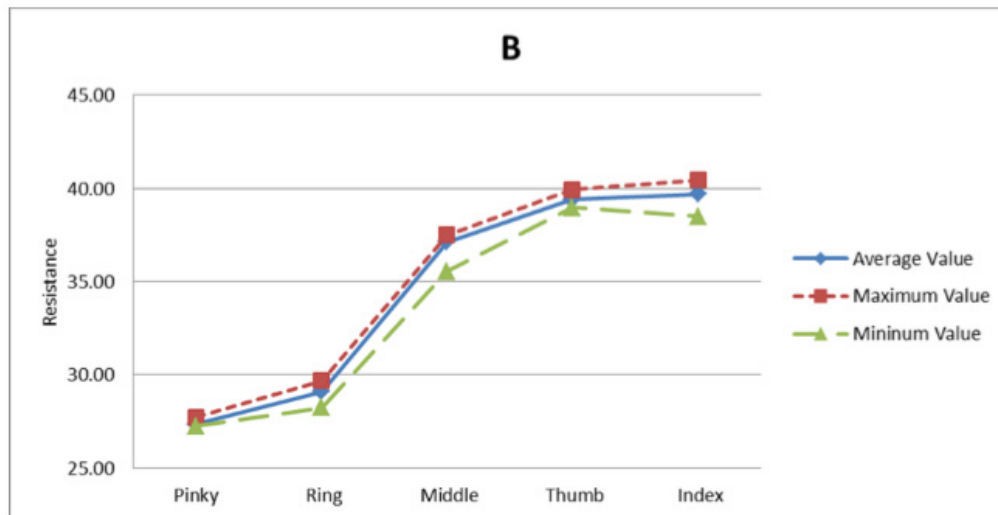
Table 1 : Average values for B

Finger	pinky	Middle	Ring	Thumb	Index
Average value	27.35	29.10	37.11	39.40	39.70

For „C", the threshold for the flex attached to all fingers are set to >60.

Figure 2 : Significant pattern for alphabet B
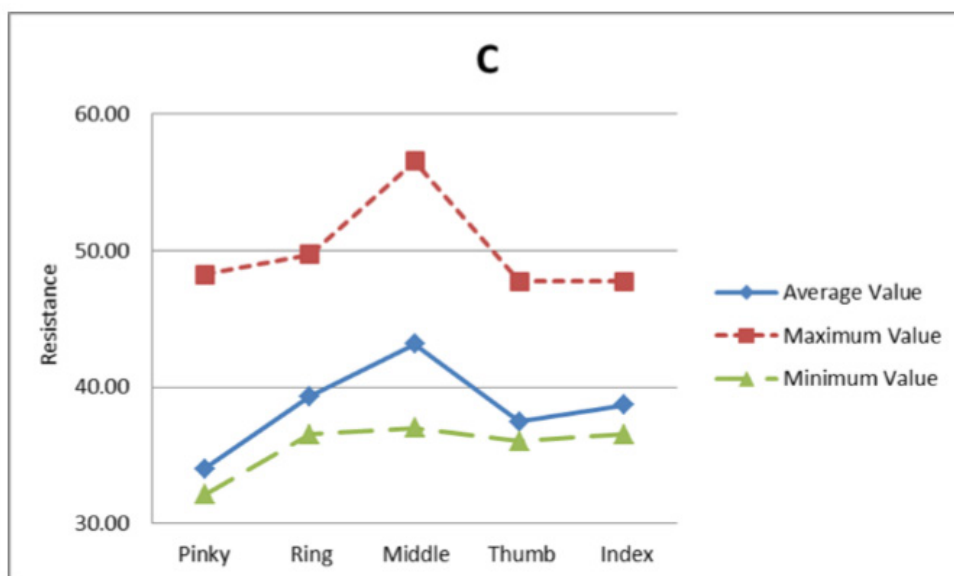
Table 1 : Average values for C

Finger	pinky	Middle	Ring	Thumb	Index
Average value	34.03	39.31	43.16	37.45	38.67

For „A", the threshold for the flex attached to the thumb was set <50 and the rest is set >60.

Figure 4 : Significant pattern for alphabet A
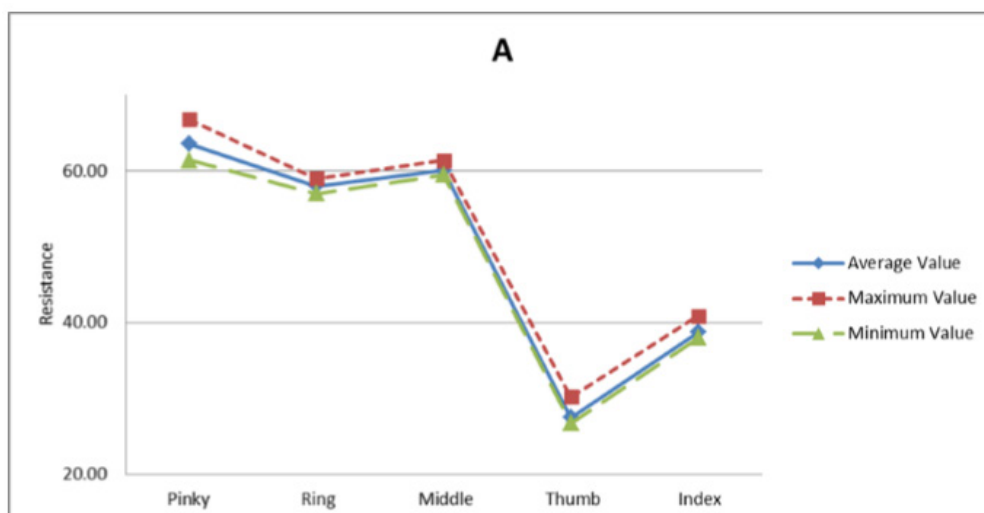
Table 3 : Average values for A

Finger	pinky	Middle	Ring	Thumb	Index
Average value	63.57	58.01	60.06	27.49	38.72

The flex sensor is a very sensitive sensor. So when handling the device, a proper care must be taken to ensure that the result is correct. The pattern produced from the fingers movement for alphabet B, C and A are shown in figures 3, 4 and 5 above. The theory in this study is that alphabet B is the first stage of the therapy, follows by alphabet C then only alphabet A because of the level of difficulty of each alphabet.

As displayed in figures 3 and 5, the patterns for B and A are polar opposite with each other. As for B, the pattern shows the increasing values from pinky to thumb and meanwhile for alphabet A it is vice versa. The patterns supported the hypothesis of the study that stated that the B is the first stage of therapy and A is the last stage of therapy.

4. CONCLUSION

The previous study shows a variety of approaches that have been done by the neurologists and the researchers to treat the patients with the aphasia disease due to post-stroke. From the traditional technique which the repetitive drill to the computerized technique has been used as the therapeutic tools for the aphasic so that patient can return to normal. Aphasia is not an untreated or a permanent disease. It can be cure if the patient is willing to undergo the therapy. There are many therapies nowadays to provide a fully functional motor movement of the fingers but this device is a bi-functional device. It is dual functional because this product was designed to help aphasic due to post stroke to undergo a speech treatment along with their physical treatment. Other than that, this analysis provided the standard pattern of finger movement therapy for aphasia to help in advance research in the future.

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FIBER OPTIC MICROBEND SENSOR IN INTRUSION DETECTION SYSTEM

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ABSTRACT

Recent explosion of Internet of Things (IOT) and Industrial Revolution 4.0 (IR4.0) have become new trend not only for manufacturing technologies but also for monitoring system. In intrusion detection system, detection of a person or vehicle attempting to gain unauthorized entry into an area that is being protected is monitored by the owner or authorized personnel. Fiber optic microbend sensor for fully distributed system is being implemented for single mode fiber optic as distributed sensors have enormous possibilities for industrial applications including the intrusion alarm system for homes and industrial machine. In this project, the monitoring of the measured value along the contour of the optical fiber requires some means of identifying the signal originating from a given section of the fiber. A pulse signal is transmitted into one end of the fiber and the backscattered signal from different parts of the fiber are recovered at the same fiber end. Further, the performance of the microbend sensor are measured by monitoring the force, pressure and stress in the intrusion alarm system for smart home IOT monitoring system.

Keywords: IOT,smart home,fiber optic sensor, microbend , intrusion detector

1. INTRODUCTION

In telecommunication, the main part of transmission and widely use nowadays is the fiber optic for transmitting and receiving data. One of its application is fiber optic sensor. The development of fiber optic sensor has been applied to many applications because of its advantages and have significantly change the telecommunications industry and also smart application [1]. The characteristics of high sensitivity, robust, multifunctioning sensing capabilities and also cost reduction is the reasons of outgrowth of the fiber optic sensor. Nearly all fiber optic sensors utilize the strain-optic effect, whereby an applied strain from an external measurand, such as a pressure wave, causes a change in refractive index of the fiber [2]. This change can be measured in a number of different ways, with the goal in security applications to correlate the change into the magnitude and location of a vibration caused by an intruder.

Microbend sensors are one of the earliest fiber optic sensors developed and have been employed by several researchers for sensing of many parameters and one of the optical fiber communication one of the major losses was the bending loss of which is called microbending. Furthermore, this microbend loss effect [3] in optical fibers were used for the measurement of many parameters and variables like temperature, displacement, pressure, pH, strain, acceleration, magnetic and electric field. In addition to the general advantages of fiber optic sensors like immunity to electromagnetic interference, high sensitivity, small size and weight, large bandwidth, versatility, reliability, reduced cost, etc. These microbend sensors have unique sets of advantages[2], [4], [5] like they are robust, they avoid differential thermal expansion problems because of easy mechanical assembly that does not require fiber bonding with other components, simple to construct, do not require any complex signal processing techniques and have good mechanical and optical efficiency that leads to low cost.

Microbend sensors have been found to be used in various applications. Fiber optic microbend sensor for fully distributed system is being implemented for single mode fiber optic as distributed sensors have enormous possibilities for industrial applications including the intrusion alarm system for homes and industrial machine was reported by [6]. Previous work on the first scientific paper described a technique for intrusion detection applications other than fiber breakage and investigated the feasibility of an optical fiber based in-ground intrusion detection sensor. The study [7] proposed a method for converting the change in polarization into a measurable electronic output for practical applications was proposed and the results showed an intruder could clearly be detected when the cable was buried in different types of gravel and at different depths which investigated the feasibility of an optical fiber based in-ground intrusion detection sensor.

Base on a concept of a smart home, a related study mentioned that Internet of Things play an important role for controlling the security system and has highly advanced automatic systems for controlling and monitoring lighting and temperature, home appliances, multi-media equipment, and security systems and many other functions. Internet of Things (IoT) plays an important role in building smart home [4]. Through IoT almost every object of our daily life in a home can be connected to the Internet. The smart monitoring system improved a living standard, security and safety as well by referring to the numerical results. IoT allows monitoring and controlling all of these connected objects regardless of time and location [8].

One of the application areas of a smart home is intrusion detection system were used for alerting user through email and text message. Applications of a smart home environment which are useful to improve safety and quality of living. The intrusion detection application can also send detailed report with images or audio/ video clip to the user. The main goal of this application is to monitor suspected activity in smart home and alert user and take necessary actions for security purpose [9] . The purpose of a smart home is to improve living standard, security and safety as well as save energy and resources.

Base on another study[5], [10]–[12], it is reported on the use of fibers as a transmission medium, also describes the development of a fiber optic pressure mat based on micro-bending for the detection of intruders. The study stated that while there was only a small change in the amplitude of the signal due to microbending of the fiber from an intruder, there was a significant rotation of the speckle pattern that was analyzed. Another study[13] stated a complete security system is found by using real time monitoring sensors via control system and it is proven reducing the number of false alarms and increasing the effectiveness of the security system both on the detection and prevention of potential intruders. According to [3], there is a large array of different sensing techniques used for physical intrusion detection, from glass break detectors, magnetic door and window detectors to surveillance cameras and infra-red trip wires, as well as in-perimeter fence and in-ground pressure sensors.

This paper investigates the measurement of microbend sensor in intrusion detection system to enhance the effectiveness of the smart security system. Based on the literature review, micro bending can be utilized by using the microbend fiber optic sensor. The objective of this study is to improve the performance of the loss effect in the optical fiber in IoT monitoring smart home system.

The rest of the paper is organized as follows. Section II describes the behaviour of microbend sensor and home intrusion while section III explain about the methodology of microbend measurement. Section IV elaborate more on discussion of the experimental result. The overall conclusion and further work in section V.

2. METHODOLOGY

Recently, fiber optic become major application in sensor technology due to the advantages of fiber optic, its immunity to electromagnetic or radio frequency interference and their ability to interface with a wide variety of measurands. A fiber-optic sensor (FOS) uses light guided within an optical fiber to detect any parameter such as physical, chemical and biomedical. Figure 1 depicts the configuration of the fiber optic intrinsic sensor. In this study, intrusion detection is used for alerting user through email and text message. The intrusion detection application can also send detailed report with images or audio/video clip to the user. The main goal of this application is to monitor suspected activity in smart home and alert user and take necessary actions for security purpose.

Fig. 1. Intrinsic –type microbend sensor
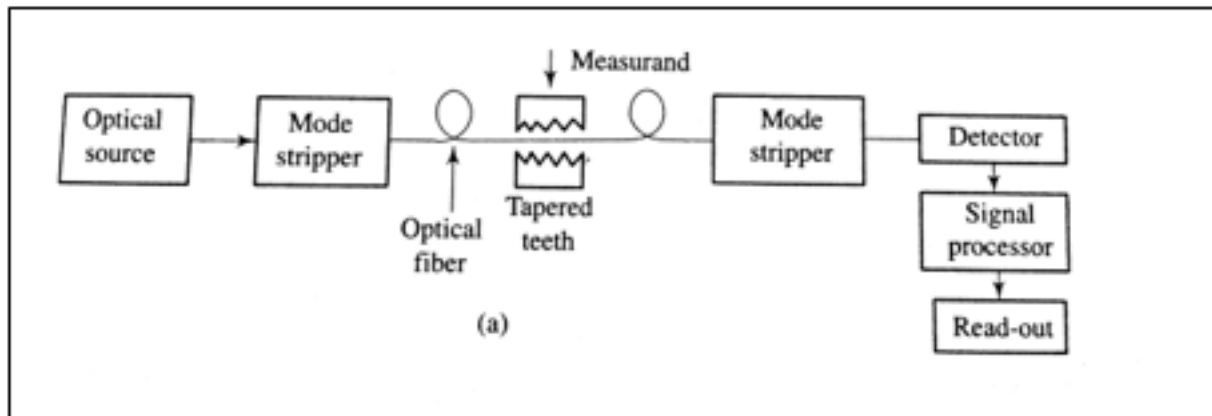
The optical source launches light into a single multimode fiber and as usual its output detected by the detector. The measurand causes the tapered teeth (or some other device) to produce microbending of the optical fiber. It can be shown in Figure 2, that the loss is maximum for periodic microbending, with the bench pitch Λ given by:

$$\Lambda = \alpha\pi an/NA$$

Where α is the profile parameter of the core refractive index of the fiber, a is the core radius, n is the refractive index of the fiber core and NA is the numerical aperture of the fiber.

Fig. 2. Details of the loss mechanism
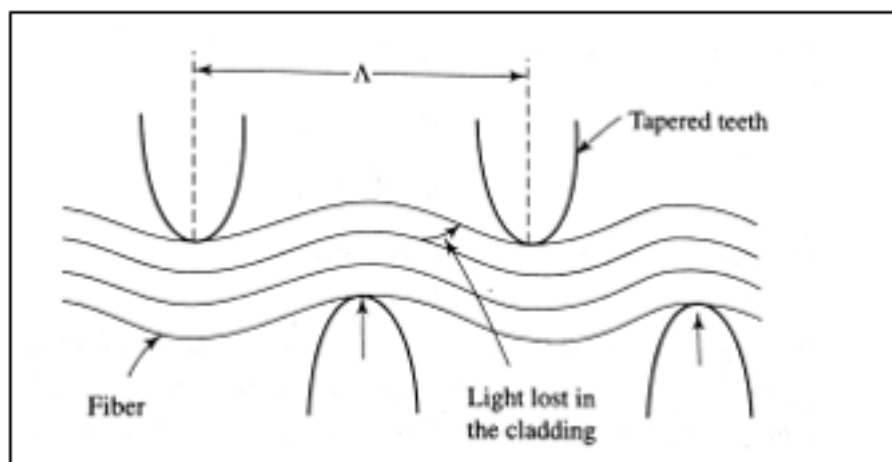
3. RESULTS AND DISCUSSIONS
3.1 Distribution

This section discusses the results obtained from the surface pressure measurement study. Establishment of alarm modes (AM) is a specific warning event which takes place continuous or abrupt actions in the microbend sensor for intrusion detection (MiSFID).

3.1.1 The effects

Overall, AM must include all features of waning signal so that it can be distinguished from other AMs. From the study, seven types of movement have been setup such as walking, running, rolling, bouncing, climbing, cutting and shaking according to the model of MiSFID was shown in Fig.3 to Fig. 9.

Fig. 3 : Walking Mode
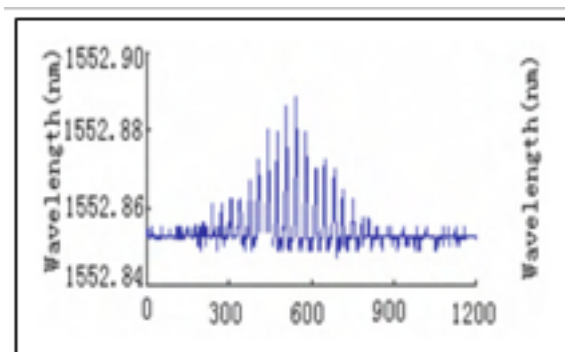
Fig.4 : Running Mode
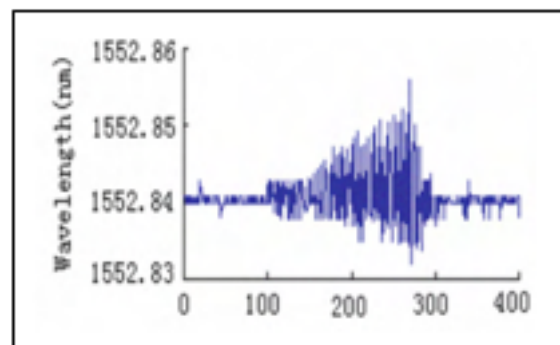
The walking mode is described as continuous knocks on the surface of the steel bar from the right to the left. These knocks are similar as walk which its frequency is about 0.5-3Hz. The period can denote correctly the frequency of knocks and the amplitudes also can refer to the distance to a sensor as shown in Fig.3.

The running mode is defined as vibrating in a certain time. Also, the amplitude and period can reflect the distance from sensor as shown in Fig. 4.

Fig. 5 : Rolling Mode
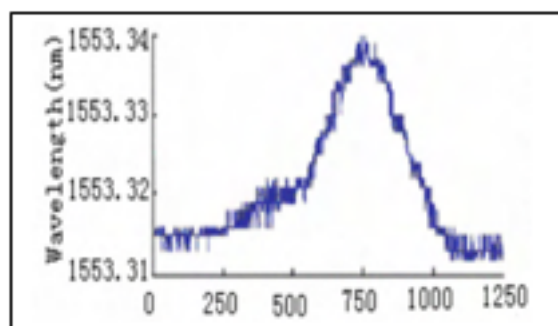
Fig.6 : Bouncing Mode
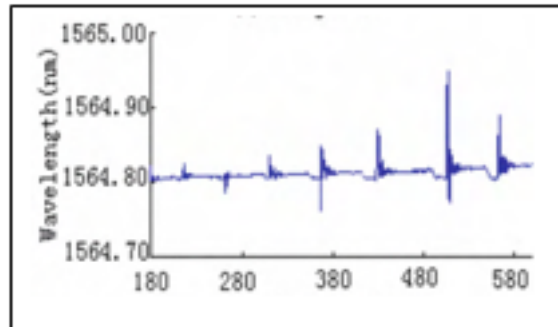
The rolling mode is caused by the wheel which is rolling on the steel bar. After several experiments of rolling and pressing, the typical results has been obtained which are demonstrated in Fig.5.

Compared with walking mode, the climbing mode setting up mainly gets some irregular or nonperiodic knocks or hits on the steel bar as shown in Fig. 6. For this mode, the method of wavelet transform is used to detect all slight changes.

Fig. 7 : Climbing Mode
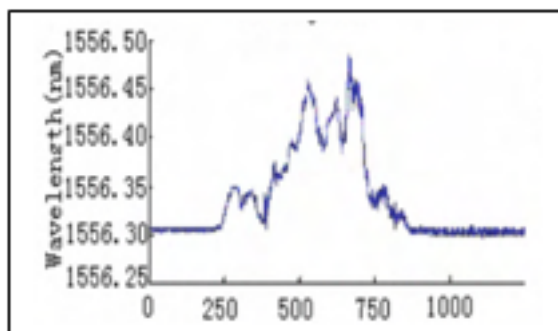
Fig.8 : Cutting Mode
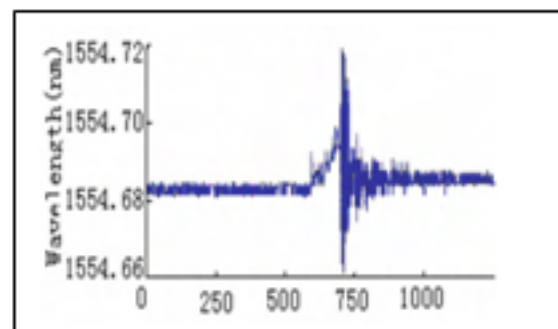
The signal of climbing the fence is obtained at the actual situation when someone climbs the fence as shown in Fig.7, the signal behavior has the features of strain and multi-peak.

Meanwhile, in Fig. 8 shows the cutting signal which is obtained by cutting the net of the fence. The signal has the features of vibration and pulse.

Fig.9 : Shaking Mode
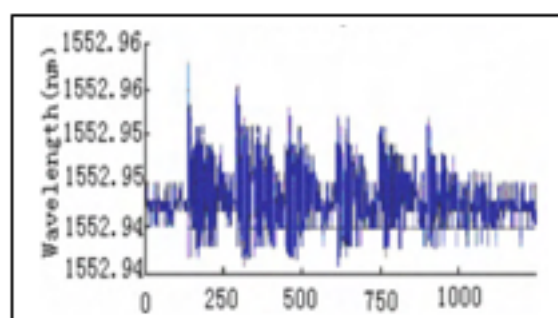
Fig. 9 depicts the shaking strength and frequency which are both uncertain, so the signal looks immethodical. However, some features of the signal such as period and vibration still can be detected. The judgment of warning mode is still needed to resolve. Therefore, the alarm signal model (ASM) and false alarm signal model (FASM) still need to be used from the data of each alarm mode.

4. CONCLUSIONS

A single security setup for a property, whether it is domestic or commercial, may utilize a number of these techniques in creating a complete security system. Moreover, modern systems usually incorporate an inherent level of intelligence for real-time monitoring of sensors via a security control center. This intelligence is essential for reducing the number of false alarms and increasing the effectiveness of the security system in both detection and prevention of potential intruders. Optical fiber security systems offer some unique advantages with respect to the other methods. One of the main advantages is that the optical fiber itself can act as both the transmission medium and the sensor. It is well recognized that optical fiber sensors have many desirable attributes; being small, lightweight, environmentally rugged, and have increased sensitivity with respect to traditional sensing techniques. These attributes are ideal for advanced security systems.

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FEATURE EXTRACTION ANALYSIS OF THE SIGNIFICANT PATTERN SIGN LANGUAGE TOWARD TO THE FINGER MOVEMENT

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ABSTRACT

In this study, feature extraction technique is used to analyze the significant pattern of sign language toward to the finger movement. This technique is used to observe the difference value of voltage and resistance between five (5) fingers in 2 condition; all extract and retract as a control measurement. This measurement is used to recognize the sign language based on the hand gesture specifically finger movement. Flex sensor bending measurements may provide the relationship of respective finger movement to the difference force that produces the angle. There are significant different of the hand gesture due to sign language based on force and angle of the finger movement. Result from the control measurement is a bench mark for the sign language to other alphabet These results shows that the amount of voltage that is required to bend the flex sensor may resulting on the difference alphabet during hand gesture.

Keywords: Feature extraction, sign language, flex sensor

1. INTRODUCTION

Sign language is a type of communicative gestures that highly influenced by hand gesture recognition for hearing impaired express their feelings, contribute to a conversation, learn, and overall live their lives as normal as possible.Gestures and sign language recognition includes the whole process of tracking and identifying the signs performed and converting into semantically meaningful words.Not many of the people with the disability understand the Sign Language even though Sign Language is the only common language and medium that is used to communicate with others [1]. The combination of the manual gestures and the communication consists of movement and orientation of handthat conveys symbolic meanings cause the sign language to be complicated to understand [2].

sign language can also show the deaf community that they are not being forgotten, and they have the same access to communication with the rest of the world as anyone else, and that their voices should never be muted or disregarded. In Malaysia the number of people who understand the Sign Language is considered small. Approximately of 40,000 has stated that deaf populations registered with Social Welfare Department of Malaysia [3], therefore an initiative techniques may give the people with disabilities opportunities to live as normal citizen of Malaysia. Those who suffer from being deaf and have impaired hearing should not be sheltered from communicating with the rest of their peers. They must live in an environment and world that they feel can hear them and what they are trying to say at all times, and to all walks of life

Gestures in sign languages can be placed along a similar scale, from fully closed (the closed fist hand shape) to fully open (the open palm hand shape), with flat, bent, and curved hand shapes in between [4]. In spoken languages, there are phonotactics (phonological rules) that regulate the sequence of open and closed sounds; similarly, in ASL, phonotactics regulate the alternations between open and closed hand shapes [5].

The most common sign languages recognition researches are based on American Sign Language (ASL), Arabic Sign Language (ArSL)and Indian Sign Language (ISL) and Several other sign languages Tamil sign language (TSL), Dutch sign language (DSL), Korean sign language (KSL), Malaysian sign language (MSL), Persian sign language (PSL), English sign language (ESL), New Zealand sign language (NZSL), Chinese sign language (CSL), Japanese sign language (JPL), Vietnamese sign language (VSL), Brazilian sign language (Libras), Bangla sign language and Indonesian sign language [5-8].

Feature extraction method has been used widely in recent gesture [9]. Selection of a feature extraction method is probably the most important factor in achieving identification performance in character [10]. It should contain relevant information from the hand gestures input and represented in characteristic sign and gesture pattern to be classified apart from other gestures [11]. The features extracted from data glove measurement include flexion of fingers, position, angles and motion

2. METHODOLOGY

This section discusses the techniques used in sensor-based gesture characterisation analysis. Flex sensor approaches on the use of sensors which are physically attached to users to measure the movement and resistance of fingers and hand data. A sensor-based approach often requires users to wear a glove with flex sensors attached to the fingers of users. It were attached to the each fingers is because each gesture has different finger placement which the flex sensor will be identifying the changes in resistance and voltage which eventually produce data for identifying the alphabets.

Flex sensors are present in some data gloves measurement. Flex sensors are mostly based on reading of resistance. Resistance values and voltage are obtained while bending the fingers. Feature extraction method formula as shown in (1) has been used to get a data glove measurement for each of the finger to calculate the amount of finger bending. And the processor should be equal or more than 32-bit, (32X32=1024) as well as to embed the coding into Arduino software.

$$s(n) = (5.0 \text{ X } s(n) \text{ X } 100)/1024 \tag{1}$$

where; s(n)=number of finger 1,2,3,4,5,
which 1 is pinky
2 is ring finger
3 is middle finer
 4 index finger
5 is thumb finger

Different movement or bending of finger is requiring in order producing an alphabet. With a different movement of finger also give a result from different forces that produce the angle. Therefore will be effect the amount of voltage that is required to bend the flex sensor. For every sign language, there is different finger movement that will be resultant on different resistance value. Arduino is not capable to reach the value of resistance so the value of voltage will digitalized into the coding for data that each flex sensors will resultant with many data of different movement. Figure 1 shows the sign language for alphabet A, B and C. For the sign language A shows all the finger are bend (retract) except thumb finger. While for B sign language all fingers are extract except thumb finger is bend, the is opposite to A characteristic. And for the sign language C all the finger are bend in difference angle.

Fig. 1 Sign language of the alphabet A, B and C
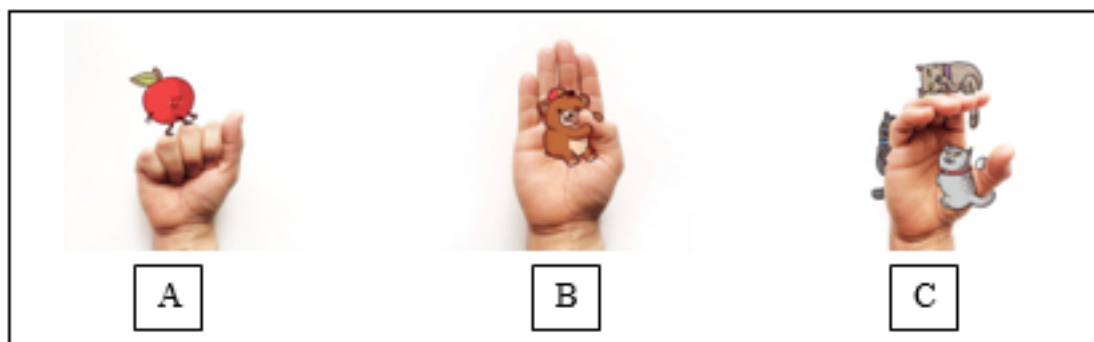
3. RESULTS AND DISCUSSIONS

In this section, measurement data analysis is focused on the resistance control value characteristics and the pattern of the letter A, B and C. The threshold resistance control values are set up in the coding to process in differentiation of the letter gesture. Each letter have difference threshold for each finger (thumb, index, middle, ring and pinky). The increase of the resistance or any changes of resistance from the extract and retract of the finger will produce certain amount of data.

Table 1 show the letter A sign language only the thumb is extract less than 370Ω and others are more than 420Ω. While alphabet A oppositely with alphabet B which is more than 420Ω at the thumb and others are less than 370Ω. And for letter C, all the fingers threshold are more than 420Ω.

Table 1
The threshold resistance control value

	Finger				
Resistance Control Value (Ω)	Thumb	Index	Middle	Ring	Pinky
Letter A	<370	>420	>420	>420	>420
Letter B	>420	<370	<370	<370	<370
Letter C	>420	>420	>420	>420	>420

Figure 2 shows difference resistance between each finger. . Letter A data are obtained when the flex sensor is bent over their resistance threshold that setting in the table 1. All the fingers were bending (retract) except thumb finger is extract. From the feature extraction analysis there are significant pattern for letter A based on the finger movement for the sign language for letter A, The pattern for maximum and minimum are similar

Fig. 2 Significant pattern of letter A
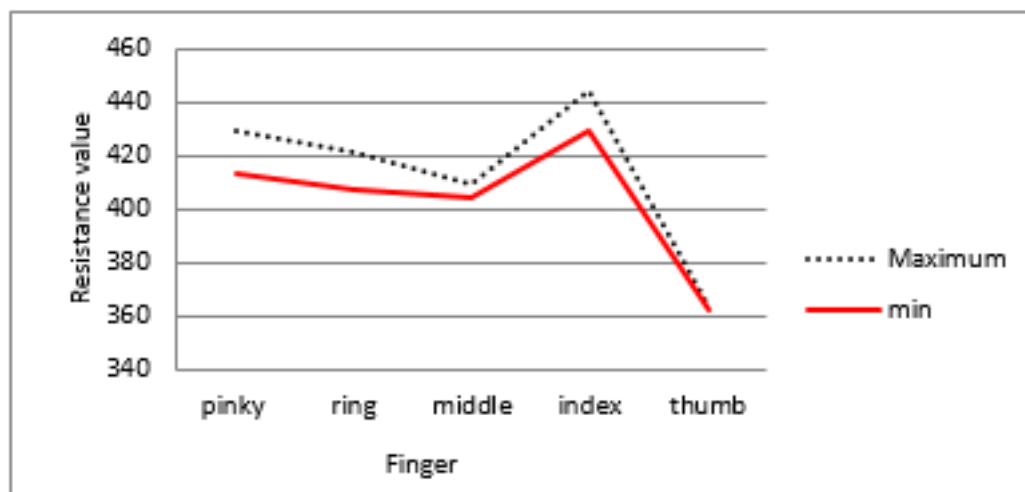
Figure 3 reveal that, there are significant pattern for sign language for letter B, which the maximum and minimum values of the resistance are similar for pinky, ring, middle and index except thumb finger. Letter B data are obtained when the flex sensor is bent over their resistance threshold that had been set in the programming. Maximum pattern show the difference for the thumb which is only thumb finger is bending.

Fig. 3 Significant pattern of letter B
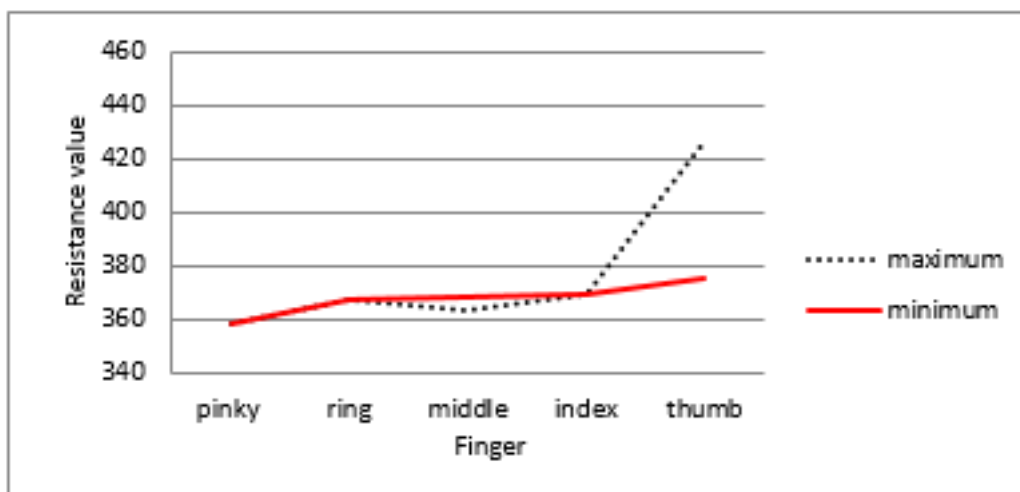
There are significant pattern between maximum and minimum value for alphabet C toward the finger movement show in figure 4. Letter C data are obtained when the flex sensor is bent over their resistance threshold that had been set in the programming. The resistance thresholds set for letter C are similar for all the fingers.

Fig. 4 Significant pattern of alphabet C
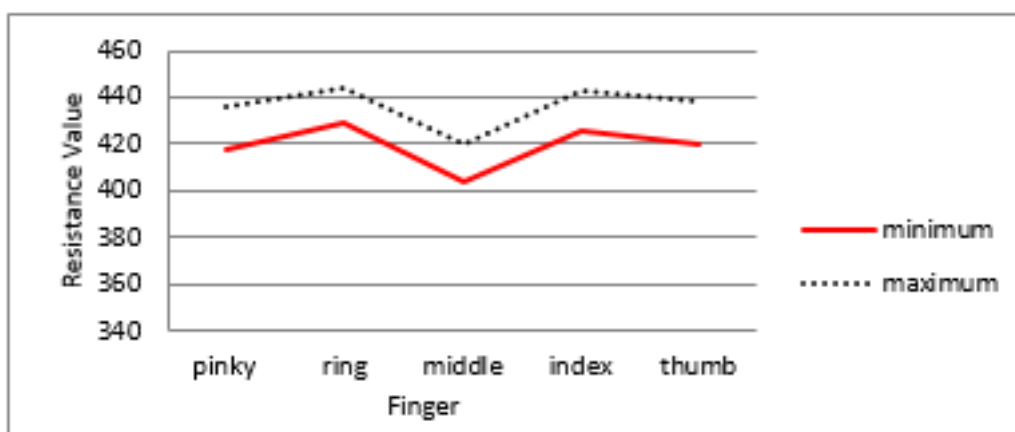
Fig. 5 Difference pattern for letter A, B and C
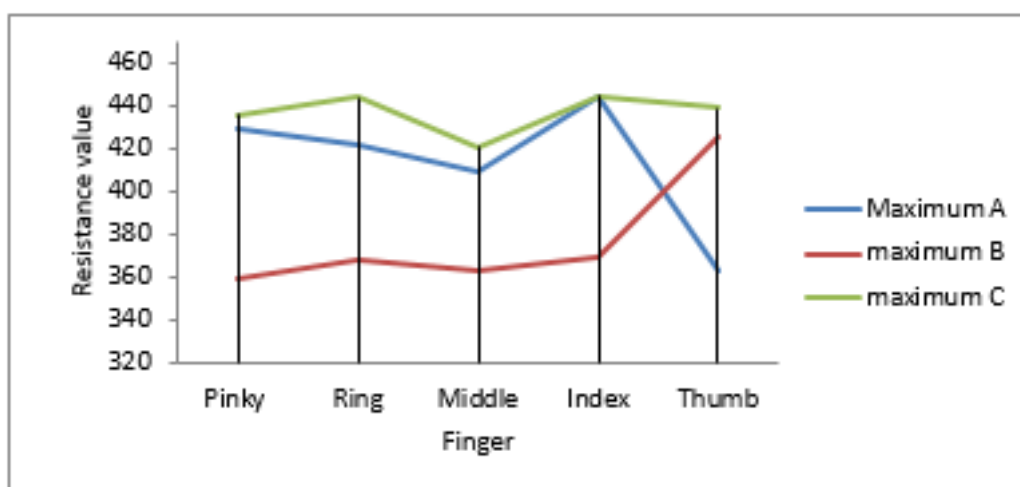
Figure 5 summarized the significant pattern for maximum value toward the finger movement for letter A, B and C. Letter A sign language only thumb finger is extract, and oppositely with letter B sign language only the thumb is bent or retract. While for letter C, all the fingers are movement. There are significant pattern for all letter toward finger movement.

4. CONCLUSIONS

Feature extraction analysis technique, works as well as for recognizing the hand gesture and the significant pattern for sign language in different resistance value and angle based on finger movement for every hand gesture. Pattern identification for gesture has been on-going research driven for future which potentially for applications such as sign language recognition, remote control robots and human–computer interaction in virtual reality

This project is of Bahasa Isyarat Malaysia (BIM) with the aid of flex sensors that were attached to the fingers. It was attached to each fingers that have different finger placement which the flex sensor will be identifying the changes in resistance and voltage which eventually produce data for identifying the alphabets. Currently, this product only be able to identify three alphabets which are B, C and A, the data were captured from the serial monitor of Arduino software when the sign language for letter is gesture.

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DEVELOPMENT OF THE FREE ENERGY FLASH LIGHT

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ABSTRACT

The road users are facing difficulties to detect the presence of safety cones when on the road due to low visibility at night. The problem faced is a road warning sign such as the safety cones in the market do not emit clear light to vehicle users. In addition, the existing safety cone requires high maintenance and electrical energy. To overcome this problem, the free energy flash light was created to solve the problem associated with the existing safety cones in the market. The project was designed to use fully free energy source which is one of the steps to make the world a greener place. It will replace the use of electrical energy such as batteries and LED light with natural energy. The working principle of this project is the circlip will rotate when the vehicle passes through the safety cones and produces the wind that will move the blade. Moreover, the blade will reflect the vehicle light. Furthermore, the project has a portable port that can be mounted on, such as safety cones and road divider. The brightness of the free energy flash light will be clearly seen up to 80 meter direction. On the other hand, this project will help the road users to be more aware of the presence of warnings along the road.

Keywords: Free energy flash light, safety cone, road users, natural energy

INTRODUCTION

The road users in Malaysia are facing difficulties to detect the presence of safety cones when on the road due to low visibility at night. Statistically, Malaysia is one of the countries that has a high rate of the road accidents (Crab & Crinson, 2008). One of the common causes of accident is vehicle user would not able to detect the hazard ahead of them (Jatinder, Manjoe, Safoora, Saleem & Inaamul, 2016). This situation occurs due to the lack of illumination on ready cones and less reflection of light to the vehicle users (Mittal, Abhijitsinh, Vidhi & Dhaval, 2014; Stanislaw & Mariusz, 2013).

The problem faced is a road warning sign such as the safety cone in the market do not emit clear light to vehicle users. Motorists will not notice the safety cones when on the road due to low visibility at night (Talib, Mohd, Sutiman & Ramlan, 2003). In addition, the existing safety cone requires high maintenance and electrical energy. To solve the problem, the Free Energy Flash Light (FEFL) is created and is associated with the existing safety cones in the market. It is designed to replace the use of electrical energy (batteries and LED light) with natural energy. They are often used to create separation or merged lanes during road construction projects or automobile accidents, although heavier, more permanent markers or signs are used to make sure it stay in place for a long period of time.

FEFL is typically used outdoors during road work or other situations requiring traffic redirection or advance warning of hazards or dangers, or the prevention of traffic. For night time use or low-light situations, traffic cones are usually fitted with a retroreflective sleeve to increase visibility. On occasion, spin reflector may also be fitted with flash lights for the same reason.

There are various types of safety cones in the market, each type has a different shape and specification. The existing safety cone in the market is more compact and has a disadvantages in which the cone has a small reflection and is hard to see as shown in Figure 1. This can lead the road users to not be able to see and notice the presence of the safety cone. The evolution process of safety cone started with addition of light electronic inside cone as presented in Figure 2. The cone can be easily be seen by the road users because there is a light bulb in the cone. However, further studies are needed to determine overall maintenance cost and frequency of batteries replacement as electronic safety cone requires electrical energy. It is expected to be higher cost than safety cone.

FEFL was designed to be highly visible and easily movable. Figure 3 shows the evolution process of FEFL with the improvement by using wind energy to propel its head above the cone. It is environmental friendly as it does not use electrical energy. By adding a spin head above the safety cone, the reflected light is brighter which in result will make the road users able to see and notice the presence of the safety cone. Traffic cones come in many different colours, such as orange, yellow, pink, and red being the most common colours due to their brightness. Others come in green and blue, and may also have a retroreflective strip known as flash tape at the blade on the head of the cone to increase their visibility. The blade of FEFL was designed in two colours, which are red and white. Blades at the top of the cone can move around in two directions. This project is highly visible and easily movable. Besides being a portable built with safety features, this product can be used for a long term.

Fig. 1. Safety cone

Fig. 2. Electronic safety cone

Fig. 3. The evolution process of FEFL
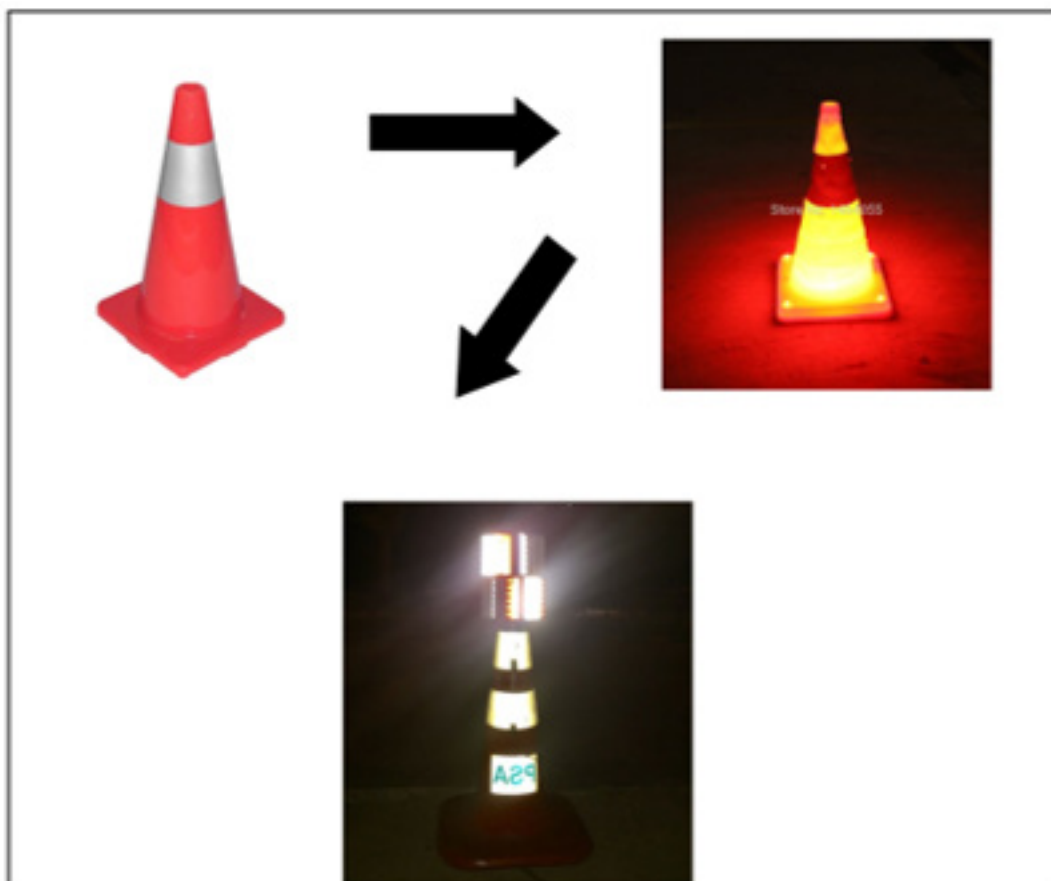
2. DESIGN CONCEPT

The project was designed using Autodesk Inventor Professional 2018. Figure 4 and Figure 5 shows the drawing of the head cone and bearing housing respectively.

Fig. 4. Head cone
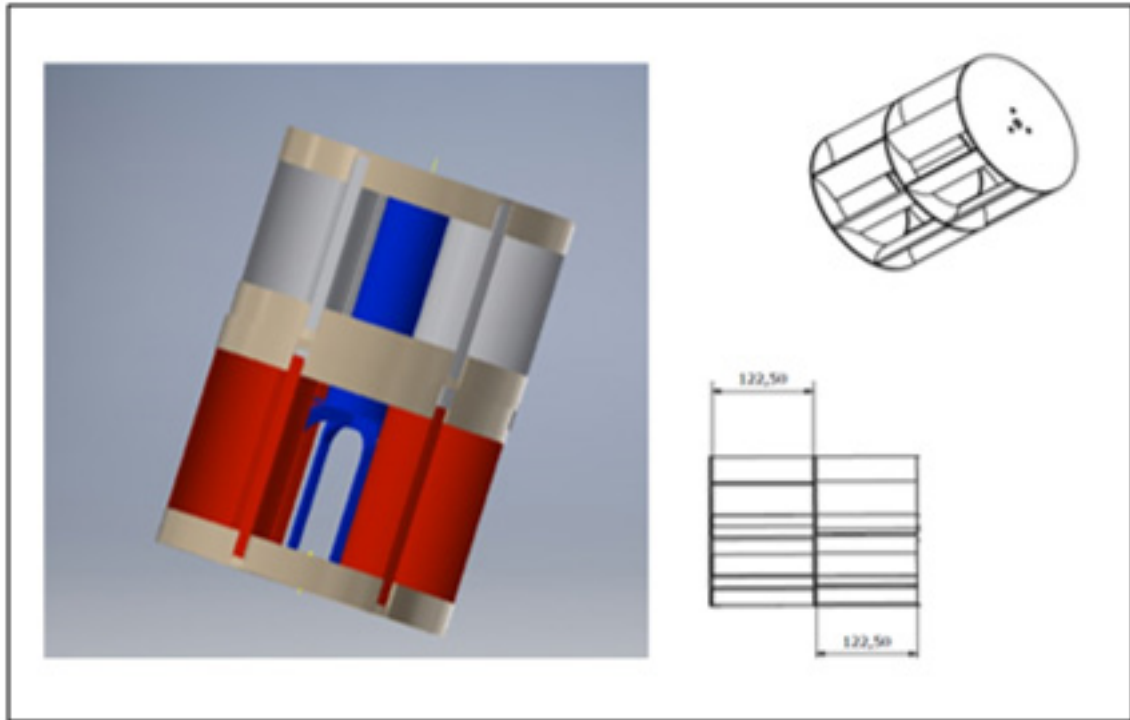
Fig. 5. Bearing housing
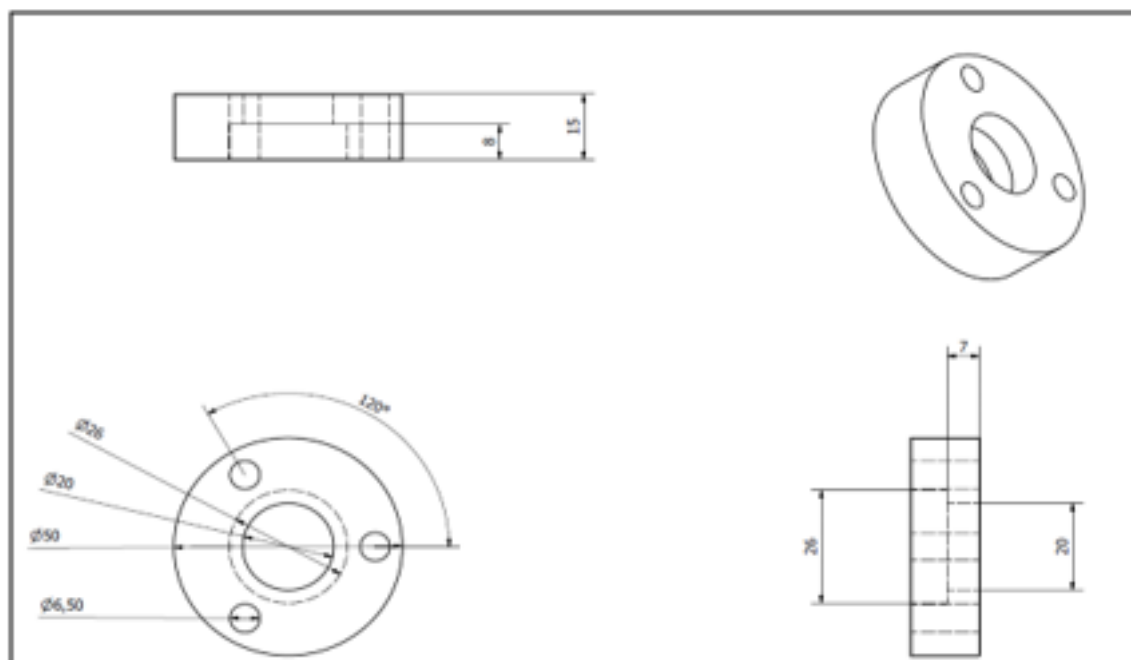
3. METHODOLOGY

A flow chart showing the development of the project is presented in Figure 6. It starts with a detailed design of the project, followed by selection of appropriate materials and components. After that, the project was identified and resolved and the project outline was installed. The project needs to be improved after assemble and assembling it was tested to various agencies such as Jabatan Kerja Raya (JKR) and Malaysian Institute of Road Safety Research (MIROS).

Fig. 6. Flow chart of project development
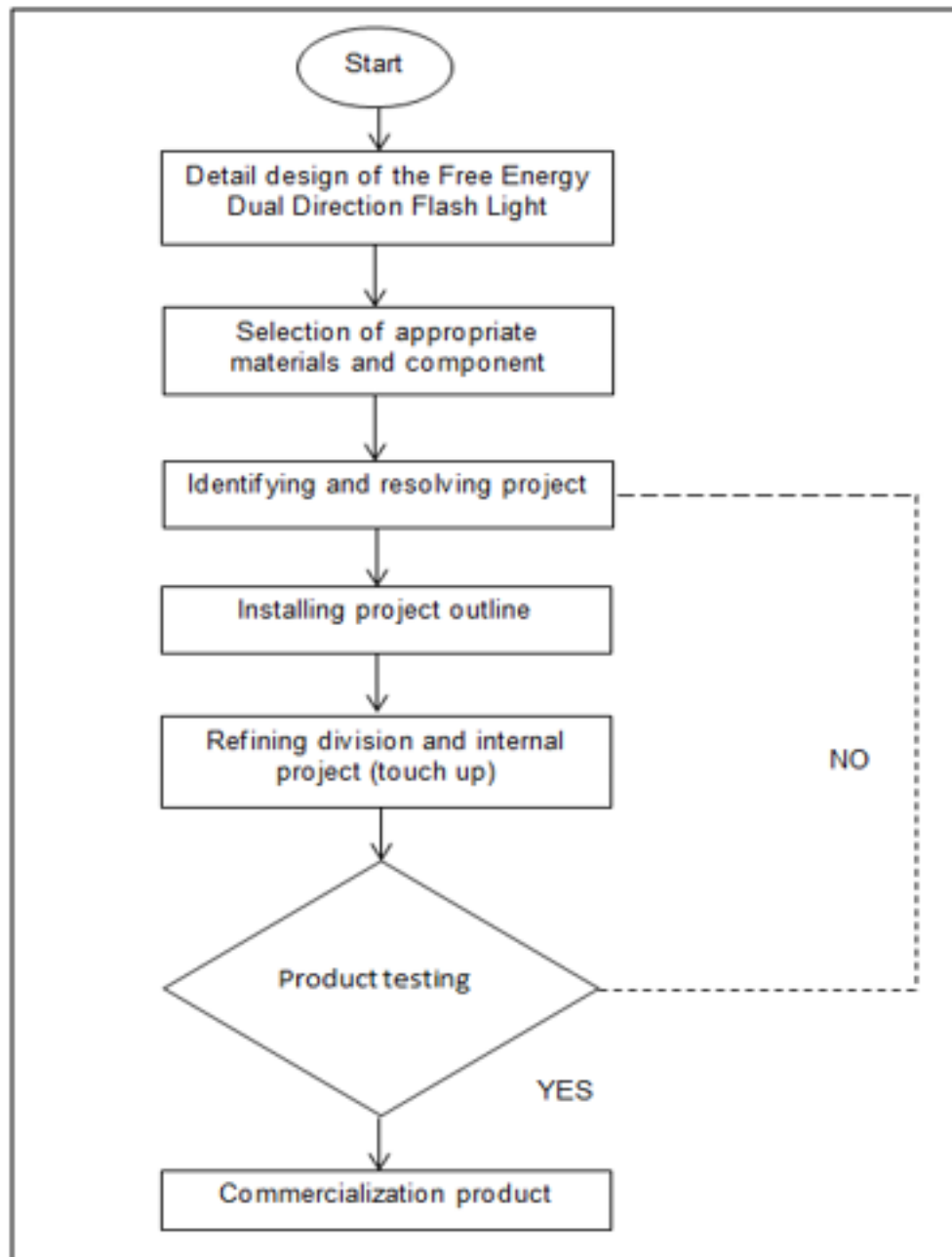
3.1 Selection of appropriate materials and component

The main materials used are aluminium and polyvinyl chloride (PVC). Aluminium is a relatively soft, durable, lightweight, ductile, and malleable metal with its appearance ranging from silvery to dull grey, depending on the surface roughness. It is nonmagnetic and does not easily ignite. Aluminium was chosen as it is light, does not easily rust and is malleable (Figure 7). A fresh film of Aluminium serves as a good reflector (approximately 92%) of visible light and an excellent reflector (as much as 98%) of medium and far infrared radiation. The yield strength of pure Aluminium is 7–11 MPa, while Aluminium alloys have yield strengths ranging from 200 MPa to 600 MPa. Aluminium has about one-third the density and stiffness of steel. It is easily machined, cast, drawn and extruded. In this project, aluminium was used for two divisions namely the shaft and plate.

PVC was used in sections of the head, cover shaft and bearing housing. The components used to develop the project are bearing, shaft, bolt and nut, screw. Bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing provides for free linear movement of the moving parts or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts. Figure 8 shows a bearing used in this project.

Fig. 7. Aluminium plate and rod
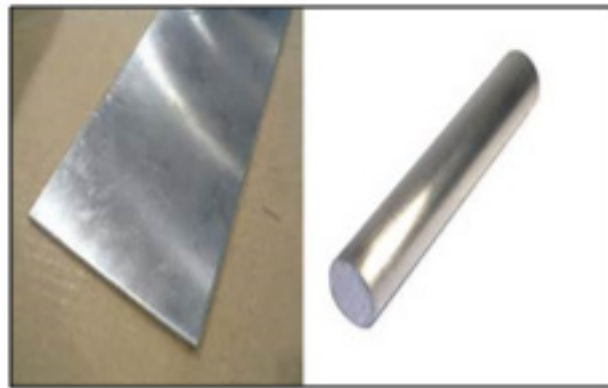
Fig. 8. Bearing

3.2 Measurement and cutting the parts of project

The circular plate was cut using a laser cutting. During the cutting process, the pieces has been arranged correctly to avoid any error. Cutting method and device selection play an important role in producing the right pieces. Lathe machine was used to make the shaft.

3.3 Identifying and resolving project

The project needs a round smooth bearing to rotate the head. In order to get the smooth bearing round, WD-40 was used to spray on all the ball bearing. Also, the surface of the plate connected to the blade was refine using sandpaper. The plate was washed with soap to make sure it was properly attached.

3.4 Installing project outline

The circular plate which has been cut and drilled was joined using MIG welding. The aluminium plates are connected to the 8 blades with an angle of 45 degrees of each blade using glue tools. Perforated aluminium plates joined with the middle of the first bar earlier also using glue tools. Similarly, the bottom bar with a combined inverted blade in the middle and bottom of the aluminium plate. Bearing is placed in the centre of the hole on top and included a plat aluminium bearing housing and cover its head and fastened with a screw. Shaft bearing is placed in the hole and inserted in the middle of the product and is driven on small plates and fastened with a screw. Small plates (base plates) are riveted by 4 rectangle-shaped aluminium plate under the plate at an angle of 90 degrees. The end plate is riveted with a head cone with an angle of 90 degrees and is now ready to be installed

3.5 Refining division and internal project (touch up)

The project needs to be touched up after being assemble. First, the plates were sprayed to avoid from rusting. Black mate colour was chosen because the black mate colour will make the plate more attractive. Next, some thinner and gasoline were applied to remove some of the paint on the blade. The paint from the blade need to be removed to create a neat look. After completing the project, the cover was created to cover the head, if not it will easily rust because it is too open. The PVC rod material was used as a cover.

4. RESULTS AND DISCUSSIONS

The developed project is presented in Figure 9. The blades are curved shape because it is suitable to rotate without the use of battery power or electricity with special characteristics so that it can move around in two directions. Besides, the innovativeness of this project is using wind energy as the primary energy for the functioning of the product and using the concept of two-way round. On the other hand, the special feature of the project is it has a portable port that can be mounted on, such as road divider, safety cone and barrier.

Fig. 9. Free energy flash light

The working principle for this project is the circlip will rotate when the vehicle passes through the safety cone and produces the wind that will move the blade. Moreover, the blade will reflect the light when the vehicle light reflects the lamp towards it. The combinations of these two functions will move the circlip and reflect the light at the same time.

The comparison between existing safety cone and FEFL for a 10 meter view and 50 meter view are as shown in Figure 10 and Figure 11 respectively. It can be seen that the FEFL is brighter as compared to standard safety cone. This result will improve the visibility of the reflection during night time.

Fig. 10. Comparison between existing safety cone (left) and FEFL (right) for a 10 meter view

Fig. 11. Comparison between existing safety cone (left) and FEFL (right) for a 50 meter view

5. CONCLUSION

The free energy flash light has been successfully developed using a new design and meet the objectives of the project. The project was designed to use fully free energy source which is one of the steps to make the world a greener place. The maintenance of the project also can be neglected as the product itself uses kinetic energy from the wind to form an enormous amount of light reflected by the vehicle on the road. The brightness of the free energy flash light will be clearly seen up to an 80 meter direction. On the other hand, this project will help the road users to be more aware of the presence of warnings in front of the road.

ACKNOWLEDGEMENT

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CONCEPTUAL MODEL DESIGN FOR SERIOUS GAME BASED ON TOURIST EXPERIENCE

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ABSTRACT

Information and Communication Technology (ICT) plays an important role in the development of the tourism industry in recent years. One of the technologies that consider popular and capable of giving inspiration to travel especially for heritage tourism is a serious game. However, studies related to serious game design on tourist experience and the usage of serious games in the field of tourism are still lacking. Therefore, a serious game based on tourism concept is designed to convey information in a fascinating way and to create brand awareness of the destination. This study is conducted to design conceptual model for serious game based on tourist experience. Tourist experience is an important element of this study as a tourist chooses their tour destination based on their previous tour experience. This tourist experience is identified through the literature review and preliminary study. The objective of this study is to identify appropriate elements of the tourism based serious game and identify travel motivation from travellers' experiences for designing conceptual models. Produced conceptual model is the guide and catalyst for future research that focuses on serious game in tourism sector. In conclusion, this study has succeeded achieving the objectives and scope of the study as well as solving the research problems that has arisen.

Keywords: Serious game, game elements, DDE framework, tourist experience and tourist motivation

1. INTRODUCTION

Technological advancements have made digital gaming one of the most accessible games everywhere, no matter where and when. The features of digital games have led towards development of serious games to benefit players from various fields including education, medicine, business and marketing [1]. Serious game is a computer game that acts as a persuasion agent in changing user behavior and transferring knowledge to the user; not only focus on entertainment such as traditional games [2]. One of the most thriving and unforgettable sectors to take advantage of this serious game concept is the tourism sector. Serious gaming technology is relatively new technology and only a few applications have been developed so far in the tourism sector. At the same time, research has shown that the use of serious games as one of the marketing strategies and succeeded attracting more tourists to the destination, enhancing their experience and knowledge before, during and after the visit [1], [3], [4]. Many researchers agree that games are used for fun and to meet the needs of consumers in the field of tourism [4]– [6]. From early reading it is clear that researches on the topic of serious game design based on the tourist experience is very minimal.

This study conducted to identify serious game elements that are appropriate for conceptual model development in designing serious games and also to identify tourist travel motivation to Malaysians' popular destination. This study focuses on Malaysian popular tourist destination Malacca as the context of the serious game.

2. SERIOUS GAME

Serious games are becoming increasingly popular technology that can influence behavior change and transfer knowledge to users [1]. Generally, game view as an activity that involves entertainment and fun. Juul defines the game as a "rule-based formal system" [1] whereby all types of game have rules of play. Commonly, the game has several characteristics that categorize it as an entertaining game [2] such as rules, unpredictable (win/lose) decisions, conflicts, challenges, interactions, storylines and more [3], [4]. In line with game purpose, Zyda (2005) describe serious games as the process of implementing game elements into non-entertainment domains such as education, medicine, military and so on [5]. Academician recommend serious games to convey knowledge/information in the form of entertainment across any fields [6].

In the tourism sector, serious games are considered as a tool to stimulate inspiration, the driver in decision making, increase brand awareness [7]. According to Mortara et al. [8], serious games involving cultural heritage can provide an immersive experience to its players such as virtual museums, historic buildings and so on. Serious games that conceptualize cultural heritage generally have three (3) learning objectives such as creating cultural attraction, reconstructing monuments and buildings and lastly creating heritage attraction [8]. Therefore, serious games should design carefully so that the elements of entertainment are not interrupted by the serious learning content in achieving their learning objectives.

2.1 Game Elements

Game elements are described as basis component of a game and these elements shared by all types of games according to its suitability and not fix to any element [9]. Game aspect such as scoreboards, trophies, challenges, avatars, badges and rewards are describe as game elements [2]. Selection of game elements depends on the game genre, gameplay and the frequency of sharing by most games [1]. This is due to the positive impact that a game element can have on the player. For instance, scores and badges keep the players to chase for the best scores or collect as much badges as possible. Thus, to create meaningful gaming experience in tourism based serious games some of the important gaming elements are considered crucial and listed as in Figure [1], [4].

Fig. 1. Elements in tourism game

Achievement	Rules	Challenges	Chances	Competition	Cooperation	Feedback
Resource acquisition	Rewards	Time Pressure	Expression	Dramatic Tension	Sensation	Fantasy	Narrative
Challenge	Fellowship	Discovery	Badges	Gifting	Collecting	Groups Messages	Blogs
Chat	Profiles	Privacy Control	Notification Control	Progressive Bar	Levels	Leader Board	Roleplay

2.2 Game Framework

The serious game design can be explained through the MDA (Mechanics, Dynamics, Aesthetics) framework [10]. MDA considered as most basic and appropriate model in the design of a serious game [4], [9]. Game mechanics is about how player dealing with game actions, behaviors and game control [10] such as jumping, running, shooting, challenges, chances, competition, cooperation, feedback, resource acquisition, rewards and transactions [4]. Dynamics are described as player interaction with game mechanics and components such as freedom of choice, progress to the next level, teamwork or compete with other players, challenge, time pressure, expression and dramatic tension [4]. A player's interaction with the mechanics and dynamics of a game leads to an enjoyable experience which is called aesthetics [4]. Aesthetics is also described as an emotional response from gamers such as fun, sensation, fantasy, narrative and challenges[4].

However, MDA has design issues where this framework only emphasizes on the mechanics, dynamics and aesthetics component of a game [11]. Therefore, MDA enhance to DDE (Design, Dynamics, Experience) framework [11]. The design part in DDE model maintain mechanics part and also includes interface to solve the design problems. Interface in DDE model concentrate on game design such as graphic asset, text, narration and sound implementation in a game development [11] which also act as medium in-between player and the game to communicate information. This design part also consists of the content and pedagogy which would be part of serious game design and development. Therefore, DDE adapt to the conceptual model of this study as a guidance to develop tourism based serious games.

3. TOURIST EXPERIENCE

3.1 Definition

Tourist experiences are described as experiences that result from interactions between travel agencies, tour guides, travelers and destinations that they visit [12]. This experience can occur when a tourist is connected to a travel service, or while in the destination [13]. On the other hand, Pine & Gilmore (1998) state that tourist experiences are generated through the combination of emotional, physical, spiritual and intellectual elements of a person's travel activities [14]. Researchers agree that tourist experiences are subjective and includes a person's emotion and behavior based on their involvement on the activities [15], [16].

The tourist experience is divided into three (3) stages: pre-travel, during travel and post-travel [7], [15], [17], [18] that can be produced either physically or virtually at any of that stages [17]. Pre-travel is the experience that comes before doing travel activities that include information about a holiday destination, travel planning process, hotel reservations, flight tickets and more. Experience is generated through travel experience which include facilities, interesting activities on location, destination scenery, amazing architecture and more. Finally, post-trip refers to the experience after they return from a destination of travel with sweet and bitter memories resulting from their travel and share experiences with their friends.

The popular theories regarding experience that most researchers refers are the Experience Realms Model by Pine & Gilmore (1999) and the Experience Pyramid by Tarssanen & Kylanen (2007) for tourism products/ services [7]. This study refers to experience pyramid by Tarssanen & Kylanen since it is developed specifically for tourism products.

3.2 Experience Pyramid

This experience pyramid is divided into two parts, experience element and level of experience. The horizontal axis comprises six (6) elements of experience such as individuality, authenticity, story, multi-sensory perception, contrast and interaction. While the vertical axis contains five (5) levels such as motivation, physical, intellectual, emotional and mental levels as shown in Figure 2. Tarssane and Kylanen (2007) state all elements of the experience must be present in a tourism product or service in order to provide the optimum experience level which will result in the next level of experience [7]. It starts with the lower level of motivation that drives the tourist interest and ends with the mental change.

Fig. 2. Experience Pyramid [7]
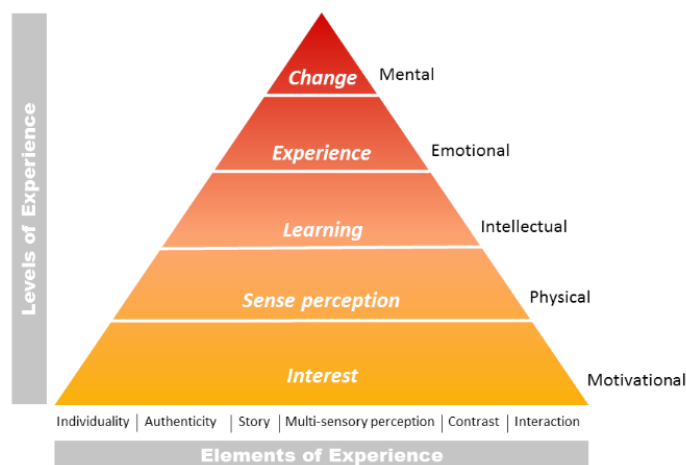
Motivation is the stage of attraction or interest prone and inspire tourists to choose their holiday product, service or destination. The second stage involves physical relation related to the perception of the tourist at the destination such as sightseeing, listening to local music or dialects, taste different foods from others culture and many more. The result of physical experience is the intellectual experience of the tourist indirectly adding new knowledge. The fourth level is the emotional level which generated from the on-site tourist experience and a bit difficult to predict because travellers' emotions may differ such as happy, excited, sad, scared, or angry about their vacation. Finally, the highest level is mental level. This mental level has a prolong impact on the tourist. According to Tarssane and Kylanen (2007) this level can change the lifestyle of a tourist after a holiday [7]. This model is developed specifically for tourism-based products or services. Thus, it is vital for this study to seek tourist travel motivation to know the triggering factor that attract them to the destination.

3.3 Travel Motivation

Travel motivation is the process of decision making of the travel destination and the factors that influence tourists in choosing a destination [19]. Travel motivation is important to identify the motivations and needs of tourists when choosing a holiday destination [20]. Travel motivation is also related to a pull and push factor [19]. Pull factor describe as factors that attract tourists and push factor describe as factors that drive tourists to a destination. Generally, tourist motivation is classified into two categories, intrinsic and extrinsic. Intrinsic motivation is stimulated from ourselves to travel based on our own interests [15]. Meanwhile, extrinsic motivations stimulated from external factors for certain benefits [15] such as discounted tickets and certain promotions that encourage us to travel. Therefore, academician has identified few tourist motivational factors in choosing a travel destination such as cultural, natural scenery, relaxation, entertainment, historic sites, knowledge and education seeking, facilities, shopping, visit friends or relatives and also for business trip. Meanwhile Yao [21], identified tourist motivational factors towards heritage destination is cultural and heritage, knowledge and education seeking and also relaxation and entertainment. Hence, this study further investigates on these factors to identify the most significant factor to develop serious game design.

4. RESEARCH METHODOLOGY

To identify tourist motivation to visit Malacca, a questionnaire was developed and distributed to international and domestic tourists online using the Google Form. Three main factors of tourist motivation is to visit heritage destination such as 1) Cultural Heritage Attraction; 2) Knowledge and Education Seeking; 3) Relaxation and entertainment used to identify the most significant travel motivation to travel Malacca. The questionnaire consists of two section mainly. Section 1 about respondent demographic and section 2 about factors that motivates tourist to visit Malacca.

5. RESULTS AND DISCUSSIONS

This section discusses the results obtained from the tourist travel motivation survey and its implementation in the suggested conceptual model of this study. A total of 100 respondents responded to the questionnaire. Respondents answered section 2 questions based on their travel experience and their travel interest. Respondents consist of foreign and domestic tourists.

5.1 Tourist demographic profile

A total of 100 respondents from 21 to 40 years old answered this survey. Most of them are Malaysian tourists who have visited Malacca. However, 6 foreign tourists from Iran, Pakistan, Syria, Singapore and the United States also respond to this study. In addition, respondents who had visited Malacca were 90 out of 100 respondents. These 90 respondents considered as experienced tourist for this study.

5.2 Results

The main factor that drives most tourists to Malacca is the cultural and heritage attractiveness of 83% as shown in Figure 3. The result shows that both domestic and international tourists are attracted to various cultures and heritage of Malacca such as historical monuments besides scenery, exotic food, different culture and more. It is due to Malacca's fame as a historical city as well as the state government's efforts to preserve the sites and to build various tourist activities such as Taming sari tower, the Malacca River Cruise, the Baba & Nyonya heritage museum, beca (rikshaw) tour and so on. Malacca also rich in many traditional foods such as cendol, palm sugar, laksa nyonya, rojak, asam pedas and so on that are inherited from many cultures.

Fig. 3. Results of tourist motivation factors

Besides cultural and heritage attraction, 65% of people wants to visit Malacca for relaxation and entertainment and 58% for knowledge and education seeking. Every vacations goal is to chill and relax during their trip. According to Yousefi & Marzuki [20], leisure and entertainment is one of the main factors that motivates travellers to engage in travel activities. Whereas, knowledge and education seeking become the least factor that motivate tourist to visit Malacca. The remaining cultures from the Portuguese, Dutch, English, Malay Sultanate governing has attracted tourists' interest to learn about the uniqueness of other cultures. However, significantly cultural and heritage factor is the highest attraction among the tourist. Therefore, the next subsection discusses further on the elements that affect the tourist to visit Malacca.

5.2.1 Cultural and Heritage Attraction Factor

One of the pull factor that affect the choice of heritage destination among tourist is cultural and heritage attractions [19]–[22]. The findings show that famous monuments and scenery in Malacca are the main driving force for respondents to visit Malacca, with 57% of people saying they 'strongly agree' and 35% agree with this statement. Refer Figure 4. Among the famous monuments and sights in Malacca are A Famosa Portuguese fort, Stadthuys building, Cheng Hoon Teng Temple, Melaka Sultanate Palace Museum, Ocean Museum and so on. Besides that, respondent also strongly agree (51%) that they would like to travel to Malacca for its popularity, to get the real experience at the site and also for its exotic foods. Malacca is known as heritage destinations and the popularity of Malacca attracts more tourists from all over the country and oversea to visit this destination. On the other side, the travelers also want to see and to feel themselves the historical sites in Malacca rather than reading in books, websites or social networking sites to enhance their experience.

Fig. 4. Element of attractions in Cultural and heritage motivation factor
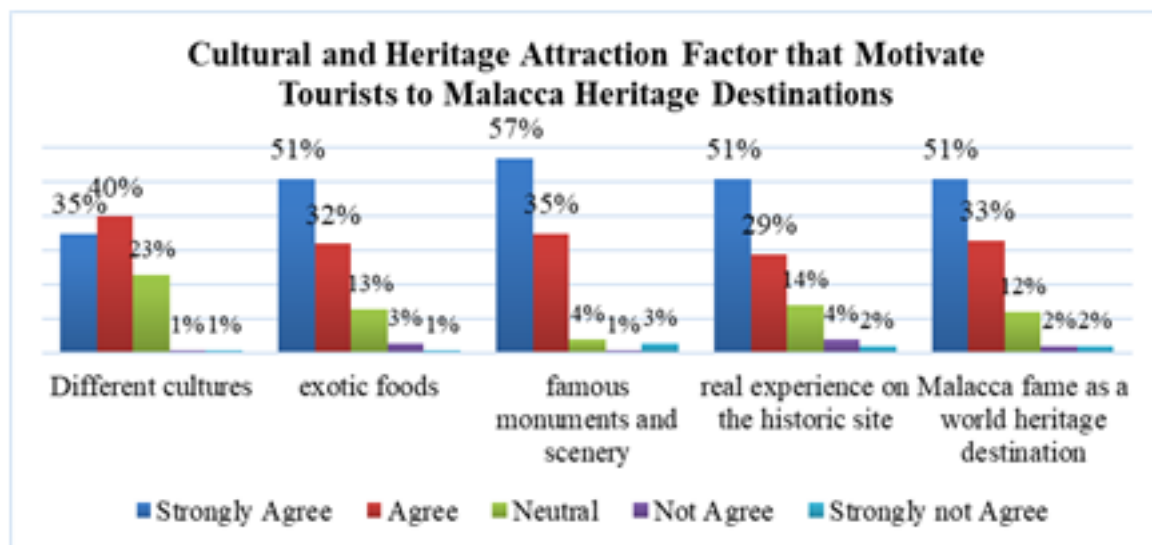
Tourists also wants to visit Malacca to enjoy variety of traditional and popular foods such as cendol, asam pedas, laksa, rojak, chicken rice balls and many other local dishes. According to Quan & Wang (2004), food is one of the driving factor for a tourist to revisit this destination and thus, the situation indirectly helps to increase the income of local traders [22]. And lastly 35% strongly agree and 40% agree on knowing cultural diversity in Malacca from the Portuguese, Dutch, English, Malacca and Malay Sultanate culture. However, famous monument and scenery, exotic foods and real experienced in the city become most attracted pull elements among tourist to visit Malacca under the factor of cultural and heritage motivation. Based on the findings of this study, the proposed conceptual model will implement the factors of monuments, famous scenery, real experienced in the city and food in Malacca as a major element of tourist attraction in culture and heritage attractions.

5.3 Proposed Conceptual Model

Based on the literature and early research there are two aspects identified to develop this conceptual model of serious game which includes game elements and factors affecting tourist motivation. The learning objective of the game is to attract more domestic and international tourists to heritage destination through serious games. For that purpose, it has been identified that cultural and heritage factors are among the main factors that make traveller to choose Malacca as a tourist destination. The main attraction in cultural heritage factors is tourists want to visit the famous monuments and scenery in Malacca and experience in real the historical city. Besides that, tourist also attracted towards Malaysian local foods. Therefore, Malacca's famous heritage and food destinations are proposed to be developed in 3D as game environment. This game design is suggested to develop based on the DDA framework by implementing game elements such as rewards, narratives, rules, feedback, opportunities, challenges and role-play and etc. As a result of the mechanical and dynamic components the players will experience fantasy, challenge, narration and discoveries by exploring the surroundings of historic destinations. Suggested conceptual model for tourism based serious game design shown in Figure 5. This conceptual model can be used as reference to develop a serious game especially in heritage tourism.

Fig. 5. Conceptual model for tourism based serious game design
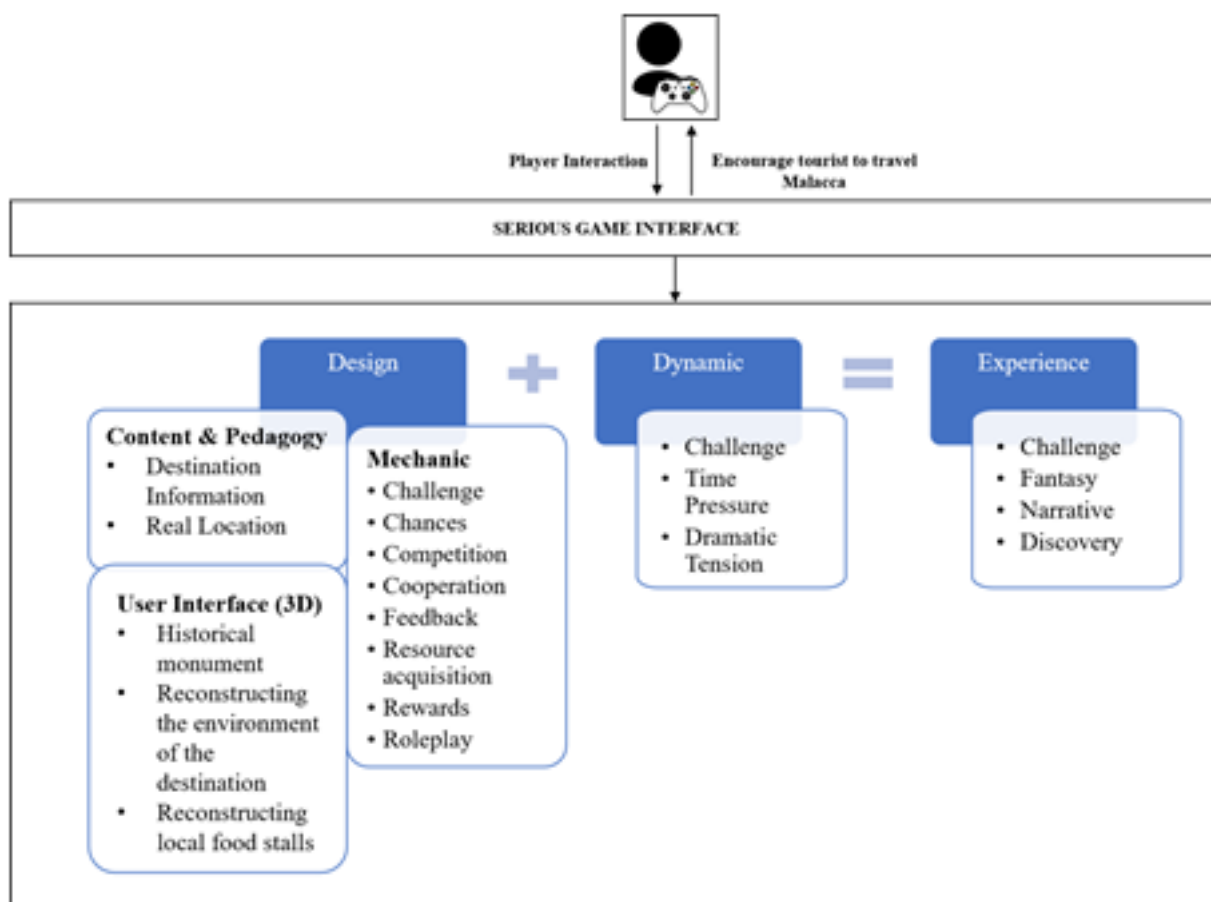
6. CONCLUSIONS

This study has identified appropriate technologies for attracting tourists, tourist motivational components, game design framework and serious game elements that contribute to the tourist experience. This study focuses on Malaysia's popular tourism destinations, Malacca. Further research is needed in identifying tourist motivation according to the type of tourism since this study only focus on studying heritage tourism. This study has produced serious game design conceptual model based on tourist experience to develop tourism based serious game. This conceptual model can be used as a reference for serious game development in the context of heritage tourism to attract tourists to heritage destination such as Malacca. However, the tourist motivational factor can be reinvestigate with equal number of local and international tourist to identify more precise results

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THE EFFECTIVENESS OF PALM OIL FUEL ASH AS POZZOLANIC CEMENT IN LIGHTWEIGHT CONCRETE

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ABSTRACT

Utilizing waste material in the construction industry is an effective way to promote sustainable construction toward green environment and technology. A study on the properties and behaviour of Palm Oil Clinker Lightweight Concrete (POCLC) with Palm Oil Fuel Ash (POFA) as pozzolanic cement. In this paper, focused mainly on investigating the effect of full replacement of the aggregates with palm oil clinker (POC) and partial POFA in cement on the physical and mechanical properties of concrete. Department of Environment (DOE) method was adopted for the mix design to produce Concrete Grade 25 and referring to the Specifications of Building Work 2014 (JKR 20800-0183-14) The 100% POC aggregates were used as coarse and fine aggregate replacement in lightweight concrete production, meanwhile, POFA with the proportion of 0%, 10%, 20% and 30% were used as pozzolanic cement. The parameters investigated in this study include the slump for the fresh properties, as well the compressive strength test at 7and 28 days for the hardened properties, splitting tensile strength, and flexural tensile strength. The hardened mean density at 28 days of the specimen was about of 1699kg/m3. Test results showed that POCLC exhibited lower strength but the acceptable compressive strength of 20.776 N/mm2 at 28 days. The tensile strength for splitting and flexural are almost similar that are 3.073 N/mm2 and 3.173 N/mm2. Based on all properties of concrete, the optimum value of POFA is obtained at 20% cement replacement. Thus, the optimum POFA content is 20% as the result show increasing the value of POCLC strength along with POFA content. Therefore, POFA has a good potential as pozzolanic cement to improve the POCLC strength.

Keywords: Palm Oil Fuel Ash, Palm Oil Clinker Lightweight Concrete, Compressive strength, Flexural Tensile Strength, Splitting Tensile Strength

1. INTRODUCTION

The thrown POFA and POC are left to rot in huge mounds that ultimately cause Carbon Dioxide (CO_2) emission and pollution. POFA and POC which is unsuitable to be used as fertilizer was dumped as waste behind the mill or landfill. Mohd Warid and Kahirunnisa (2019) stated that Palm oil fuel ash (POFA) being disposed of as profitless waste by palm oil mills throughout Malaysia has inspired researchers to integrate this material in lightweight concrete production.

Jamilu Usman and Yahya (2015) state that the partial substitution of Portland cement with pozzolans in concrete greatly reduces the environmental pollution due to CO_2 emission during cement production. Pozzolans equally enhance mechanical properties and guarantee the production of concrete with minimum costs. These added benefits result in the increasing use of pozzolans as a significant innovation in the construction industry. Meanwhile, Hamada et. al. (2019) has been used POC in fresh and hardened concrete and gave positive result. The use of POFA and palm oil clinker offers many advantages in terms of quality of construction, cost control, construction time and environmental credentials. The specialties of lightweight concrete are its low density and thermal conductivity.

In this study, the evaluation of the combined effects of palm oil fuel ash (POFA) as pozzolanic materials on the performance of cement mortar in palm oil clinker lightweight concrete (POCLC) referred to Specifications of Building Work 2014 (JKR 20800-0183-14), BS 1881, ASTM C1609/C1609M-10 and ASTM C496/C496M-04 [21] examined. Furthermore, this study was examined the properties of the fresh and hardened properties of the POFA blended cement mortar in POCLC. The mechanical properties behaviour of POCLC with normal weight concrete and the optimum replacement levels of POFA blended cement mortar in POCLC were determined.

2. METHODOLOGY

The performance of concrete is evaluated from mechanical properties which include compressive strength, tensile strength, and flexural strength but a compressive strength of concrete is the most important characteristic and it is generally assumed that an improvement in concrete compressive strength will improve its mechanical properties (Abdullah, 2009). However, in a case of concrete in which cement is partially replaced by mineral admixtures, the effects of the same amount of different mineral admixtures on the mechanical properties of hardened concrete are not same. The application of the palm oil clinker as aggregates, where the conventional aggregates in normal weight concrete replaced by the palm oil clinker 100% both in fine and course aggregate. Meanwhile, POFA was added proportionally 0%, 10%, 20% and 30% as pozzolanic cement (Lim et.al, 2013). The materials used and the methods followed for conducting the tests are given in the following sections.

2.1 Materials

Cement corresponding to Ordinary Portland Cement (OPC) MS 522: Part 1 from a single source was used throughout the experimental work. The coarse aggregate was crushed granite with a maximum size of 20mm. Natural river sand was used as a fine aggregate for NC meanwhile crushed POC from Kilang Sawit Besout, Perak was used as an aggregate for POCLC. Both coarse and fine aggregates were batched in a saturated surface dry condition. Supplied tap water was used throughout the study in mixing, curing and other purposes. A commercial Sika Viscocrete 2199 type superplasticizer was utilized as high range water reducing agent in the concrete. The dosage of superplasticizer was kept constant 2% for all concrete mixes in order to eliminate any probable effect of this parameter on the properties of hardened concrete.

2.2 Preparation of Palm Oil Fuel Ash

The POFA used throughout this study was collected from a local mill that is Kilang Sawit Besout, Perak. The collected ashes were dried for 24 hours in the oven at the temperature of 110ºC ± 5 for 24 hours before sieving through 300 µm sieve. Then, it was ground using a modified Los Angeles abrasion test machine until the fine particles produced able to fulfill the fineness requirement in ASTM C618 - 05 (2005). This is because it has been stated in ASTM C618 - 05 (2005) that, for a material to be used as a mineral admixture in concrete, the maximum amount of pozzolanic material that can be retained when sieved wet on the 45µm sieve is 34% (Mohd Warid Hussin et. al, 2015).

Table 1 Chemical Composition (%) of OPC and POFA, (Mohd Warid Hussin et. al, 2015).

Chemical composition (%)	OPC	POFA
Silicon Dioxide (SiO2)	16.40	69.3
Aluminium Oxide (Al2O3)	4.24	5.30
Iron Oxide (Fe2O3)	3.53	5.10
Calcium Oxide (CaO)	68.30	9.15
Potassium Oxide (K2O)	0.22	11.10
Magnesium Oxide (MgO)	2.39	4.10
Carbon Dioxide (CO2)	0.10	0.10
Sulphur Oxide (SO3)	4.39	1.59
Loss On Ignition (LOI)	2.4	1.3

The chemical composition of Ordinary Portland Cement (OPC) and POFA in Table 1 showed that high combination of silicon dioxide (SiO_2), aluminium oxide (Al_2O_3) and iron oxide (Fe_2O_3) are more than 70% indicates that the POFA was classified as Class F pozzolan according to ASTM C618-05 [19]. For this study, POFA passing 300 µm was used as pozzolanic cement with proportional 0%, 10%, 20% and 30% by weight of cement, with water cement ratio 0.50.

2.3 Preparation of Palm Oil Clinker Aggregate

The POC was taken from a local mill that is Kilang Sawit Besout, Perak. The POC looks like a porous stone which is gray in color. All the clinkers are prepared to be crushed into required size. The clinkers were flaky and irregular shaped. The broken edges were rough and spiky. The POC with the nominal size of 20mm is used as coarse aggregate and size below 5.00 mm is used as fine aggregate.

Fig 1: The nominal POC aggregates (a) POC coarse aggregate (b) POC fine aggregate
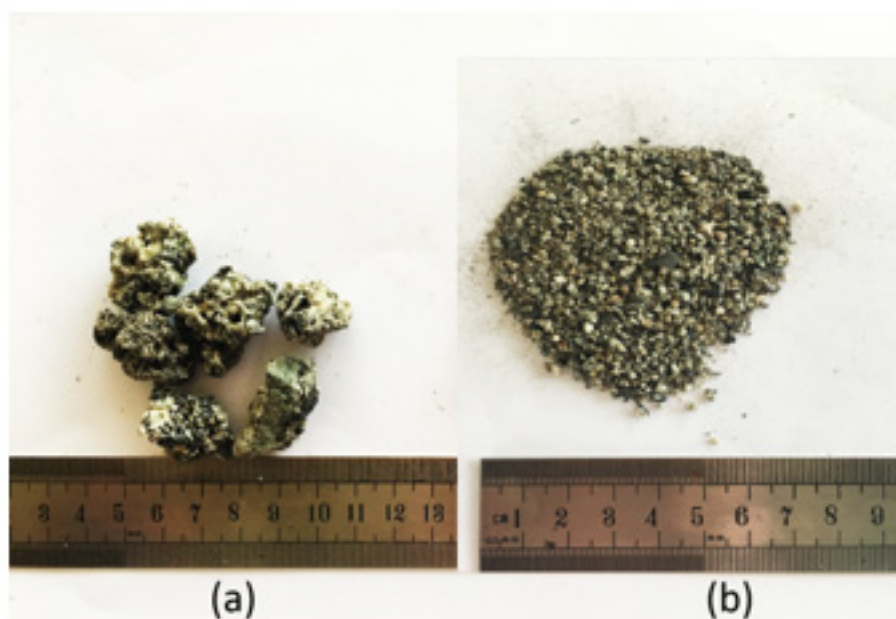
Table 2 Basic properties of the aggregates.

Basic Properties	Aggregates			
	POC Coarse	POC Fine	Granite Coarse	River Sand Fine
Specific gravity (oven dry)	1.76	2.02	2.6	2.65
Bulk Density (kg/m3)	733	1027	1301	1384
Gradation (JKR 20800-0183-14)	Satisfied the grading limit			
Water absorption 24h (%)	5	10	0.38	0.53

The physical properties of all the aggregates used are presented in Table 2. Based on its physical properties, POC falls within the criteria for structural lightweight aggregate. According to BSI Document 92/17688, aggregates with the specific gravity lower than 2.2 and the bulk density less than 1200 kg/m3 are classified as lightweight aggregates (Abutaha, 2018). The bulk density of the POC aggregate is also lower than granite and river sand. The bulk density of POC coarse aggregate is 56% lower than granite coarse aggregate, meanwhile POC fine aggregate is 30% lower than the river sand fine aggregate. Besides that, the percentage of water absorption shows huge different that is POC coarse aggregate is higher 172% than granite coarse aggregate, meanwhile POC fine aggregate is 180% higher than the river sand fine aggregate. The huge differences occurred because of aggregate is a porous material and it absorbed huge amounts of water compared to the normal weight aggregate. Mohammed et. al, (2018) and Lura et. al (2004) said that the high water absorption of OPC aggregate can be valuable for the resultant hardened concrete. It is reported that LWC with a porous aggregate is less sensitive to poor curing compared to NC, especially in the early ages due to the internal water supply placed in the pores of lightweight aggregates.

Sieve analysis was done for coarse and fine aggregate. Sieve analysis helps to determine the particle size distribution of the coarse aggregate and fine aggregate using MS JKR 20800-0183-14. From the analysis, the POC aggregate is well graded. The envelope of grading and sieve analysis for both POC and normal aggregate as shown in Figure 2.

Fig. 2. Sieve analysis grading.
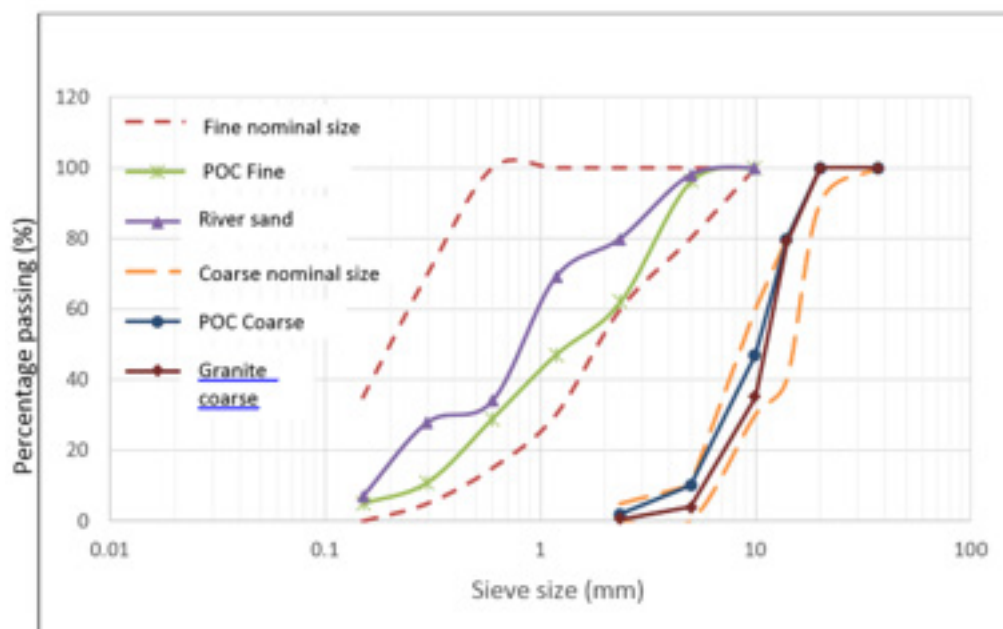
The aggregates satisfied the parameters and fell within the range of well-graded aggregate as stipulated in BS882:1992 (Abhyuday Titiksh, 2016). This result shows that this POC is suitable for replacing natural aggregates for structural application.

2.4 Preparation of Specimen for Test

The mix design in this study is in accordance with DOE method to produce Grade 25N/mm3 concrete with a slump range of 25-50 mm.

Table 2: Summary of Bridge Rectifier by using IN3882

Material (kg/m3)	NC	POCLC Mixes			
		POFA 0%	POFA 10%	POFA 20%	POFA 30%
Cement	360	388	349.2	310.4	271.6
POFA	0	0	38.8	77.6	116.4
Fine aggregate	577.5	574	574	574	574
Coarse aggregate	1750	826	826	826	826
Water	180	210	210	210	210
Super plasticizer	0	7.8	7.8	7.8	7.8

For this study, 100% POC was used as both course and fine aggregate to produce lightweight concrete. The mix proportion of this mixes is shown in Table 3. The mixing was carried out at room temperature of approximately 29±2°C.

2.5 Tests on Fresh and Hardened Concrete

Fresh and hardened mechanical properties of concrete were conducted according to the specified code of practice as mentioned above. The slump test, following JKR 20800-0183-14 standard, was carried out to measure the consistency of a concrete which has a close indication to workability. In order to investigate the compressive strength of concrete, the cube compression strength test was carried out on 150mmx150mmx150mm cube specimens following JKR 20800-0183-14 and BS 1881-127:1990 for 7 and 28 days concrete. The flexural strength test was conducted using 100x100x500mm beams under three point loading following the ASTM C1609/C1609M-10. The splitting tensile test, however, was performed on the standard test cylinders measuring 100x200mm conforming ASTM C496/C496M-04 for 28 days concrete specimen.

3. RESULT AND DISCUSSION
3.1 Workability

In this study, the slump test was conducted to investigate workability of a fresh concrete mix. From the test for each mix, the slump test value meet the specification of JKR 20800-0183-14 that is 25mm to 50mm. Slump value for NC is 30mm compared to POCLC with POFA 0% is 35mm, POCLC with POFA 10% is 35 mm, POCLC with POFA 20% is 50 mm and POCLC with POFA 0% is 45 mm. The differences of slump value are shown in table 4. The highest workability is the POCLC + POFA 20% that is 50mm.

FTable 4 Slump value for five type of concrete mixes

Mix	JKR 20800-0183-14 (slump limits)	NC	POCLC			
			+ POFA 0%	+ POFA 10%	+ POFA 20%	+ POFA 30%
Slump test (mm)	25 to 50	30	35	35	50	45

From the result of slump test in Table 4, the value of slump test of POCLC is slightly higher than the NC but it still meets the specification in JKR 20800-0183-14. The workability of POC aggregate after combined with POFA as pozzolanic cement showed an increasing value from 0%-20% but the value falls at POFA 30%. However, it was observed that the concrete mixes with POC coarse aggregate were found less cohesive than the corresponding conventional concrete mix. The workability of the mixes was affected by the replacement of coarse POC because of the particle shape and rough surface. According to Abu Taha et. al,(2016) the irregular shape of POC resulted in the higher surface area increasing the demand for extra paste volume to ensure good workability.

3.2 Hardened Properties of Concrete

3.2.1 Density

Figure 4 below shows that the cross section of POCLC of the specimen. Meanwhile for the category of lightweight concrete, POCLC with the different level POFA content showed the highest density of POFA 30%.

Fig. 4. Cross section of the specimen of POCLC

Fig. 5. Density of POC compare to POCLC with POFA
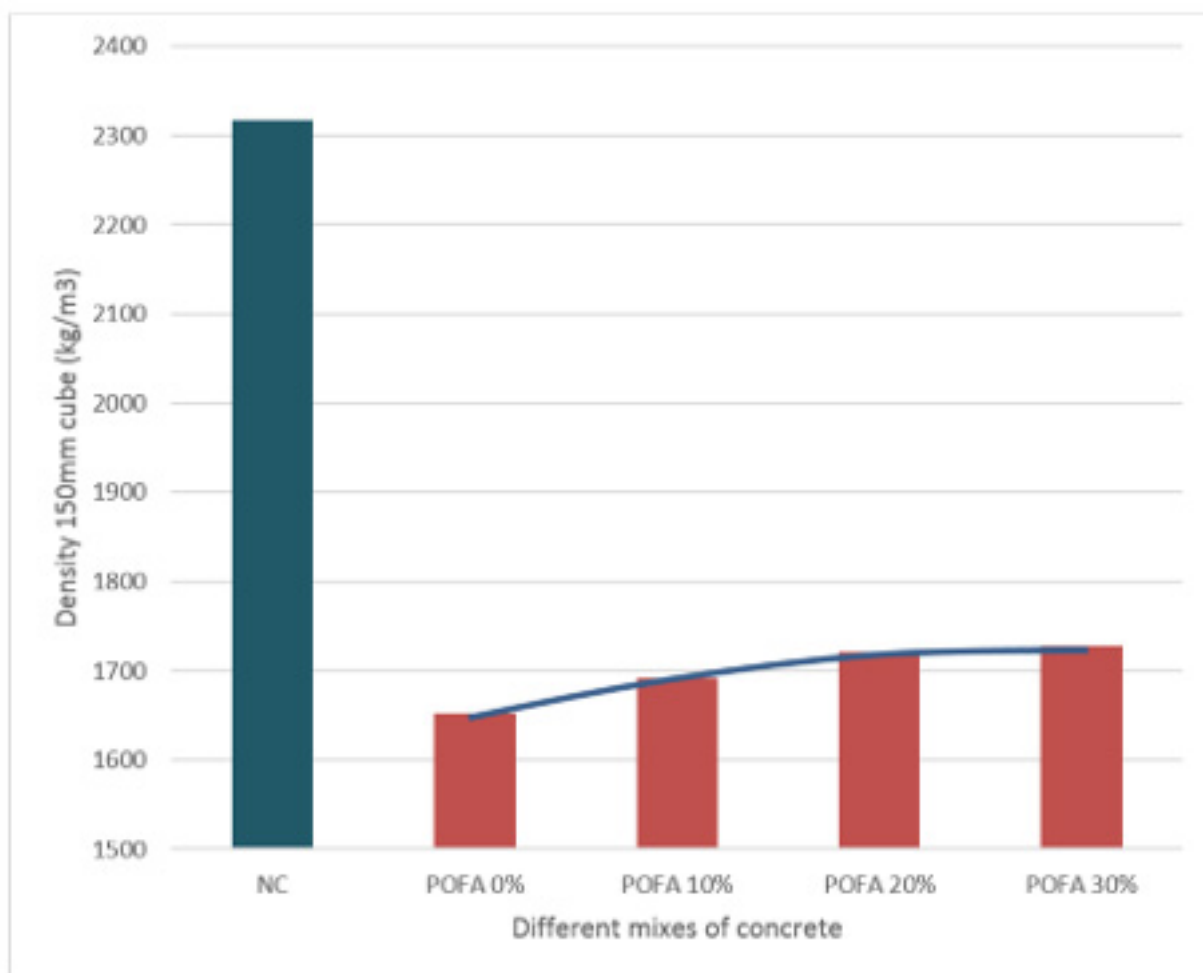
Referring to the cube density value in Table 5, the unit weight of the POCLC is approximately 31% lighter than NC. This is because the properties of aggregate itself contribute to the cube density. According to M. Aslam et. al. (2016), the density of structural lightweight aggregate concrete typically ranges from 1400 to 2000 kg/m3 compared to that of 2400 kg/m3 for normal-weight concrete.

3.2.2 Compressive Strength

A compressive test was performed in accordance to JKR 20800-0183-14. The compressive strength. A lot of voids were observed within the internal structure of the POC aggregates as shown in Figure 4, which significantly contributed to the strength reduction. The 28-day compressive strength values of the concrete specimen are presented in Table 3. The POCLC compressive strength at 7 days is the average of 12.878 N/mm2 meanwhile the NC showed the high result of 29.148 N/mm2 with different strength 77%. The POCLC compressive strength at 28 days is in the average of 20.776 N/mm2 meanwhile the NC showed the high result of 32.222 N/mm2 with different strength 43%. It showed that in the early age of concrete, POCLC tends to have lower strength compare to the NC but had a significant strength improvement when its reach 28 days. The compressive strength of concrete depends on the hardened density (Abutaha, 2018).

Besides that, POCLC with POFA 20% has the highest compressive strength compare to the other proportion level of POFA as shown in Figure 6. Mohd Warid and Khairunnisa (2019) state that the integration of 20% POFA also alters the microstructure of aerated concrete making it be denser than the plain aerated concrete. The graph in figure 6 shows increasing the value of compressive strength from POFA 0% until its reach maximum strength at 21.788 N/mm2 and slightly fall at POFA 30%. Abutaha et.al (2016) also said that a poor load-bearing capacity of the POC aggregate may be due to the heavily porous and honeycombed structure of POC induces quick load propagation to fail easily.

Fig. 6. Comparison of POCLC with different level of POFA to NC

	NC	POFA 0%	POFA 10%	POFA 20%	POFA 30%
■ Compressive strength 7 days (N/mm2)	29.148	10.232	13.284	14.22	13.775
■ Compressive strength 28 days (N/mm2)	32.222	19.523	20.965	21.788	20.829
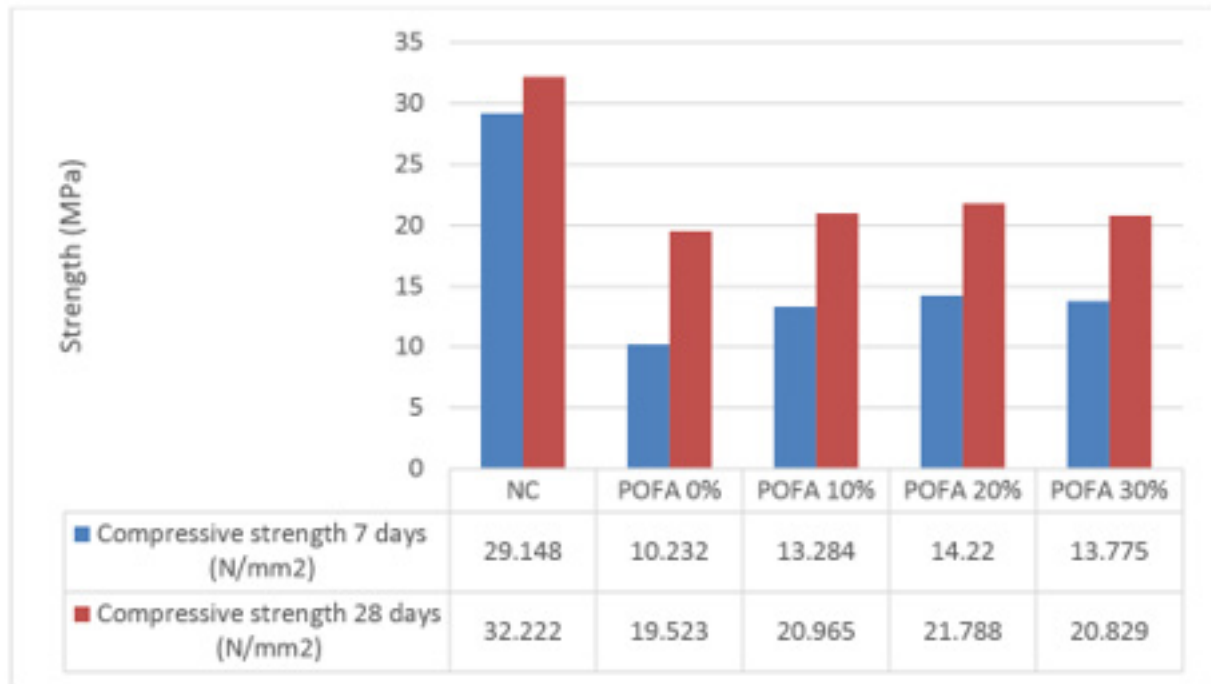
The compressive strength of POCLC was much affected by the presence of POC and the POFA content of 20% slightly increased the strength.

3.2.3 Splitting Tensile Strength

The compressive strength is the property of concrete normally considered in a structural design, however, for some purposes, such as the design of airfield slabs and highways, resistance to cracking, the shear strength and the tensile strength are of interest (Muhammad Aslam et. al, 2016). In this study, the observed of the splitting tensile strength increased when the POFA content increased. This range of splitting tensile strength was about 54% less than the control NC. It also reported that the splitting tensile strength of the concrete was dependent on the splitting tensile strength of OPC aggregate. Figure 7 illustrate the NC of cylindrical specimen cracking behavior and Figure 8 illustrate POCLC of cylindrical specimen cracking behavior to compare the differences in cracking visually.

Fig. 7. Normal Weight Concrete of cylindrical specimen cracking behaviour

Fig. 8. POC Lightweight Concrete of cylindrical specimen cracking behaviour

3.2.4 Flexural Tensile Strength

The flexural behaviour of prism specimen 100mmx100mmx500mm produced by POC (as coarse and fine aggregates) reported having lower flexural tensile strength than NC. Generally, similar to the splitting tensile strength, the tensile strength of the POCLC is increasing with the POFA content from 0% to 20% POFA. The POCLC is tend to fail earlier than NC. According to Wahid and Roslli (2002) during testing, it is found that, in all beam specimens, cracks tend to appear earlier in lightweight beam specimens. This indicates that the lightweight beams have a lower cracking load compared to the normal weight beams. This phenomenon may be explained by the lower tensile strength properties of lightweight concrete, as indicated in the investigation of basic material properties. Figure 9 and Figure 10 illustrate the different failure cracking behavior where NC is smoother than POCLC cracking shape.

Fig. 9: Failure mode of normal weight concrete beam in flexure.

Fig. 10: Failure mode of POCLC concrete beam in flexure.

The tensile strength of POCLC is lower than NC but still, meet the requirement at 3N/mm2. The comparison between POCLC strength showed that the tensile strength increased as the POFA portion were increased.

3.2.5 The Optimum Content of POFA in POCLC

The optimum content of POFA in POCLC was determined by analyzing the mechanical properties of fresh and hardened POCLC concrete.

Table 5: Mechanical properties of different concrete mixes for 28 days.

Basic Properties	NC	POCLC Mixes				Average value for POCLC	Different Percentage POCLC vs NC (%)
		POFA 0%	POFA 10%	POFA 20%	POFA 30%		
Density 150mm cubes (kg/m3)	2317	1653	1692	1721	1728	1699	31
Compressive strength (N/mm2)	32.222	19.523	20.965	21.788	20.829	20.776	43
Flexural Tensile Strength (N/mm2)	4.211	3.145	3.189	3.301	3.058	3.173	28
Splitting Tensile Strength (N/mm2)	5.370	3.055	3.047	3.263	2.926	3.073	54

The results of POCLC and NC mechanical properties in term of cube compressive strength, density, flexural tensile strength, and tensile splitting strength static as stated by Shafigh et. al, (2010) were tabulated in Table 5. The mean cube strength for POCLC was 20.776 N/mm2 compared to 32.222 N/mm2 of the NC. It was found that the compressive strength of lightweight concrete is lower than standard JKR 20800-0183-14 [16] that is 25N/mm2. According to RILEM's functional classification of lightweight concrete, structural lightweight concrete is defined as having oven dry-density of less than 2000 kg/m3 and compressive strength more than 15 N/mm2 (Wahid and Roslli, 2002). Figure 11 shows that the optimum content of POFA by analyzed all the basic properties of the POCLC.

Fig. 11: The optimum content of POFA in POCLC
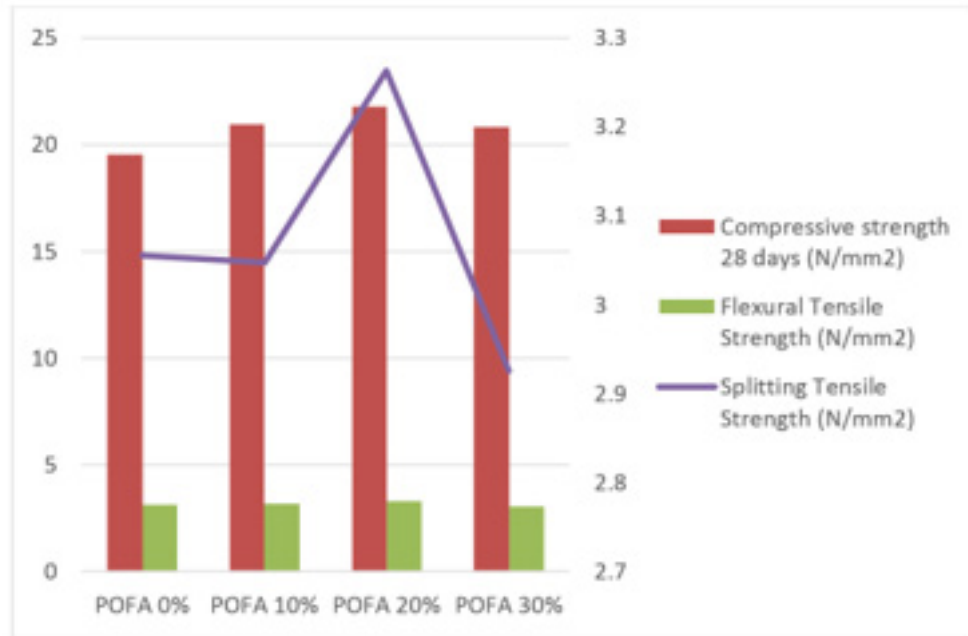
4. CONCLUSIONS

The results obtained and the observation made in this study draw some conclusions. These are:

i.   The POCLC properties such as compressive strength have a low strength but can be acceptable for lightweight concrete where its mean strength is 20.776 N/mm2 is slightly high than the requirement for lightweight concrete strength.

ii.   The POCLC strength is suitable for non-structural part of the building such as a secondary wall.

iii.   The mechanical properties of POCLC are lower than the NC, but with the proportion of 20% POFA as pozzolanic cement, all the properties such as the compressive strength and tensile strength of POCLC are slightly increased.

iv.   The optimum replacement levels of POFA blended cement mortar in POCLC is given by 20% POFA.

v.   The strength of POCLC is increased as POFA used as pozzolanic cement.

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MECHANICAL PROPERTIES OF HYBRID WOVEN KENAF/GLASS COMPOSITES

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ABSTRACT

Mechanical properties are an important property to explore such as tensile and flexural properties. The awareness for the greener world has led to the applications of natural fibre in composites application. Aiming for reducing in usage of synthetic fibre, this study reveals the potential reinforcement of hybrid woven kenaf and glass composite. The specific objective of this study is to discover the tensile and flexural strength and modulus properties of hybrid woven kenaf/glass polyester composites respectively. Cold Compression moulding method was selected for composites fabrication at 35% fibre-resin percentage. Fibre involved Kenaf long fibre 1000 tex size manually plain weave into 1500 g/m2 area weight and interlayer by E-glass mat area weight 30 g/m2. Unsaturated polyester resin used matrix resin usually used as a binder. Tensile and flexural test perform according to ASTM D3039 and ASTM D7264 respectively. Increased in mechanical properties of hybrid composites observed compared to kenaf composites. The tensile modulus of hybrid composites shows increased by 10%, measured at 9.88 GPa. However flexural modulus and interlaminar shear modulus shows slightly decreasing, reduce by 7% and 12.7% respectively. The fracture observed from flexural specimen identified glass fibre reduce the composites interface bonding.

Keywords: Hybrid Kenaf/Glass, Mechanical Properties, Tensile test, Flexural Test, Interlaminar Shear test

1.0 INTRODUCTION

Natural fibres are fibre sources from plants, animals, and mineral. Plant fibres are the most preferred natural fibres due to its abundance and are able to produce different types of fibres which can be applied as reinforcement or fillers [1-3]. Review from natural fibre studies exhibit that the natural fibres are more cost-effective in terms of raw material due to its renewable resources and results in cost reductions [4-6]. In natural fibre composites, the combination of natural–natural and artificial–natural fibres are potential for hybridization [7]. The hybridization is a potential solution for natural fibre drawback of possessing low mechanical properties [8].

Hybrid polymer composites are fabricated by amalgamation of at least two or more different types of fibres in a polymer matrix. Hybrid composites can be a combination of artificial-artificial fibres, natural-natural fibres, or combination of artificial-natural fibres. The synergistic effect offered by hybrid fibre composites enables the properties to be tailored [9]. In engineering application, hybrid composites are preferable owing to the few advantages they offer such as low cost, high strength-to-weight ratio, and ease of fabrication. The advantages of hybrid composites are ability to modify the mechanical properties such as stiffness, ductility, and strength; thus increasing fatigue life, higher fracture toughness, and lower notch sensitivity compared to mono fibre reinforced composites [9]. Gradual failure altered for brittle material is namely called pseudo-ductility [11].

Kenaf plants (Hibiscus cannabinus L., family Malvaceae) originated from Africa and grow in wide-range of weather conditions. Currently, kenaf is one of the Malaysian crops intentionally grown to replace tobacco supported under government agencies, The National Kenaf and Tobacco Board (LKTN) [10]. Kenaf cultivation is introduced to Malaysian farmers due to it fast growth. Since kenaf are abundantly available as Malaysian commodity, it is significantly viable for researcher to study the potential of kenaf for economic reasons [11]. Hybrid Kenaf and glass is one method for increasing the field of application for natural fibres is by increasing their mechanical properties through hybridizing process.

2. METHODOLOGY

The following section describes the properties of all materials and process used in this research.

2.1 Materials and Fabrication

The fibres involved in this research are woven kenaf and C-glass fibre (CSM-chop strand mat). Kenaf polyester composites and kenaf/glass composites data will be compared respectively. Unsaturated polyester 1.3 g/cm3 density was selected for matrix binder in the composites. Kenaf fibre supplies in yarn type by Innovative Pultrusion Sdn. Bhd, Seremban, Malaysia. Kenaf yarn then weaves using a lab scale self-designed handloom. The resin and glass fibre used in this study was supplied by S&N Chemicals Sdn Bhd.

Fig. 1. Reinforced Fibre Material

(a) Woven kenaf   (b) CSM Glass Fibre
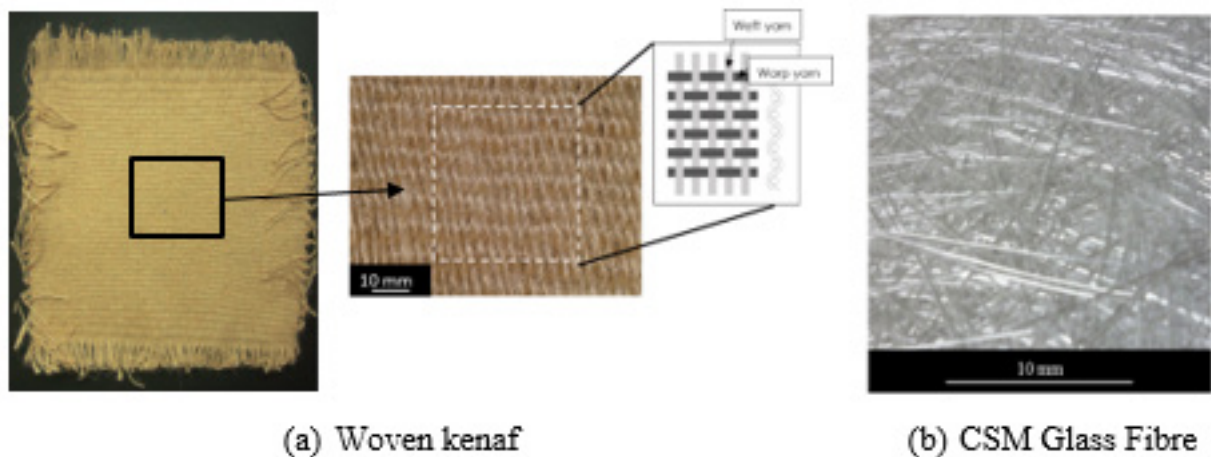
Closed mould compression moulding method was selected for fabrication with Methyl ethyl ketone peroxide (MEKP) hardener with 1% wt percentage by the resin were mix prior of fabrication process. Hybrid kenaf/glass composites sample fabricated as illustrated in Figure 2.

Fig. 2. Sample fabrication
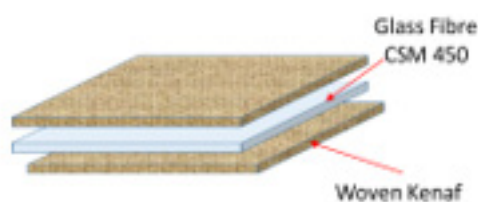
Pressure was applied to the closed mould by hydraulic compressor at one bar pressure. The average composite fibre-resin fraction is 38% weight percentage and average composites thickness measured at 4 mm.

2.2 Testing Procedure

Fig. 3. Testing Sample Configuration

(a) Tensile specimen

(b) Flexural specimen
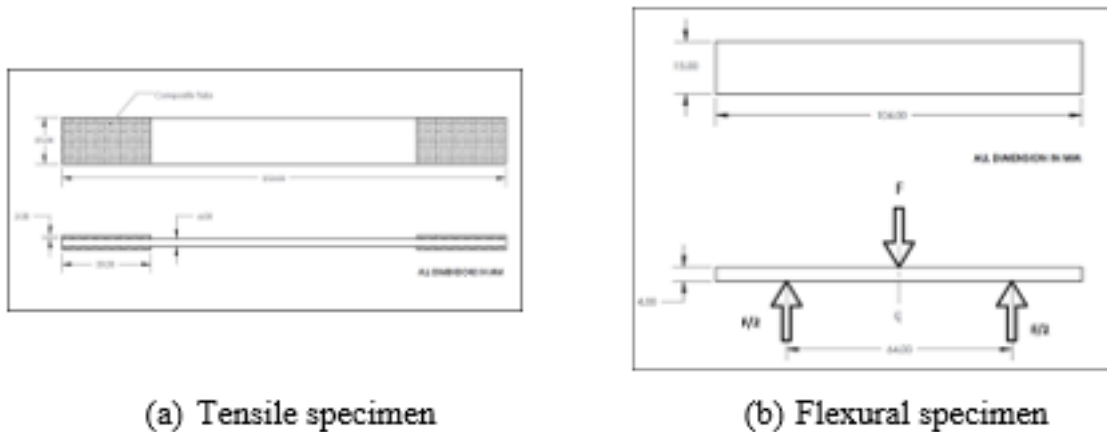
The composites cooled in room temperature for 24 hours under pressure. The cured composite plate was cut in the weft direction using band saw into samples of 250 mm x 25 mm, 104 mm x 15 mm as shown in Fig. 3. Tensile flexural and Flexural tests was performed according to the recommendation by ASTM D3039[12] and ASTM D 7264 [13], respectively.

Tensile test was performed at the crosshead speed of 2 mm/min with gauge length of 50 mm to measure the elongation of the specimen by extensometer. Meanwhile three-point flexural test was performed at span to depth ratio of 16:1 tested at a crosshead speed of 1.5 mm/min. Both tests executed using the same universal testing machine with five repeated tests.

Fig. 4. Testing Configuration

(a) Tensile test
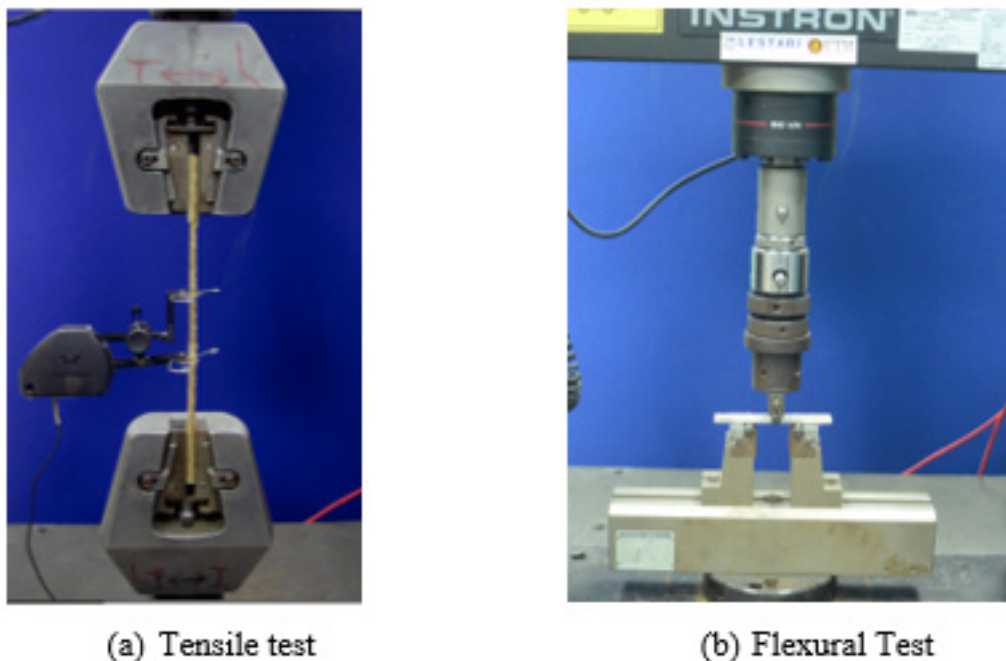
(b) Flexural Test

3. RESULTS AND DISCUSSIONS

Fabricated composites cut, polish and measure its average thickness observed under optical microscope Ziess S2000. The mechanical properties obtained from flexural and tensile tests are presented in Table 1.

Table 1: Tensile and Flexural Test Data

Sample	Tensile Strength (MPa)	Tensile Modulus (GPa)	Elongation (mm)	Flexural Strength (MPa)	Flexural Modulus (GPa)	Deflection (mm)
Kenaf	81.82	8.96	4.28	118.09	4.90	5.19
Kenaf/glass	85.49	9.88	3.69	123.85	4.51	5.42

3.1 Flexural strength and Modulus

The flexural strength and flexural deflection measured by three-point flexural test shows kenaf/glass composites performed slightly higher compared to kenaf composites. Flexural strength recorded at 118.09 MPa and 123.85 MPa with 4.88% increment. Comparing flexural deflection for kenaf/glass and kenaf composites exhibit 4.43% elevation measure at 5.42 MPa and 5.19 MPa, respectively. Hence, the flexural modulus shows slightly reduce by 8% comparing between 4.90 MPa for kenaf composites and 4.51 GPa for kenaf/glass composites. Flexural strength was calculated as; $\sigma_f = \dfrac{3FL}{2bt^2}$;Flexural Modulus, $E_f = \dfrac{L^3 m}{4bt^3}$; Figure 5 shows the comparison on flexural curvature behaviour and composites flexural strength.

Fig. 5. Flexural Test Results
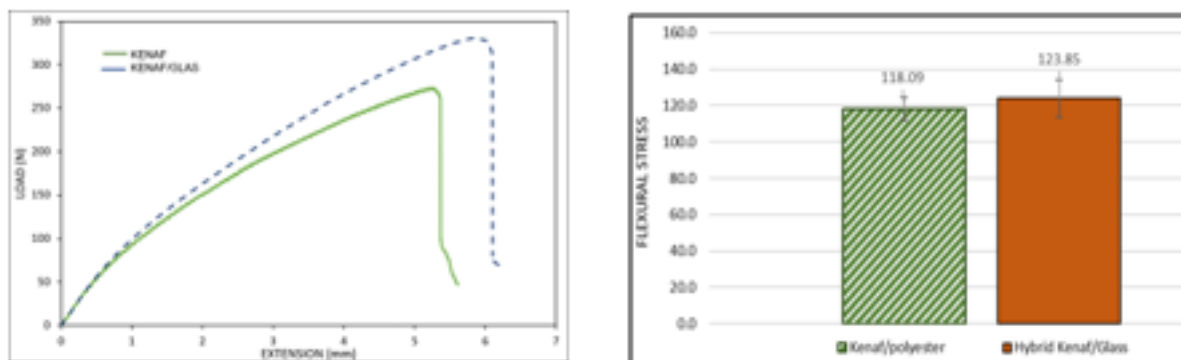
a) Flexural Load vs Flexural Extension curve   b.) Comparison on Flexural strength

The average flexural strength considering the standard deviation shows in Figure 5 (b), Kenaf and Kenaf/glass composites exhibited comparable values. The results seem to comply with the work of Swolfs et al. [2]; they found that the flexural strength depends on the outer layer fibre in which the interleaf glass fibre in between does not give significant effects to flexural strength due to its orientation near the neutral line.

Fig. 6. Morphology of flexural test specimen

(a) Kenaf specimen   (b) Kenaf/glass
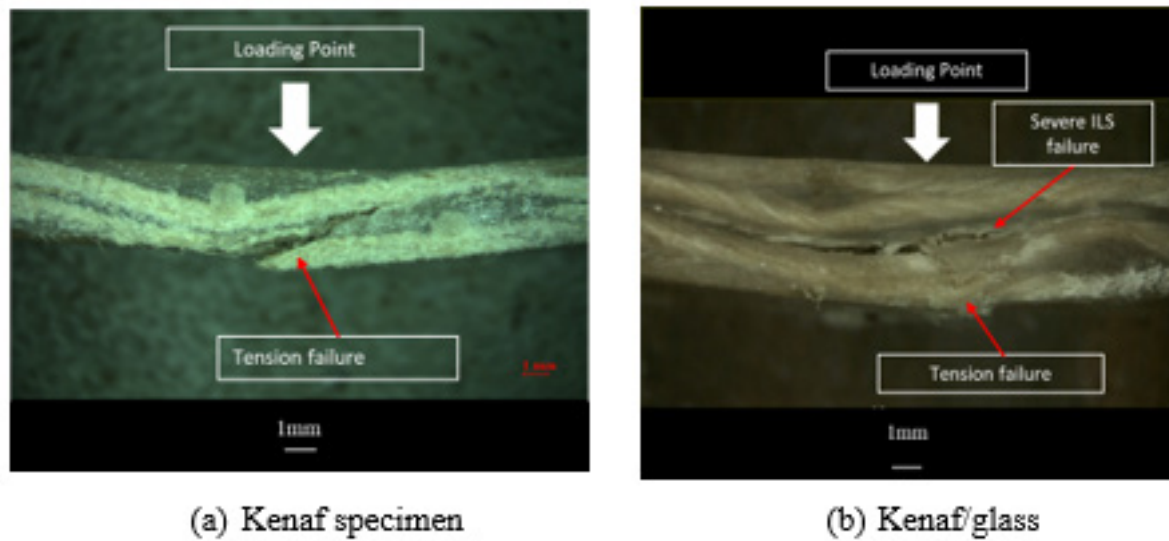
From the image observed under an optical microscope see Figure 6. It can be observed there are two types of failure observed on flexural test fracture. Kenaf composites seen face severe damage due to compression failure as shows in Figure 6(a). Meanwhile, Kenaf/glass fibre composites flexural failure dominated by interlaminar shear failure with minor compression failure also observed in the fracture, Figure 6(b).

3.2 Tensile strength and Modulus

Fig. 7. Tensile Test Results

a) Tensile stress vs tensile strain curve   b) Comparison on Tensile strength
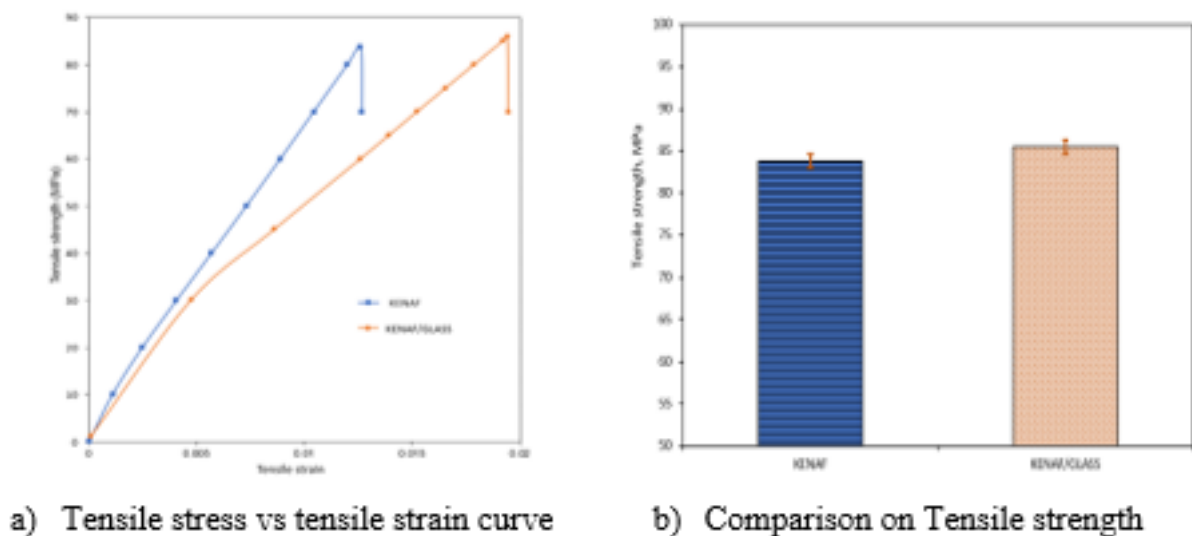
A comparable curvature is observed for tensile behaviour Figure 7(a), the graph shows linear increment up to failure. The linear plot shows a sudden drop when peak load is attained signifying brittle behaviour of the composites. For Kenaf/glass composites, the hybridization effect is observed with higher maximum stress and strain [14,16]. The tensile strength and modulus show 4.29% and 10.27% increment respectively effect on glass hybridization.

Fig. 8. Morphology of Tensile test specimen

a) Kenaf Composite

b) Kenaf/Glass Composite
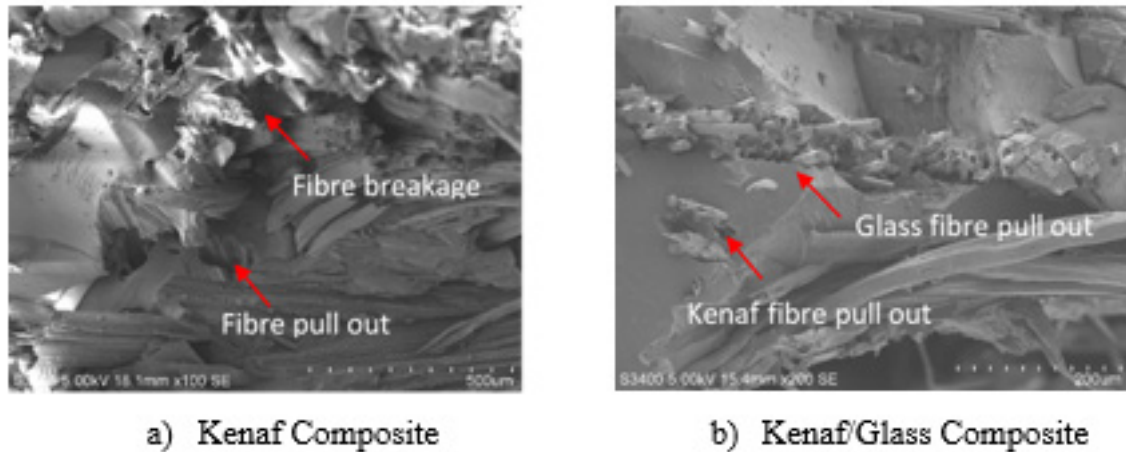
The morphology studies on tensile specimen as Figure 8 shows, both composites fail due to fibre breakage and fibre pull out. Thus, proved that both composites were dominantly influenced by fibre reinforcement.

4. CONCLUSIONS

Glass interleaf kenaf reinforcement has been successfully studied and their performance was compared to control sample kenaf composites. The incorporation of glass proved to increased composites flexural strength and elongation. However, decreasing on flexural modulus was observed. The failure fracture from flexural test revealed that decreased flexural modulus of kenaf/glass composites is because of interlaminar shear failure. Tensile properties illustrate a slightly increment in tensile strength and modulus. On the basis of the results obtained, the following conclusions can be drawn, Glass fibre hybrid woven kenaf composites had proven to give less significant effect on tensile properties. Furthermore, interlaminar failure observe in bending behaviour its mechanical properties thus reduce composite laminate integrity.

1. Kenaf/glass composites shows higher in flexural strength, and flexural modulus compare to kenaf composites.
2. Comparable Tensile strength of kenaf/glass composites compared to the control sample.
3. Kenaf/Glass composites experiences shows severe damage due to interlaminar shear on flexural fracture compared to kenaf composites.

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THE ROLE OF TECHNOLOGY BASED TRAINING AND TVET FOR PREPARING A SKILLFUL GRADUATE STUDENT

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Politeknik Ungku Omar

ABSTRACT

Globalization has become a crucial issue in the developing country and its impact on our future live. Therefore, we need to complete the challenge and meet a requirement of globalization by conducting a significant improvement by maximizing the effectiveness of the Technical and Vocational Education and Training (TVET) using innovative technology. This technology used to generate the knowledge and to developed skill of graduate student by intensive training and vocational education in the institution. The main objective of this study is to develop a skillful graduate student by maximizing the technology in training and vocational education during their study. This study focused on engineering student of polytechnic in Malaysia by inviting and organizing the training with expert from industries. This research proposed an effective technology in training and vocational education based on field practice and experiences. The sample of this study will conduct in 60 students to conduct the intensive training. Based on satisfaction analysis using questionnaire conducted on the final year students, R square of 91.7% indicated a positive remark. Thus, TVET curriculum is acceptable and recommended to be more applied in the institution for developing and preparing the skillful graduate students that meet the requirement of the industry.

Keywords: TVET, Technology-based training, skillful student

1. INTRODUCTION

Globalization is one of the most debated issues of our times. The sectors affected by globalization include: technological innovation, trade development, entrepreneurship, great opportunities for economic growth, which enable people to support their professional activities, increase of productivity through transfer of technologies and know-how, and upgrading of the role of media and communications which are developed to a transformation agent of social, cultural, and political structures [1-3].

Technical and Vocational Education Training (TVET) play a significant role on development of nation as well as instrument of social policy in many countries [4-6]. TVET also contributed to the enhancement of many organization in the globalized world by improving the quality workforce in terms of their mobility, adaptability and productivity [7-8]. The enhancement of workforce also to accomplish job duty and as function to fulfil the employer needs [10]. TVET system was designed for the purpose to produce competence and skill-full semi-professional workforce with innovative attitude, creative and highly etiquette while to accomplish responsibility in work [9].

In Malaysia, TVET has been chosen as a key component to achieve the country's goal as a high-income nation [10-11]. To become a high-income country, Malaysia need to ensure of having a large pool of high skill worker and TVET institution play an important role on managed to produce at least 3 million of skilled worker by the year 2020 [12]. Various ministries and agencies in Malaysia are working together in order to achieve the objectives of having as much as of TVET's graduated students with different area [13-14]. Malaysia government also continuously formulated and coordinated strategies on improving the skill-based training education by strengthened the collaboration between TVET institution and industries [15-17]. According to Abu Raihan (2014), an adequate collaboration between TVET institutions and industries would lead to provision of relevant practical skills among students for industrialization [18]. Thus, this study focuses on evaluation of the effectiveness of technology-based training by industries through field practices and experiences in TVET institution. This study also focuses on relation between the technology-based training with the TVET curriculum

2. METHODOLOGY

This quantitative research used a questionnaire as the research instrument to evaluate the perceptions of the students on the effectiveness of technology-based education with relation of TVET curriculum in producing students who are knowledgeable and skilled. A questionnaire survey was chosen as the main method of data collection as it is an effective instrument for gauging people's perceptions. Furthermore, the information acquired can be used for further inter-correlation mining [19]. The questionnaire has 36 items and was designed and developed based on information from the literature review, project observation and short semi-structured interviews. Standardized 5-point Likert scales ranging from strongly disagree to strongly agree (1 to 5 points) were used for all the items. The respondent was consisting of mechanical engineering students with the total of 60 students. The training was conducted for two days with extensive training of technology based by industries that held in Politeknik Ungku Omar (PUO) as one of TVET institution in Malaysia. It was carried out to prepare the student for facing the industrial 4.0 that required the skilful worker. The evaluation of technology-based training effectiveness is conducted based on the feedback of students.

3. RESULT AND DISCUSSION

This research is associative, which aims to determine the effectiveness of technology-based training in TVET institution. Data analysis methods used were multiple regression, and the questionnaire was used to collect the data. Multiple regression was used to find out respondents' knowledge of technology based training by industry that applied in PUO.

Respondents characteristics of this study are listed in Table 1. All respondents in this study came from mechanical engineering field with different program which 45 people from total respondent is male. Based on the results, 15 respondents were in the age group of 18 to 19 years old, 42 respondents were 20-21 years old, and 3 respondents were of 22-23 years old.

Table 1. Respondent characteristics

No.	Variable	Characteristic	Frequency	Percentage (%)
1	Gender	Male	45	75
		Female	15	25
		Total	60	100
2	Age	18-19 Year	15	25
		20-21 Year	42	70
		22-23 Year	3	5
		Total	60	100

Fig 1: Percentage of respondents from mechanical engineering students with different program

- Diploma in Mechanical Engineering
- Diploma in Mechanical Engineering (Automotive)
- Diploma in Mechanical Engineering (Air-conditioning & Refrigeration)
- Diploma in Mechatronic Engineering
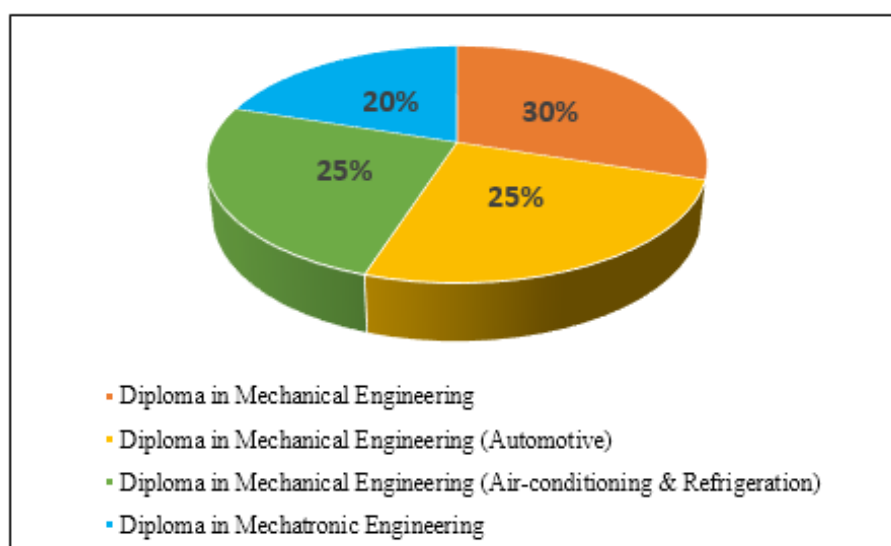
Figure 1 indicate the percentage of respondent from mechanical engineering student with different program. Majority of the respondent with 30% are from Diploma in Mechanical Engineering program while the others come from Diploma in mechanical Engineering (Automotive), Diploma in Mechanical Engineering (Air-conditioning & Refrigeration) and Diploma in Mechatronic Engineering.

The results of regression analysis and test hypothesis to the effect of Technology based training (X1), Effectiveness of TVET (X2), Improve skill by technology (X3) and professional trainee (X4) to TVET curriculum (Y) are shown in Table 2.

Table 2 : Test quality instrument

Variables	Validity	Reliability
X1	0.673 - 0.941> 0.250	0.948
X2	0.7 47 - 0.872> 0.250	0.933
X3	0.793 - 0.898> 0.250	0.905
X4	0.705 - 0.952> 0.250	0.953
Y	0.802 - 0.951> 0.250	0.929

Based on Table 3, it can be seen that the R Square depicts a value of 0.917 or 91.7%, thus the dependent variable X1 to X4 shows the appropriate TVET action on the students (Y) of 91.7% while the remaining 8.3% was influenced by other variables not included in this study.

Table 3 : Regression coefficient

Variables	Coefficient Regression	t count	Sig	Information
Constants	-2.592	-1.647	0.105	
X1	0.050	3.693	0.001	Significant
X2	0.280	7.990	0.000	Significant
X3	0.382	7.505	0.000	Significant
X4	0.062	3.519	0.001	Significant
Y	0.917			
	F Count	151.734	0.000	Has accepted

The result also shows that the calculated F value is 151.734, with a p-value or significance value of 0.000. This means that the value is 0.000< 0.05. So, it can be concluded that TVET curriculum (Y) give a significant effect on the improvement of student skill based on all variable.

A hypothesis testing was conducted in mechanical students in regard to the influenced factors which were the X1 to X4, as listed in Table 4. The result shows that all hypotheses are accepted which mean that the student achieve a significant improvement on their skill through technology based training.

Table 4 : Testing hypothesis

Hypothesis	Hypothesis	Conclusion
H1	There is influence of TVET curriculum to X1	Be accepted
H2	There is influence of TVET curriculum to X2	Be accepted
H3	There is influence of TVET curriculum to X3	Be accepted
H4	There is influence of TVET curriculum to X4	Be accepted

Table 5 shows that the t value for the Technology based training (X1) at 3.693 with significance of 0.001, which means 0.001 values of <0.05 had a significant and positive impact that given by TVET curriculum. The t value for the effectiveness of TVET (X2) variable amounted to 7.990 with the significance of 0.000, which means 0.000 values of <0.05 had a significant and positive impact that given by TVET curriculum.

Table 5. Result of multiple regression analysis

Variable	Coefficient	t value	p-value	Conclusion
Constant	-2.592	-1.647	0.105	
X1	0.50	3.693	0.001	Significant
X2	0.280	7.990	0.000	Significant
X3	0.382	7.505	0.000	Significant
X4	0.062	3.519	0.001	Significant
Y	0.917			
	F value	151.734	0.000	Has accepted

The t value for improve skill by technology (X3) and professional trainee (X4) was defined as 7.505 and 3.519 respectively. The p-value for both variable below than 0.05 also had significant and positive impact. The constant value of this research was -2.592, which shows that if the independent variables were constant or zero.

4. CONCLUSION

Statistical analysis was performed on 60 respondents, which consists of mechanical engineering student who divided into 45 students is male and 15 students is female. The questionnaire consisted of five major topics which were the demographic section, Technology based training, Effectiveness of TVET, Improve skill by technology and professional trainee. Multiple regression analysis showed that the data were normally distributed, no multi collinearity symptoms in multiple regression models, no symptoms of heteros cedasticity on the data due to the significant value were below than 0.05. Also, all hypothesis was accepted, and the result of multiple regression was significant. From this study, TVET curriculum is acceptable and recommended to be more applied in the institution for developing and preparing the skillful graduate students that meet the requirement of the industry [20].

ACKNOWLEDGMENTS

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PRELIMINARY RESULT FOR PORTABLE INFANT INCUBATOR TESTER

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ABSTRACT

Neonatal incubators were made for survival of new-borns. They regulate temperature, humidity and oxygen concentration, providing the perfect environmental conditions for the newborn improvement. The incubator analyzer used to test the performance of the incubator. The incubator analyzer simplifies testing and ensures proper performance and safety of newborn incubators and transport incubators. The biomedical staffs faces difficulties in lifting heavy safety analyzer from one place to another and the misplacement of external probes may disrupt the process flow of safety test. In this research, a portable infant incubator tester is developed. Temperature, humidity, noise level, and oxygen concentration are the main parameters that is measured in the infant incubator. The four parameters readings will be detected and measured from the infant incubator. The data will be transmitted and processed into Arduino Uno and the result willbedisplayed onthe LCDscreen. Thedataalso willbestoredin theSD card. In addition, the usability of the tester also has been compared with the incubator analyzer. The invention of the light-weight portable tester for neonatal incubator will help to reduce the burden of technician by bringing around the tester. It will also increase the efficiency of the staffs to perform betteratworkplacewith user-friendlytester.

Keywords: NeonatalIncubator,MultiparameterSensor,Portable,Tester

1. INTRODUCTION

Neonatal Intensive Care Unit (NICU) is a special unit for premature babies care in hospitals. The health of the baby is maintained and monitored through this unit. There are a lot of infant incubators analyzers out there in the market been designed for the PPM purpose. However, they are high in cost and not environmentally friendly. Basic infant incubator problem according to the report of WHO (World Health Organization), arecausedbyuncontrolledoxygen saturationanduncontrolledtemperature[2].

The infants have very low thermal regulation and temperature regulation is one of the most important factors which affect the preterm. One of the major problems that new-born's face is improper thermoregulation [3]. In premature baby studies, there is a delicate balance between too much and too little supplemental oxygen exposures [4]. Pretend infants usually have to spend long time incubator, excessive noise in which can adversephysiologicaleffectonneonates[5].

The sound pressure level (SPL) in the NICU is often much higher than the levels recommended by the American Academy of Pediatrics [6]. Alternatively, the portable tester is designed to overcome this problem. This invention is low cost and one of the high demand from biomedical team from hospital. The biomedical staffs face challenges in lifting heavy analyzer from one spot to another. Biomedical team from hospitalhadrequestedaprototypethatcanbeamodelfortheincubatoranalyzer.

This invention is developed to identify the infant incubator tester usability. Then the temperature, humidity, noise and also air quality parameter is assessed. Temperature sensor is used to detect the temperature and humidity. Gas sensor is used to measure air quality in environment of the incubator. Then, sound sensor is used to detect noise inside the infant incubator. Buzzer, LED indicator, LCD screen display and data logger willbeusedaspartofoutput.

2. METHODOLOGY

The scope of this project is categorized into three parts such as software, hardware and mechanical design. Infant incubator tester is a biomedical equipment that used for perform preventative maintenance and routine verification of baby incubators in hospital. In this respect, the micro-controlled structure facilitates the programming of correction functions that can be modelled from the calibration points. The software whichusedforthisprojectisArduinoUNOsoftware.

2.1 Block Diagram of the System

The system of the project starting from input, process and output. Input consists of 4 main parameter which is processed by microcontroller and gives output in form of displaying the reading, blinking of LED light, buzzer and store data.

Fig.1 : Block Diagram of the Incubator Tester

INPUT	PROCESS	OUTPUT
Temperature	Microcontroller	Led
Humidity		Buzzer
Noise		Reading
Gas		
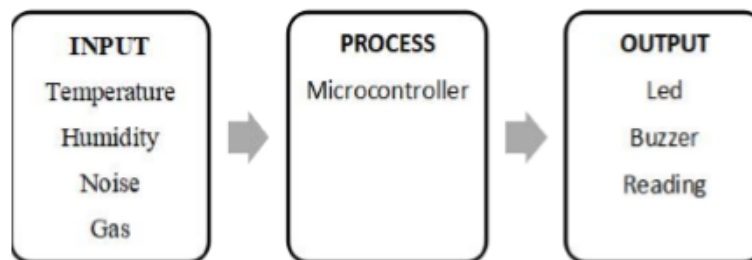
2.2   System Flow chart

Fig.2 : FlowchartoftheProject

```
                    ┌───────────┐
                    │   START   │
                    └─────┬─────┘
                          │
                          ▼
        ┌───────────────────────────────────┐
        │  TEMPERATURE, HUMIDITY,           │
        │  NOISE AND GAS                    │
        │  CONCENTRATION                    │
        │  PARAMETER IS SET                 │
        └─────────────────┬─────────────────┘
                          │
                          ▼
        ┌───────────────────────────────────┐
        │        DELAY TIME IS SET          │
        └─────────────────┬─────────────────┘
                          │
                          ▼
        ┌───────────────────────────────────┐
        │  TEMPERATURE, HUMIDITY,           │
        │  NOISE AND AIR QUALITY IS         │
        │  MEASURED                         │
        └─────────────────┬─────────────────┘
                          │
                          ▼
        ┌───────────────────────────────────┐
        │  DATA DISPLAYED ON LCD            │
        │  SCREEN                           │
        └─────────────────┬─────────────────┘
                          │
                          ▼
        ┌───────────────────────────────────┐
        │  DATA STORED IN SD                │
        │  CARD                             │
        └─────────────────┬─────────────────┘
                          │
                          ▼
                    ┌───────────┐
                    │    END    │
                    └───────────┘
```
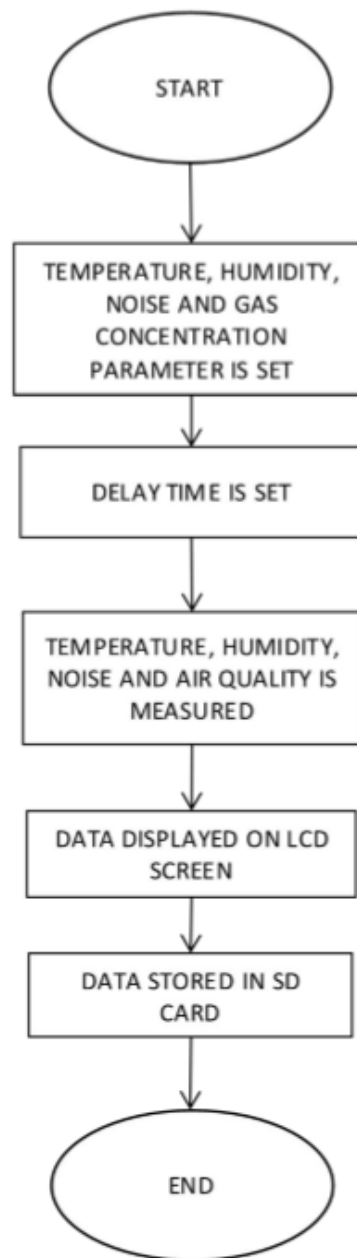
2.3   3D Design of thet ester

The 3D design is based on the system size. The tester is designed by own creativity.

Fig.3. Isometric View of the Casing
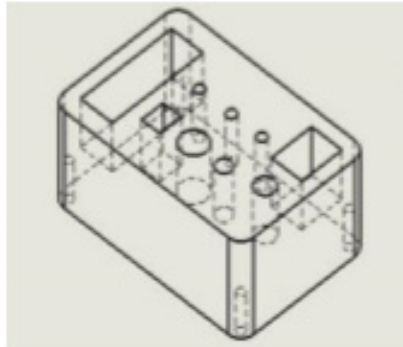
Fig. 4. 3D Sketching of the Hardware
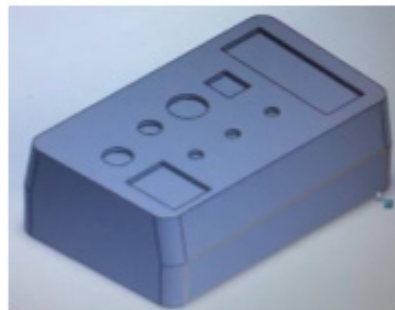
Fig. 5. 3D Design of Tester

3. RESULTS AND DISCUSSIONS

3.1   Experimental testing

The analysis of the results obtained by the tester is presented. The results are related to the testing performance of the parameter inside the incubator. The sensor response was monitored by changes in close.

3.1.1   Temperature testing

The incubator temperature is set to 35°C. The air temperature shows reading of 27.5°C. The humidity is set to 80%. The readings displayed is 59%. Table1 shows the data recorded.

Table1 : Air Temperature Inside the Incubator

Time (Mins)	Incubator Reading (°C)	Tester Reading °C
2	28.5	28
4	29.5	29
6	30.5	30
10	31.5	31
12	32.5	32
14	33.5	33
16	34.5	34
16m and 30s	35	35

The time interval taken for the temperature to increase is 2 minutes. The incubator temperature and the tester temperature show exact reading 16 minutes and 30 seconds. The results obtained were within the ranges specified in the standards.

3.1.2 Humidity testing

The humidity in incubator is set to 70%. Within 16 minutes, the humidity is measured. The data shows that the reading in incubator and tester is different by 2%. The gas concentration and noise level were read through the display for 16 minutes. Table 2 shows the data recorded.

Table2 : Humidity Reading of Incubator

Time (Mins)	Incubator Humidity (%)	Tester Humidity (%)
2	56	55
4	54	53
6	53	52
8	60	57
10	61	58
12	63	59
14	69	64
16	70	68

3.1.2 Humidity testing

The noise reading is taken along with gas concentration testing.

Table 3 : Noise Reading and Gas Concentration Inside the Incubator

Time (Mins)	Noise Level (dB)	Gas Concentration (%)
2	19.68	9.77
4	18.82	9.28
6	19.43	10.25
8	19.8	10.74
10	19.68	11.72
12	21.31	13.18
14	22.96	11.23
16	19.8	10.74

The measured values indicate acoustical environments just a little louder in the NICU's than within the incubators. This reveals that one of the best ways to decrease the sound levels close to the infants must consider the reduction of sound levels in the NICU's. Table 3 shows the reading taken in sound and gas sensor.

4. CONCLUSIONS

This project is focuses on design and develop portable tester based on temperature, humidity, noise, and air quality measurement for infant incubator. To achieve this, a 3D hardware is designed so that the above-mentioned parameters can be tested. The possibility of using the presented methodology, in the development of other prototypes analyzers of medical equipment, contributing to the production of national tester of good quality and low cost. Accuracy of the sensor was checked in the incubator and the acceptability of the obtained values was evaluated. The obtained test result shows that with more accurate sensors, this tester can be used as an incubator analyzer and user friendly.

ACKNOWLEDGEMENT

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DEVELOPMENT OF A SEMI-AUTO MIXING MACHINE

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Politeknik Sultan Salahuddin Abdul Aziz Shah

ABSTRACT

The manufacturing technologies keep changing from time to time with the latest technology such as automated system. Therefore, a Small and Medium or SME industries also looking for the automated or semi-automated system, which to compete in their business. Currently, there are a manual, semi-auto and fully-auto method implemented for the mixing process. Furthermore, a pH value is an increase during the filling process, where, the material exposed to the environment. But, pH value also needs to maintain at less than 4 in order to prolong the life of the product. In controlling a temperature, traditionally method difficult to maintain the temperature above 70°C. Therefore, the development of this project is to develop a semi-auto mixer for making any mixing food. The concept used, based on the mechanical principles and electrical control for cooking, mixing and temperature control to maintain temperature. Hence, the project controlled by PLC (Programmable Logic Controller) and Proportional controller for controlling a temperature, the speed of the motor and timing of the heating element in order to maintain the temperature above 70°C. The bowl of the mixer made by the good quality of material, which is stainless steel with food grade. Furthermore, the filling method is also developed in order to maintain a pH value due to human error or environmental exposure. This design is capable to overcome the production in large quantity up to 150 litres for each process.

Keywords: Mixing machine, pH value, PLC

1. INTRODUCTION

Currently, a manual method is implemented for mixing processes. A pH value is increased during the filling process, where, the material is exposed to the environment. But, pH value also needs to be maintained at below 4 in order to prolong product life. Furthermore, the current method is difficult to maintain a temperature at 70°C to 80°C. For that reason, as a solution method is introducing a mixing, heating and filling device for making any paste of the food to be solved. This machine is designed to overcome the production in large quantities to control temperature, maintain pH value, and filling method. Also, a semi-auto controller is implemented to control a process. Hence, the mixing affects various process parameters including heat and mass transfer rates, process operating time, cost and safety, as well as product quality (Ghanem et al., 2014).

This project focuses on mixing and heating element with a capacity of 150 liters. PID controller is used for controlling temperature, speed and motor. While PLC is used to control the sequence of the process. On the other hand, the quality and the packaging of the product are not taken into account.

1.1 Comparing Existing Machine In Market

Fig. 1: Machine Comparison

	Characteristic	Machine Design	Operation	References
	- Stand alone - Capacity up to 100 Liters - Fixed system controller (not able to integrate with other system) - Only for filling and mixing process - No heating element	Vertical	Manual	http:// rcmesinmakanan. com
	- Stand alone - Capacity up to 30 Liters - Fixed system controller (not able to integrate with other system) - For Filling, Mixing and Cooking	Vertical	Semi-Auto	http:// mgequipments. miiduu.com
	- Stand alone - Capacity up to 100 Liters - Fixed system controller (not able to integrate with other system) - For Filling, Mixing and Cooking - Not be able control temperature and expensive.	Horizontal	Semi-Auto	http://ms.365gbo. com

2. METHODOLOGY

In this paper, there are some solutions (Fig. 2) for mixing, cooking and filling process, which include design, fabrication, installation, testing and commissioning:

- Stainless for mixer stirrer, outside body and inside of the vessel.
- System controller (PLC, PID)
- Hard wiring system
- Motor and motor controller
- Pneumatics system for filling process
- Heating element for maintaining temperature inside hopper
- Speed of mixer stirrer can be controlled

Fig. 2: Machine Components

Figure 3 shows the flow chart of product development, starting with literature review up to product testing. The product is designed using 2D AUTOCAD software with complete dimension. Furthermore, the design is analyzed to identify the suitable process, such as fabrication and joining process. TIG welding is used for all joining process for stainless material.

The criteria of the product must meet the specification, requirements, flow of process and standard (Beitz, W., & Pahl, G., 1995), including geometry, design, materials, market and ergonomics. This design criteria has been taken into account for machine development.

Fig. 3: The Flow of Project Development
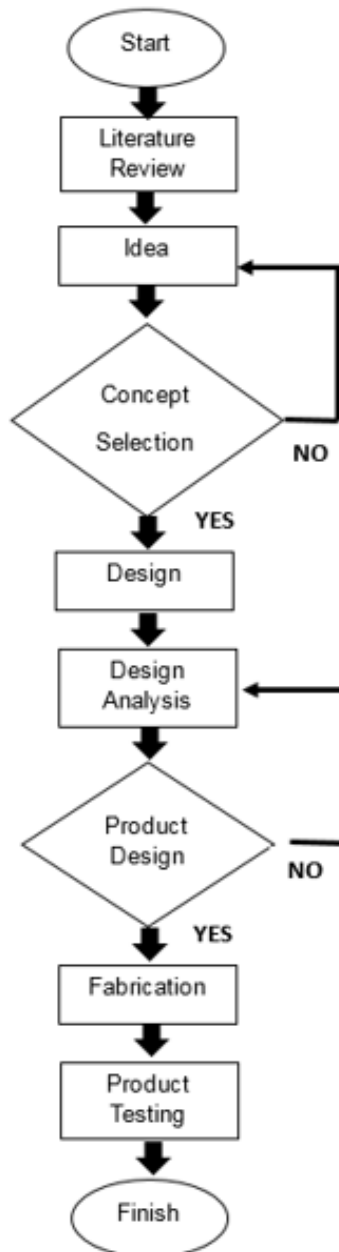
There are some fixtures of the machine:
- Introducing a new method and controlling of mixing machine as in Figure 2, for mixing various ingredients and cooking for producing a good quality and quantity of product.
- The mechanism consists of a heating system with gas, mixer stirrer (operated by electrical motor), controller (PLC and PID) for controlling start/stop, heating process (maintain 80°C), timing and motor.
- It can be a continuous or step process.
- This process is estimated to be capable of producing 150 Liters per process for one hour with closed vessel compared to the current process with open vessel.
- After completing a process, this machine is able to transfer curry paste to other containers or filling process through outlet valve (through ball screw) without opening the top of the vessel.
- For cleaning process without dissembling the mixer stirrer.
- Flexible system means that, it can be integrated with other equipment easily through PLC (Programmable Logic Controller).

A model of the machine was designed and fabricated through CAD drawing as shown in Figure 4. The real machine was developed based on design.

Fig. 4: Machine Design
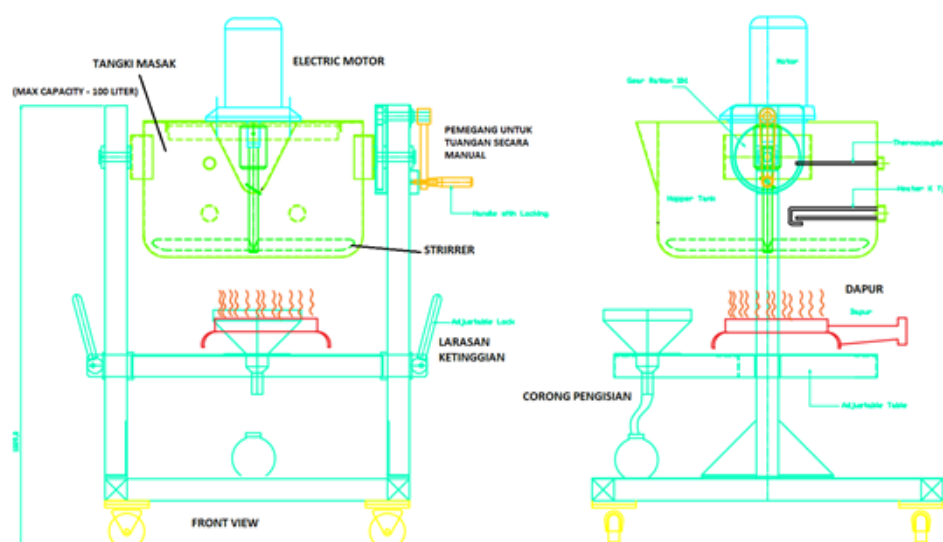
3. RESULTS AND DISCUSSIONS

Results and benefit of the machine can be summarised in table 1. It can be seen that, the developed machines have more advantages compared to the existing machines, which combine three functions in one machine. Therefore, it offers a quality and large quantity of the product. It is easy to maintain temperatures at 70°C to 80°C for lifespan of the product. While, by introducing a new method of filling process through a pneumatic valve, it guarantees a faster time compared to conventional method. Through the mixing process, it has an excellent mixing effects on various process parameters including heat and mass transfer rates, process operating time, cost and safety, as well as product quality.

Table 1: The Benefits of the Mixing Machine

Benefits	Conventional current method	Proposed method
Controlling a temperature	The use of current method does not permit the temperature to be controlled at 70°C.	The use of PSA method has enabled the machine to maintain the temperature at 70°C.
Production /Capacity	The use of current machine has limited production about 50 litres.	Capable to produce 150 Litres per process. *(triple production)*
Filling method	To transfer to other containers or filling process through conventional method.	To transfer to other containers or filling process through outlet valve of the external hopper.
Mixing processes	Less excellent mixing affects various process parameters including heat and mass transfer rates, process operating time, cost and safety, as well as product quality.	Excellent mixing affects various process parameters including heat and mass transfer rates, process operating time, cost and safety, as well as product quality.

The machine specifications are as follows:

Heating Element
Max Temperature: 1000C
Heating Media: Gas Stove
Heater: K-Type Heater and Thermocouple

Motor:
Max speed: 1410 r/min
Input: 220 – 230 Volt, 50 Hz.
Output Power: 1100 Watt
Output Current: 6.76 A

Table 2 shows, the performance of machine has been tested by the industry and it is proven that the machine developed has a good potential to be commercialised in future.

Table 2: The Performance of Mixing Machine

	Current Method	New Method
Productivity	200 liters	Increase up to 1200 liters
Cost (raw material)	RM 200 per 50 Liters	RM 300 per 150 liters
Time Saving	50 liters in every 2 hours	150 liters in every 1 hours
Quality	Below 1 years lifespan of product	More than 1 years lifespan of product

4. CONCLUSION

This developed machine able to help industry increased their product by introducing a mixing, cooking and filling machine method of a curry paste. Therefore, it can be one of the solutions in food industries processes. In future, it may have a positive impact in increasing the quantity of the production due to the semi-automated system compared to the current method, which operates manually. It is hoped that this product meets industrial food processing requirements.

ACKNOWLEDGEMENT

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INTEGRATION OF ACTIVATED CARBON FILTER AS INNOVATIVE TECHNOLOGY THROUGH INTENSIVE TRAINING IN MALAYSIA'S TVET INSTITUTION

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Politeknik Ungku Omar

ABSTRACT

Currently, the technology application and integration were necessary in teaching and learning in institution especially for Technical and Vocational Education and Training (TVET) institution. However, the student commonly implemented and absorb the technology in their life in order to improve their skill and their value to fulfil the industrial requirement. Therefore, the objective of this research is to implement one of the innovative technologies which is Activated Carbon (AC) filter for Indoor Air Quality (IAQ) improvement through intensive training. Training was focused on mechanical engineering students. There are several stages of training that performed in this study such as training in developing the AC filter product that starting from charcoal development and carbonization process by semi-automatic closed horizontal burner. The training also was conducted in developing AC air filter for air pollutant absorption. The Palm Shell AC (PSAC) has been successfully developed with the dimension of air filter of 60 x 30 x 2.5 cm (L x W x H) with granular PSAC of 0.5mm to 2mm. In terms of the transferring knowledge of PSAC development, the respondent signed in very understand level with 51%, it also showed by the knowledge of application of PSAC filter in level very understand and understand level for 31.6% and 42.1%, respectively. Effectiveness of the PSAC filter shows that most of respondents obtain that PSAC filter was very effective to improve the quality of air. In conclusion, the training give a significant effect to the TVET student which shown by very satisfied level with 80.7%.

Keywords: Activated Carbon, IAQ, AC filtration, TVET

1. INTRODUCTION

Technical and Vocational Education and Training (TVET) was designed for students having experiences hand-on learnings and also understand knowledge on related occupational in various sector [1]. Commonly, TVET's students implemented and absorb technology in their life based on teaching and learning process in class or practical task activities. Therefore, the technology application and integration were necessary in teaching and learning of TVET especially in specialized area such as activated carbon development and applications.

Activated carbon (AC) is one of the cheapest and popular materials as air purification, cleaned/ desorption which can be used hundred or thousand times [2]. Air purification through activated carbon adsorption technique is the most common air cleaning method, especially for VOC and other polluted gases [3]. Many researcher have revealed that AC filtration is one of the methods known to be effective and reliable for Indoor Air Quality (IAQ) improvement [4][5][6][7][8]. There are many problems of application of AC due to it not well known by the society. That phenomena influenced by the perception that the production and the properties of AC were complicated. Therefore, this study aims to educate the society that consists of the polytechnic's student through intensive training of development and applications of activated carbon from waste material.

2. METHODOLOGY

The research methodology was conducted by several stages such as development of AC as air adsorption media, training of AC filter production to the student that delivered by lecturer from polytechnic as well as evaluation process by using questionnaire and analyzed by statistical tools.

2.1 Development of AC

The AC were developed by using palm shell as waste material. The charcoal was carbonized by semi-automatic closed horizontal burner at temperature of 300-600 ^0C become charcoal. It requires to activate by combination of physical and chemical activation process. It was conducted by KOH catalyst that heated at 900^0C for 1 hour, soaking- KOH with 1:1 concentration and re-heated at 850^0C for 1 hour. The palm shell AC was crushed into certain size of 0.5 mm-2 mm as shown in Figure 1.

Fig 1: Granular AC of 0.5mm - 2mm size

Fig 1: Granular AC of 0.5mm - 2mm size

The palm shell AC then applied for Air filtration as shown in Figure 2 which installed in air conditioner in selected building.

2.2 Training of AC filter

Training was focused on mechanical engineering students. There are several stages of training that performed in this study such as training in developing the AC filter product that starting from charcoal development and carbonization process by semi-automatic closed horizontal burner. The characterization of the product before AC filter development need to deliver to the student through training in order to improve their knowledge in optimization process to select an appropriate product. The training also will be conducted in developing AC filter for air adsorption.

2.3 Training of result analysis

The analysis was conducted through the interview and questionnaire that filled by the students. The questionnaire and interview were conducted based on several clusters of question such as the knowledge of palm shell AC production, palm shell AC application, the effectiveness of palm shell AC in filtering the air and the satisfaction of the respondents for this training. The questionnaire was conducted in 114 respondents from academic students.

3. RESULTS AND DISCUSSIONS

3.1 Palm Shell AC (PSAC) filter development

The PSAC filter is designed to be implemented in air conditioning system. Air-conditioning is categorized as a mechanical ventilation system. Mechanical ventilation includes central air conditioning (such as Air Handing Unit (AHU), Fan Cooling Unit (FCU) and AHU mix FCU and non-central air conditioning (such as type and single-split type).

Granular palm AC with 0.5mm to 2mm size underwent the activation process. The granular AC was used for the development of the air filter. About 100 -200 g of granular palm AC was embedded into the non-woven fabric cloth to form a layered filter. The filter paper as shown in Figure 3 is a three-layered component which the top and bottom layers are non-woven cloth created from polyester; while, the middle layer is the granular palm AC. The thickness of each filter was recorded in the range of 3 - 5 mm thickness. The non-woven cloth and granular palm AC were fastened with adhesive followed by thermal pressing at the temperature of 150□C. A steel fencing mesh was used to hold the filter pad so that it is flexible enough to be arranged. The filter paper was then pleated to reduce the pressure drop as indicated in Figure 4. The dimension of the filter which is 60 x 30 x 2.5 cm (L x W x H) of PSAC air filter products shown in Figure 5.

Fig 3: Filter paper with PSAC

Fig 4: Pleated process
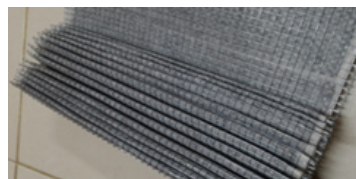
Fig 5: PSAC air filters
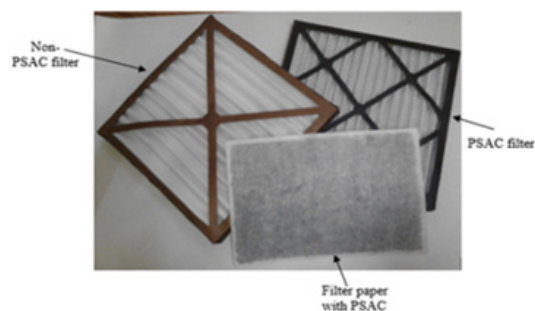
3.2 Analysis of the training

Demographic analysis of the respondents consists of gender. Most of the respondents was Male with 77% and female of 23% as shown in Figure 6. It caused by most of the respondent is mechanical engineering students. This condition give advantage due to the production of palm shell AC require the burning and crushing process that mostly conducted by male respondents. Therefore, the training process run as scheduled.

Fig 6: Gender of respondents
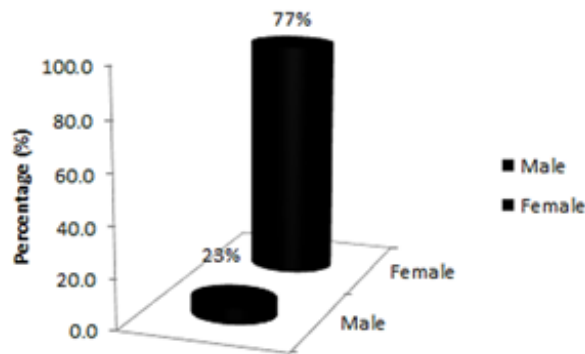
The output of the training was to improve the knowledge of the student in terms of AC production including the method of carbonization, crushing, sieving and filter fabrication process. From 114 respondents who joint in this seminar there are a significant impact to the respondents. It showed by the statistic that 51% of the total respondents was very understand about the palm shell AC production as shown in Figure 7. It means that the training successfully improve their knowledge in terms of PSAC production.

Fig 7: Level of understanding of the respondent in PSAC production
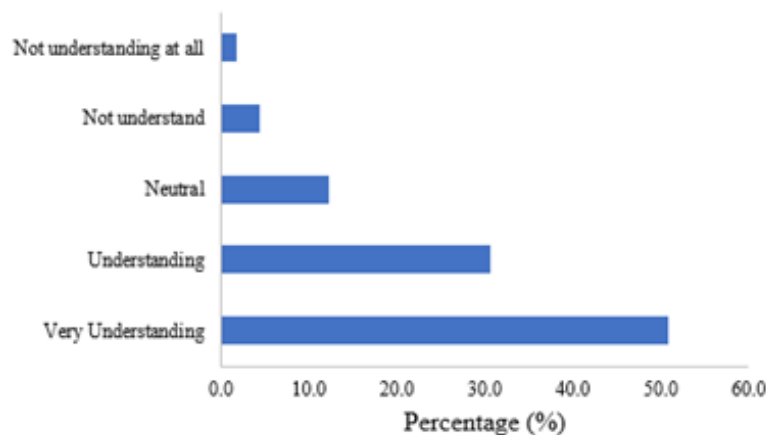
There are several applications of AC such as air and water purifier, power plant, landfill gas emission and precious metal recovery. However, in this training explain deeper in air purifier or filtration. In this training conducted the method of the installment of PSAC as air filtration media in air conditioning system. Hands-on process in training believe can improve their ability to install the PSAC filter to the specific application. It can be seen in Figure 8 that most of the respondents in very understand and understand level with the percentage of 31.6% and 42.1%, respectively.

Fig 8: Level of understanding of the respondent in PSAC application
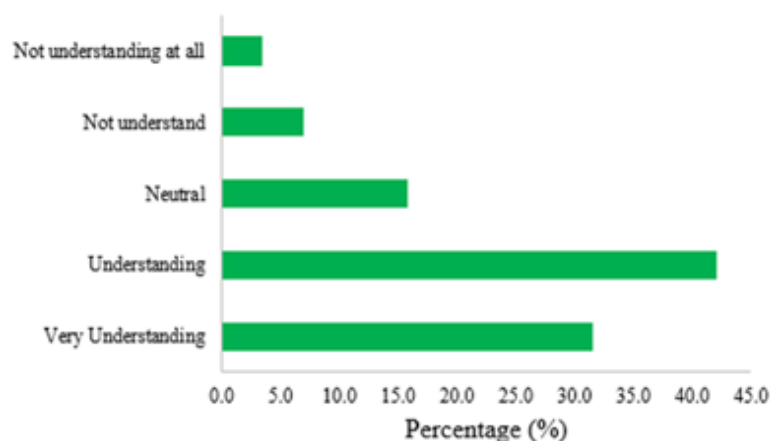
The training of PSAC production as air filter real application was conducted. The respondents divided into some groups and they should investigate the effectiveness of the PSAC in specific application. From the activity conducted, it shown that the respondents were very enthusiasm with the activity and they obtained the effect of the PSAC filter in filtering the air. The results show that more that 80% in level very effective and effective level with 57.9 and 35.1%, respectively as shown in Figure 9. Meanwhile, there is no respondent in very not effective level. It can be concluded that in reap application, PSAC filter was very effective on improving IAQ.

Fig 9: Level of effectiveness of PSAC as air filter
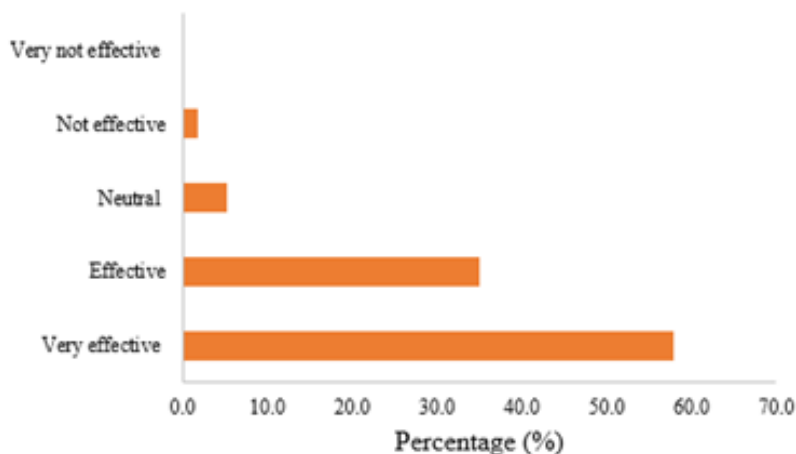
The satisfaction analysis was conducted by questionnaire that aimed to investigate the satisfaction level of the respondents about this training. The results show in Figure 10 that there is 80.7% and 15.8% in very satisfied and satisfied level, respectively. It achieved caused by the training was conducted in two methods which are theory based and practical based in real application. Therefore, the knowledge of PSAC has fully delivered.

Fig 10: Satisfaction level of respondents for the training
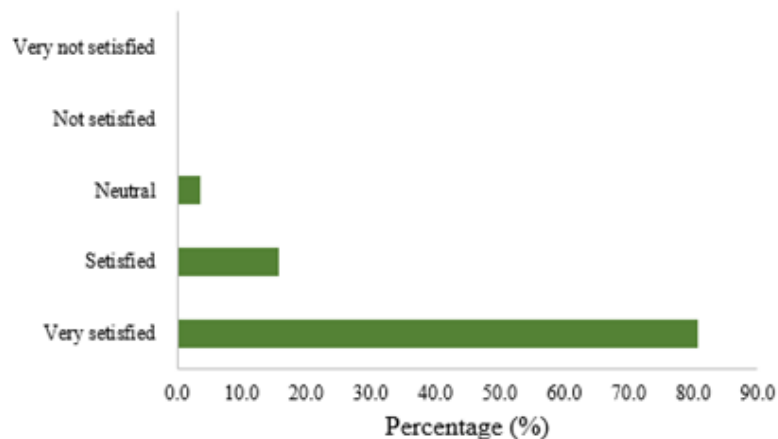
4. CONCLUSIONS

The integration of PSAC as air filter media has been delivered by training process in TVET institution. The transfer knowledge in terms of PSAC development with the dimension of air filter of 60 x 30 x 2.5 cm (L x W x H) with granular PSAC of 0.5mm to 2mm, its applications and its effectiveness as air filter has been successful investigated. It shows that most of the respondents was very satisfied for the training with 80.7%. This training believe that give a significant effect in improving the knowledge and practical skill of the TVET student in air purification and filtration using AC.

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OPTIMIZATION PROCESS PARAMETERS OF 3D PRINTING PROCESS

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Universiti Teknikal Malaysia[4]

ABSTRACT

Additive Manufacturing is identified as a key emerging technology and has received incredible attention during recent years. Three-Dimensional Printing is an Additive Manufacturing method and has huge applications in industries. This paper presents experimental investigations on influence of main process parameters viz., print speed, infill speed and layer resolution on dimensional accuracy, surface roughness, time taken, and mass of Fused Deposition Modelling (FDM) processed Polylactic Acid (PLA) part. Optimum parameters setting for best surface roughness, size accuracy, lower machining time and mass have been found out using Taguchi's parameter design. Experimental results indicate that optimal factor settings for each performance characteristic are different.

Keywords: Additive Manufacturing, 3D Printing, Fused Deposition Modelling, Polylactic Acid, Taguchi Method

1. INTRODUCTION

Additive Manufacturing is identified as a key emerging technology and has received much attention during recent years (Bai Huang et.al. 2019). Three-Dimensional Printing (3Dprinting) is an additive manufacturing (AM) is a technique that uses the combination of computer aided design (CAD) and computer aided manufacturing (CAM) in fabricating parts for precise geometry. In every AM technique, the first step is the 3D model that has been designed in CAD software is converted into STL format which is a triangular mesh of the object. The computer software will sliced the part required in the STL format into 2D profile layers. The 3D part is constructed by each layers that sliced into 2D profile layers is bonded to the previous layer on the build platform until it is completed as it is required as in the 3D model in the original CAD software (Anoop et al. 2009).

Compared with traditional processing technology, 3D printing has many advantages such as low cost, easy operation, and short processing. In recent years, 3D printing technology has been widely used in many fields, including aerospace, medical, food, electronic, and automobile applications. 3D printing also named as Fused Deposition Modelling (FDM) uses extrusion nozzle to extrude material to create successive layers. Most commonly used materials for FDM process are thermoplastics such as Acrylonitrile Butadiene Styrene (ABS), Poly-Carbonate (PC) and Poly Lactic Acid (PLA). According to the standard of ISO/ASTM 17296 standard on Additive Manufacturing (AM) Technologies (ISO 17296-2:2015), it stated that there are seven types of AM processes. These seven types can be differentiated into material jetting, material extrusion, direct energy deposition, sheet lamination, binder jetting, powder bed fusion and vat photo polymerization. 3D printing can be categories such as laminated object manufacturing, selective laser sintering, fused deposition modeling (FDM), and PolyJet technology. Among these techniques, FDM, which deposits semimolten plastic filaments on a build platform layer by layer, is one of the trendiest 3D printing technologies owing to its simple principle, reliable technology, easy operation, small size, low cost, and etc. For 3D printing materials, include polymeric materials, metallic materials, inorganic nonmetallic materials, and composite materials. However, thermoplastic polymer materials, are mainly used in FDM, including acrylonitrile-butadiene-styrene (ABS) resin, polylactic acid (PLA), nylon, and polycarbonate, etc.

In recent years, researchers have continually explored ways to achieve high-quality FDM products. However, researchers studied the processing parameters of FDM to optimize the printing process to prepare products that meet all kinds of demands. The processing parameters are the basis of the FDM process, and their rational selection is the key to prepare high-quality products. Omar et. al, 2015, discussed the effect of the processing parameters such as layer thickness, raster width, raster angle, extrusion temperature, and printing speed, on the surface roughness, mechanical properties, viscoelasticity, dimensional accuracy, etc. of the products. Khan et al. 2005, identified important parameters and their levels for improving the flexibility of FDM part using design of experiments approach. Lee et al. 2007, performed experiments on cylindrical parts made using three RP processes FDM, 3D printer and nano composite deposition (NCDS) to study the effect of build direction on compressive strength. However, due to the complexity of processing parameters and the unclear relationship between processing parameters and product performance, the influence of each processing parameter on 3D printed products has not yet been universally understood [2]. Thus, it is necessary to explore the law of parameter selection to prepare qualified FDM products.

Therefore, based on the previous research, this work chooses print speed, infill speed and layer resolution as the research parameters, pure PLA as raw material for 3D printing. The effects of three processing parameters on the fabrication performances namely, surface quality, fill time, size accuracy and mass of FDM products were investigated by orthogonal experiments, and the molding process was optimized through Taguchi Method. The results revealed that both print speed and layer resolution thickness have a great influence on the surface roughness and total machining time of the specimens.

2. DETAILS EXPERIMENTAL

Selection of Processing Parameters.

To study the influence of different processing parameters on the 3D printing products of PLA specimens, this work investigate the effects of print speed, infill speed and layer resolution on FDM PLA parts by orthogonal experiment to optimize the printing process. Each parameter was defined as follows:

a. Printing speed: The moving speed of the nozzle.
b. Infill speed: Percentage count for compact models to be filled with the material when printed
c. Layer resolution (thickness): The slice thickness of each layer when the model was sliced by software.

For the FDM product performance responses:
a.   Surface roughness (Ra): FDM final products surface finish and can being used directly.
b.   Total machining time: Total time taken to complete the product by FDM.
c.   Mass: Total mass (weight) for each product
d.   Size: The accuracy of the product compare to simulation model

To determine the effect of process variables on printed parts, 3DBenchy model were built under different conditions of input parameters. Process parameters considered are (1) print speed, (2) infill speed and (3) layer resolution. Test samples were manufactured using RPMAKER manufactured by MYCRO 3D printer machine and PLA plastic as build material. Table 1 shows the selected values of process parameters. Three factors with three-levels Taguchi Design (L9) is used to design the experiments run using those process parameters as shown in Table 2.

Figure 1 show the 3D printer machine, RPMAKER manufactured by MYCRO while in Table 3 shows some of the technical specifications. The measurement of surface roughness was attained by using an ALICONA Infinite Focus Microscope IFM-Infinite Focus Surface Metrology System as shown in Figure 2. The measurement recorded follows the guideline from ISO 4288 standards. For each sample test, the data were taken at three different positions on the sample surface and averages of those values were taken as final experimental data of surface roughness. Figure 3 shows the 3D surface roughness of the selected sample (Test 3).

Signal to noise (S/N) ratio is used to determine the influence and variation caused by each factor and interaction relative to the total variation observed in the result. The advantage of using S/N ratio is that it uses a single measure, mean square deviation (MSD), which incorporates the effect of changes in mean as well as the variation (standard deviation) with equal priority. Moreover, the results behave linearly when expressed in terms of S/N ratios. The linear behavior of results is an assumption necessary to express performance in the optimum condition. Experiment analysis is made using Minitab R14 software. Main effect plot for S/N ratio is used to predict the optimum factor level. Relative influence of each factor and interaction is determined by ANOVA.

Table 1: Factors and Levels

Machining Parameters	Level		
	Level	Median	High
Print speed (mm/s)	100	150	200
Infill speed (%)	10	20	30
Layer resolution (µm)	100	200	300

Table 2: Experimental Layout

Test Run	Print speed mm/s	Infill speed (%)	Layer resolution (µm)
Test 1	100	10	100
Test 2	100	20	200
Test 3	100	30	300
Test 4	150	10	200
Test 5	150	20	300
Test 6	150	30	100
Test 7	200	10	300
Test 8	200	20	100
Test 9	200	30	200

Figure 1: RPMAKER 3D printer manufactured by MYCRO
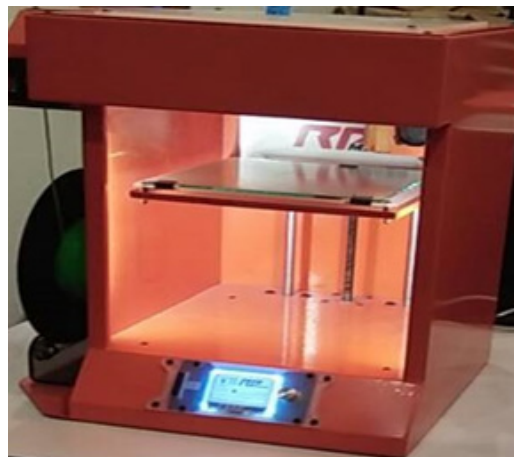
Table 3: RPMAKER Specification

Items	Specification
Build volume	150 x 150 x 150mm
Layer resolution	60 -300 µm
Max printing speed	80mm/s
Max travel speed	200mm/s
Nozzle diameter	0.4mm
Filament diameter	1.75mm
Electrical power	12 Watt

Figure 2: Alicona Infinite Focus 3D Metrology System
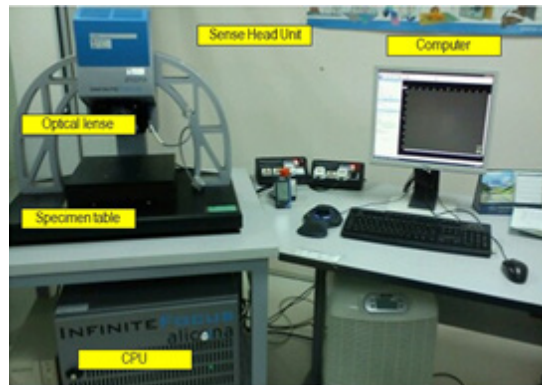
3. RESULTS AND DISCUSSION

3.1. Surface roughness

The results of mean surface roughness of the FDM products are presented in Figure 4. The value of the surface roughness, Ra for each experimental was the average value of three roughness readings. Based from the result in Figure 4, the resulted mean surface roughness, Ra obtained range from 1.56 to 4.61µm. The smoothest Ra is achieved when cutting condition of Test 3 (print speed 100mm/s, infill speed 30% and layer resolution 300µm) is employed whereas the roughest Ra is detected with cutting condition Test 6 (print speed 150mm/s, infill speed 30% and layer resolution 100µm).

Figure 5 shows, S/N response graph of surface roughness. It is clearly observed A1B1C3 are the optimal levels of the design parameters for improve surface roughness which implies print speed at low level, infill speed slow level and higher layer resolution. These combinations give the best surface finished within the specified range.

Figure 3: 3D surface roughness (Test 3)
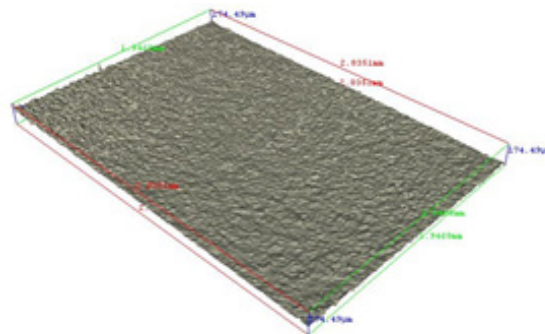
Figure 4: Mean surface roughness
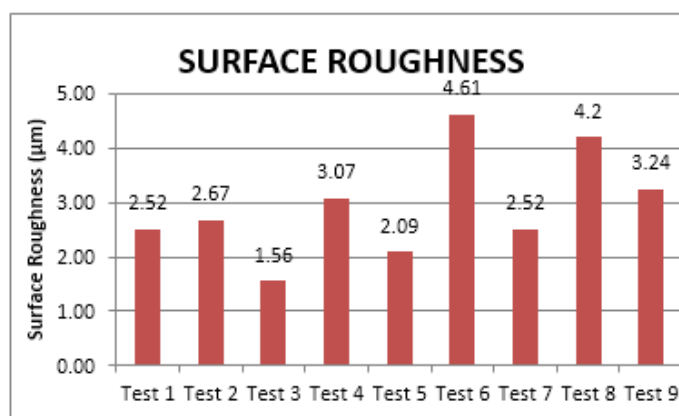
Figure 5: S/N response graph of surface roughness
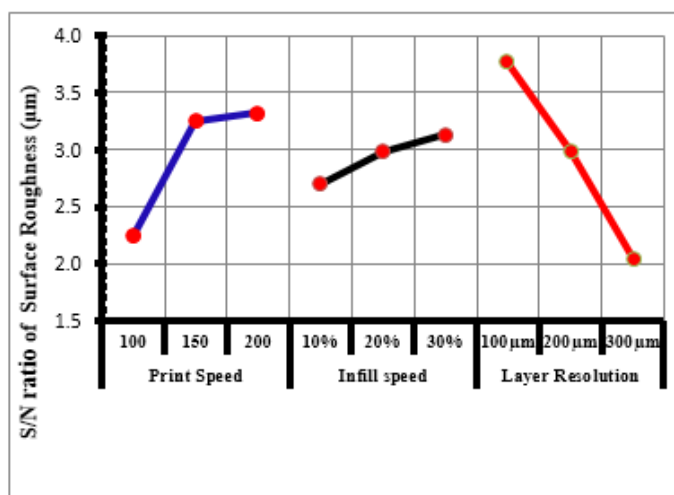
3.2. Total Machining Time

The results of total machining time of the FDM products are presented in Figure 6. The total machining time obtained range from 15.6 to 53 minute. The shortest time is achieved when cutting condition of Test 5 (print speed 150mm/s, infill speed 20% and layer resolution 300µm) is employed whereas the longest time taken is detected with condition Test 6 (print speed 150mm/s, infill speed 30% and layer resolution 100µm).

Figure 7 shows, S/N response graph of mean total machining time taken to complete the product. It is clearly observed A1B1C3 are the optimal levels of the design parameters for improve fastest machining time which implies print speed at low level, infill speed slow level and higher layer resolution. These combinations give the fastest machining time within the specified range.

Figure 5: S/N response graph of surface roughness
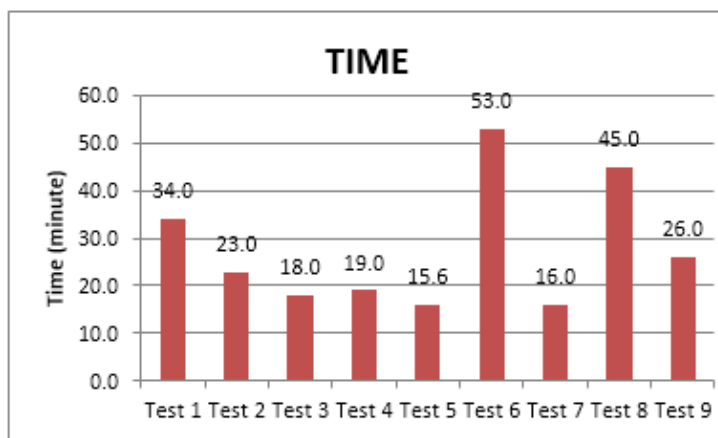
Figure 7: S/N response graph of total machining time
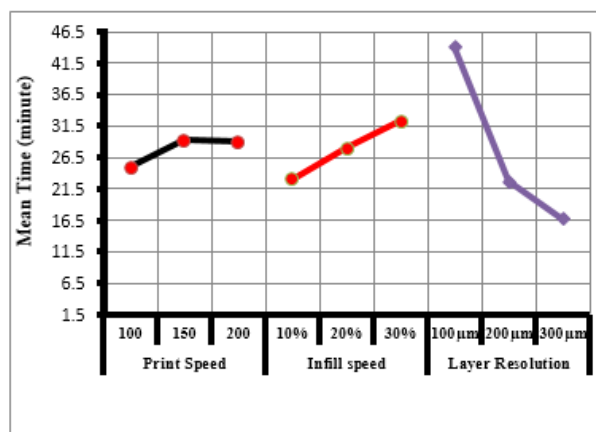
3.3. Mass

The results of mass of the FDM products are presented in Figure 8. The value of the mean mass for each experimental was the average value of three readings. The result mass obtained range from 2.674 to 4.137g. The lightest is achieved when cutting condition of Test 1 (print speed 100mm/s, infill speed 10% and layer resolution 100µm) is employed whereas the weighty is detected with cutting condition Test 6 (print speed 150mm/s, infill speed 30% and layer resolution 100µm).

Figure 9 shows, S/N response graph of mass of the product. It is clearly observed A1B1C2 are the optimal levels of the design parameters for improve lightest mass which implies print speed at low level, infill speed slow level and medium layer resolution. These combinations give the lightest mass of the product within the specified range.

Figure 8: Mass of products
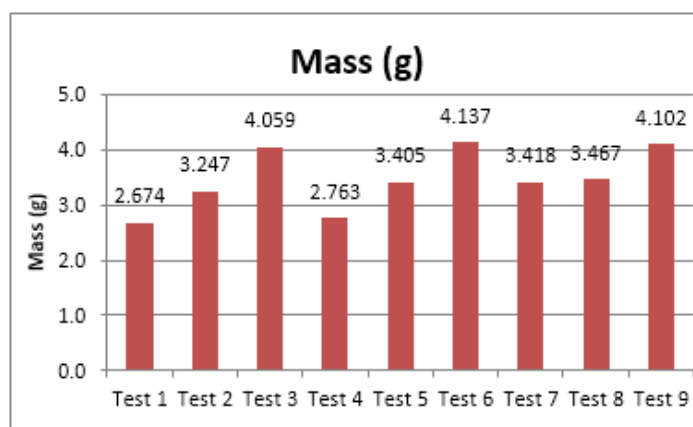
Figure 9: S/N response graph of mass
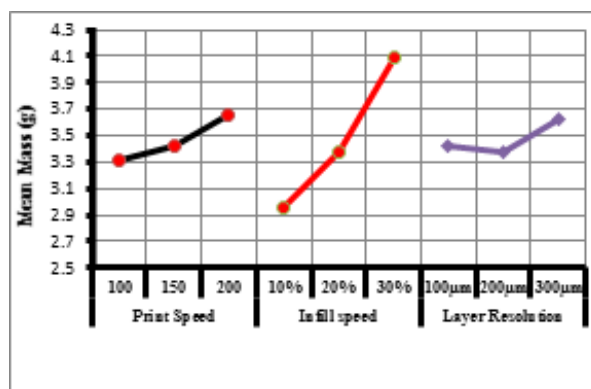
3.4. Size - accuracy

The results of size accuracy of the FDM products are presented in Figure 10. The result obtained range from 1.04 to 1.56µm. The best accuracy is achieved when cutting condition of Test 4 (print speed 150mm/s, infill speed 10% and layer resolution 200µm) is employed whereas the worst accuracy is detected with cutting condition Test 6 (print speed 150mm/s, infill speed 30% and layer resolution 100µm).

Figure 11 shows, S/N response graph of size accuracy of the product. It is clearly observed A2B1C2 are the optimal levels of the design parameters for improve accuracy which implies print speed at medium level, infill speed low level and medium layer resolution. These combinations give the best size accuracy of the product within the specified range.

Figure 10: Size accuracy
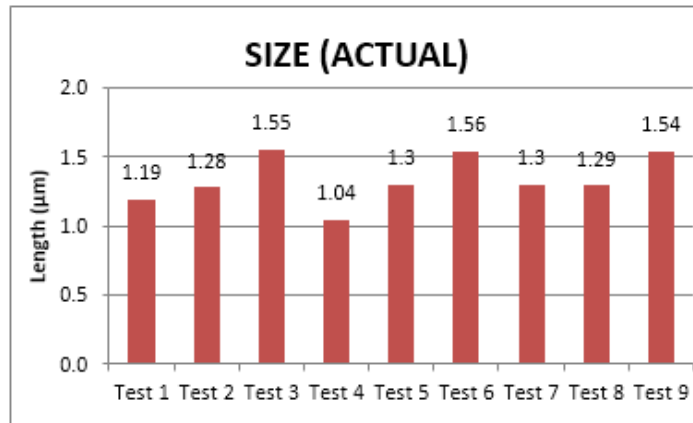
Figure 11: S/N response graph of size accuracy
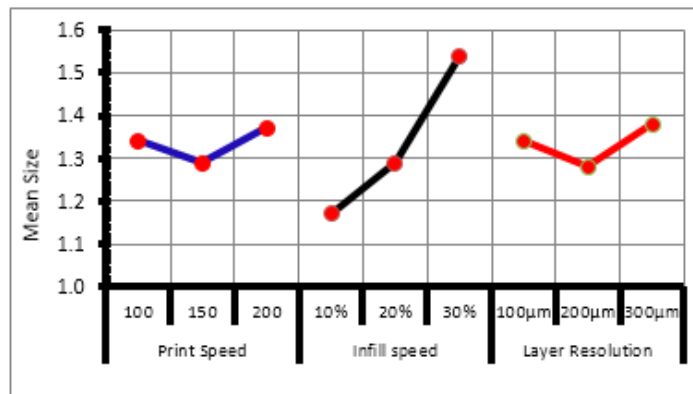
CONCLUSIONS

The experimental investigations on influence of main process parameters viz., print speed, infill speed and layer resolution on dimensional accuracy, surface roughness, time taken, and mass of Fused Deposition Modelling (FDM) processed Polylactic Acid (PLA) part was studied. The following conclusions can be drawn based on the experimental results of the study.

1. Print speed and layer resolution are proved to be vital factors influencing surface roughness of the product. Surface finish obtained at high layer resolution was obtained the best quality product. Furthermore, there is a significant decrease in Ra value for lower print speed.
2. Layer resolution thickness was found to be an influencing parameter affecting total machining time. Build time was lower for higher values of layer resolution thickness.
3. Infill speed was found to be an influencing parameter affecting mass of the product. Mass was higher for higher values of infill speed.
4. Infill speed was found to be an influencing parameter affecting size accuracy of the product. Size accuracy was good for lower values of infill speed.
    Future work would encompass layout optimization for cost effectiveness both qualitatively and

quantitatively. This research can also be extended in the direction of prototype production by functionally graded materials by utilizing the conclusions obtained using this approach.

ACKNOWLEDGMENTS

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DEVELOPMENT OF AN AFFORDABLE DIGITAL TRAINER WITH HEADER CONNECTOR (HC), ZIF SOCKET AND WI-FI MODULE FOR USER FRIENDLY APPLICATION IN DIGITAL ELECTRONIC PRACTICAL WORK

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ABSTRACT

Technical skills are the abilities and knowledge needed to perform specific tasks. It becoming an essential skill for Technical Vocational and Education Technology (TVET) field. However, a few problems occur with the available trainer, such as being unrepairable, inefficient and other intermittent connection occurs. Therefore, based on the current problems faced by the students and lecturers during its practical session, an affordable and user-friendly of digital trainer has been designed and most importantly no breadboard was used. Therefore, the longevity of Integrated Circuit (IC) can be extended. The new digital trainer consists of a 5 volt Direct Current (DC) power supply, 9 volt battery, multivibrator circuit to provide the clock pulse, 7 segment, Light Emitting Diode (LED), digital switches and including four 20 pins ZIF sockets which enables the student to easily place and remove the integrated circuit (IC) repeatedly from the trainer without damaging the IC. Other than that, the digital trainer is built by using the female header connector (HC) to replace the conventional breadboard. Subsequently, the students are able to remove the solderless female to female jumper wire easily from the trainer without worrying the core of the jumper will be stuck or broken in the breadboard or the previous connector. Moreover an Arduino Wi-Fi module will act as an interface device to communicate with the Internet Of Thing (IoT). A few experiments have been conducted for the digital trainer and it was found that the digital trainer is a user-friendly product, that can help the students to express their thoughts and try out their ideas through IoT.

Keywords: Digital Trainer, ZIF Socket I, Header Connector, Internet Of Thing (IoT), Wi-Fi Module

1. INTRODUCTION

Malaysia and other countries around the world are moving towards the industrial revolution 4.0 (IR4.0). In this regards, the Institute of Higher Learning (IPT) in Malaysia which offers the Technical Education and Vocational Training Transformation Program (TVET) program such as community colleges and polytechnics, should ensure that their graduates are qualified to meet the needs of various industries to face of the IR4.0 era. For that, graduates should not only excel in the academic field but also need to be equipped with other skills such as skills in performing practical work (Affandi,R & Omar, Z, 2018).

Practical work is one of the most important components of teaching and learning activities. It is an activity that helps in enhancing the student technical skills, at the same time enhancing their understanding of the theory that teaches in a classroom. Until today, practical work becomes as one of the most effective ways for students to understand the concepts or theories that they have learned while in the classroom. (E Haritman,D Wahyudin&E Mulyana, 2018) in his study explain that adequate and suitable practical equipment, labs or workshops are an essential facility that enables students to improve their skills and perform practical work effectively.

Generally, different types of practical equipment have been developed around the world with aim to help students to improve their technical skills, therefore students can perform their work effectively. As an example, a digital logic training system is a basic equipment in electronics and digital learning aid (Myo SU, 2014). It is used by all electronic and electrical engineering students at vocational schools, community colleges, polytechnics or other institutions of higher education such as the universities. It was designed to educate students in the study of logic design skills, practice, testing and modify the digital circuits. It also becomes the basic teaching tool for practices involving digital circuits or sequential circuits.

However, the cost for available digital trainers used by the educational institution such as polytechnics in Malaysia is approximately RM1500 - 3500 each. With the higher cost, added with unrepairable problem especially the intermittent connections problem, thus, it was difficult to provide a sufficient quantity of trainers for student practical work activities (Aaron R. Dickinson. 2005). According to (Ajao,K. Kadiri, 2014), in relation to vocational education and training (VET), while the need to keep course relevant and up-to-date with the industrial developments might be the ultimate aim. Proximate factors such as lack of funds to purchase equipment may interfere.

Since the 1990s until now, research and development on the improvement of digital trainers, especially in terms of user-friendly and affordable, is minimum. The first research and development for the digital trainer were conducted by (Hacker, 2009) from Griffith University, Gold Coast, Australia in 2009. He has designed a low-cost digital trainer by using a technology called PortBuffer. This system is cheap and mobile, but the module works based on software simulation and its operation depends on computer applications and has limited applications. In 2012, (Tao Y, Cao J., Zhang Y&etc,2012) have made the Evolvable Hardware (EHW) approach by compiling the logic circuit simultaneously.

Subsequently in 2013, (Godwin, 2013) developed digital trainers by making microcontrollers as a replacement for digital devices. However, the design of the proposed digital trainer is complex and occurs overlapping conditions within the sequential logic circuit. In addition, (Manfrini F., Helio J. C., Bernardino H. S.,2014) in 2014 developed digital trainers with the goal of minimizing the number of logical elements in the circuit, suggesting new encoding for the circuit using a multiplexer (MUX) on circuit output. Latest, (Ajao, K. Kadiri, 2017) develops a modular digital logic prototype trainer with low cost, for student learning when in the lab. However, all of the digital trainers that have been developed from 2009 to 2017, still has the same design, focused on getting better in the output results, uses a conventional breadboard for place the Integrated Circuit (IC), and expensive.

With the limited studies in the development of affordable digital trainer and with a few of problems that still occur with the available digital trainer, such as the trainer is beyond repairable, not efficient and the intermittent connection appears. Therefore, based on the current problem and problem faced by the student and lecturer during the practical section, prototype for an affordable and user-friendly of digital trainer need to design and develop.

2. METHODOLOGY

There are five main phases involved in the development of the Affordable digital trainer with HC, ZIF socket and Wi-Fi module application. The phases are Phase 1- Circuit design, Phase 2 – Simulation, Phase 3 – Build Circuit, Phase 4 – Test Circuit and Phase 5 – Analyze circuit (Refer Table 1).

Table 1

PHASE 1 (Circuit Design)	PHASE 2 (Simulation)	PHASE 3 (Build circuit)	PHASE 4 (Test circuit)	PHASE 5 (Analyze circuit)
Selecting and design circuit 1. Digital trainer mainboard 2. DC Power Supply 3. Multivibrator circuit 4. Wifi Module	**Simulate circuit** in phase 1 by using simulation program	**Build circuit** 1. Transfer circuit to PCB 2. Etching 3. Drill 4. Soldering	**Test circuit** in phase 1 by using multimeter etc	**Analyze the output/result from circuit** in phase 1

In Phase 1, four circuits have been selected and designed. The circuits are digital trainer mainboard, DC power supply, multivibrator, and Wi-Fi module circuit. For the digital trainer mainboard a 7-segment display, Light Emitting Diode (LED), digital switches are components that built together in the circuit. It also consists of four ZIF socket for loading and unloading an IC. Other than that, the header connector also included in the digital trainer mainboard to form the connection between the slide digital switches and the output indicator on LEDs and 7 segment display. The Printed Circuit Board (PCB) layout and the Three Dimension (3D) layout for the digital trainer mainboard can be referred at Figure 1a and Figure 1b. The 3D layout for all 3 circuits is obtained from the PCB wizard real world view.

Fig. 1a. PCB Layout for the Digital Trainer mainboard
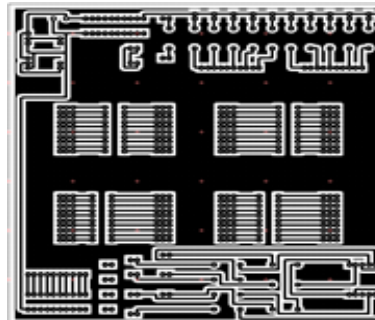
Fig. 1b. 3D layout for the Digital Trainer mainboard
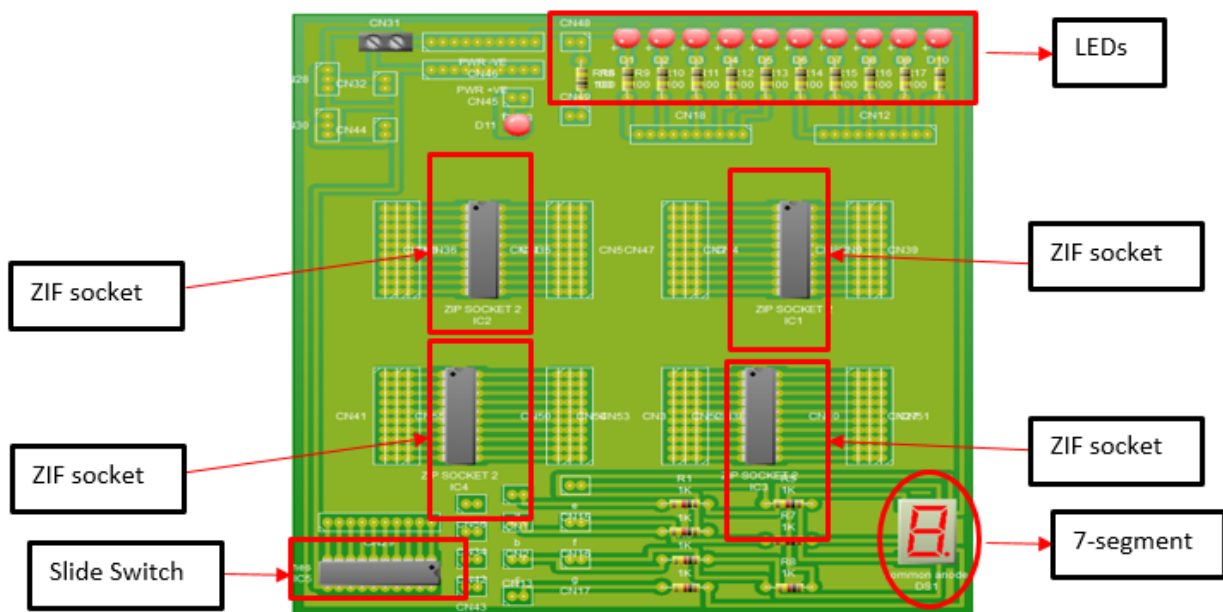
Basically, an IC component provide many advantages especially for the digital trainer application. However, some challenges always exist during the applications, especially the intermittent connections problem (Weifeng Liu and Michael Pecht, 2000). The intermittent connection problems always appear during the loading and unloading of an IC using breadboard in the conventional digital trainer. This problem make the usage of conventional digital trainer are inefficient. According to (S. Nurcahyo,2017) a common way for testing an IC is by plugging the IC into ZIF socket. ZIF socket can holding the IC for testing or any other experiment purposes. Furthermore, (B. Senol,2018) in his study mentioned that ZIF socket makes loading and unloading IC much easier. Therefore, ZIF socket are used in this digital trainer prototype to replace the breadboard in conventional digital trainer.

For the DC power supply circuit, step down transformer, full-wave rectifier with two diodes, capacitor, and 5V voltage regulator are the components that used to convert the AC voltage to 5v DC and for stabilizing the DC power supply. Besides the DC Power supply circuit, the HC Digital Trainer are also equipped with the build in 9v battery supply. The battery will act as a backup power supply and make the HC trainer portable and user friendly. The development of a user friendly trainer will reinforce the student understanding (Vinod Choudhary, &etc,2017). Meanwhile, the portable trainer will become as an alternative to the traditional on-campus instructional laboratory (Rebecca M. Reck and R. S. Sreenivas 2016) (Şenol, Bilal & Yeroglu, 2012) .

Figure 2a shows the PCB layout of the DC power supply circuit and Figure 2b shows the 3D layout of the DC power supply.

Fig. 2a : PCB layout for the DC Power Supply
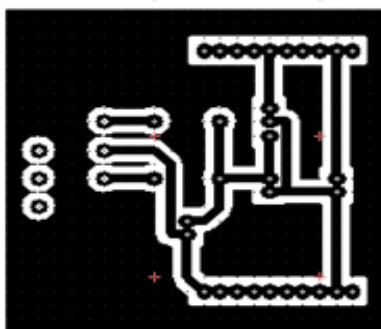
Fig. 2b : 3D layout for the DC Power Supply
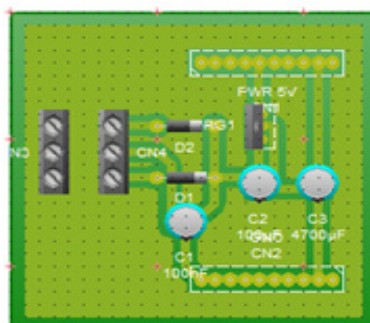
Multivibrator circuit was built by using the components such as the 555 timers, capacitor, resistor, and diode. The 555 timers in the multivibrator circuit are used to produce the 1Hz output frequency. The output frequency can be controlled by the variable resistor. This circuit operates as an oscillator circuit, in which output oscillates at a particular frequency and generate pulses in a rectangular waveform which are all important for the trainer to set off the sequential circuit such as encoder, counter and others. Figure 3a shows the multivibrator circuit and Figure 2b shows the 3D layout of the multivibrator circuit.

Fig. 3a : Multivibrator Circuit
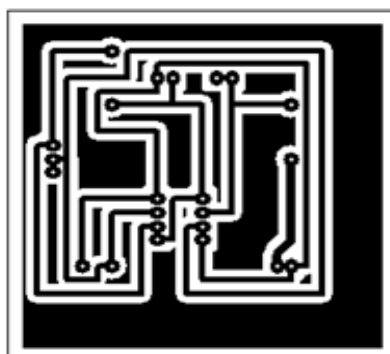
Fig. 3b : 3D layout for Multivibrator Circuit
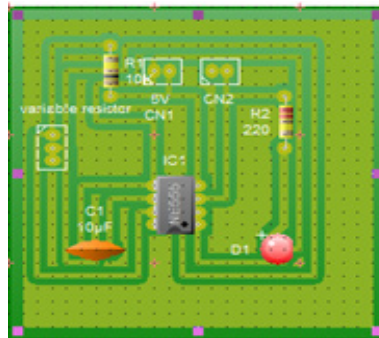
Meanwhile, the Wi-Fi module circuit is used to provide internet connectivity to the Digital trainer. The Wi-Fi module circuit work as a station, therefore it can easily fetch data from the digital trainer mainboard circuit and upload it to the internet (Kishore. P ,T. Veeramanikandasamy,etc 2017) (Swati Tiwari,2016). This function making this prototype Digital Trainer as an educational trainer with the Internet of Things (IoT) function and user friendly. At the same time, an app developed by MIT App Inventor is used in the HC digital trainer. This app is installed in the android device and then by connecting it to the Wi-Fi module, the output can be control through the same Wi-Fi connection as the phone users.

In phase 2, three circuits in Phase 1 which are digital trainer mainboard, DC power supply, and multivibrator circuit are simulated by using Multisim simulation software. Simulation process has been actively introduced in the areas of circuit design. The process basically, saves considerable time and money compared to actual experimental circuits and repeating tests (R. Hossain, M. Ahmed, H. U. Zaman and M. A. Nazim 2017). Therefore, this process is a process to assure that the circuit can operate in a real condition before the circuit transfer to the Printed Circuit Board (PCB) (R. Kumar, K. Kumar 2015).

For Phase 3 & Phase 4 which are for Build & Test Circuit. The digital trainer mainboard, DC power supply, and multivibrator circuits that have been simulated in phase 2, then converted to the PCB layout. The PCB layout was transferred to the PCB by using the uv explosure machine and follow with the process of etching, drilled and soldered. Meanwhile, for the MIT App Inventor, google account will be linked with the App Developer Application. After the circuit design has been set, the program is upload to the Wi-Fi module. Then, the functionality of HC Digital trainer is tested through observing the ON/OFF of the LED according to the input given to the IC and from the digital switch and from the MIT app. Figure 4 shows the overview for the complete circuit of the digital trainer prototype with HC, ZIF Socket and the Wi-Fi module.

Fig. 4 : Digital trainer prototype with HC, ZIF Socket and the Wi-Fi module
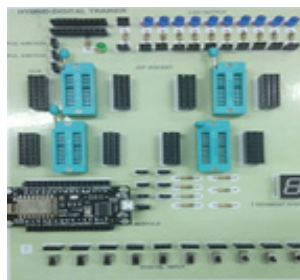
3. RESULTS AND DISCUSSIONS

A couple of experiments has successfully done with the Digital trainer prototype with HC, ZIF Socket and the Wi-Fi module. One of the experiment is testing the AND gate. The test results for AND gate implementation using Digital Trainer with HC, ZIF Socket and Wi-Fi module application is shown as in Figure 5 and in Table 2. For the AND gate experiment, as in Figure 5 and Table 2, when the button for Input A and B are LOW or "0", a LOW Logic signal and the Output is "0". For Input A LOW or "0", and B are HIGH or "1" and for Input A HIGH or "1", and B are LOW or "0", a LOW Logic signal and the Output is "0". Therefore, from the AND gate experiment, it shows that the Digital Trainer with HC, ZIF Socket and Wi-Fi module Application works well.

Fig. 5. AND gate experiment results using Digital Trainer with HC, ZIF Socket and Wi-Fi module Application
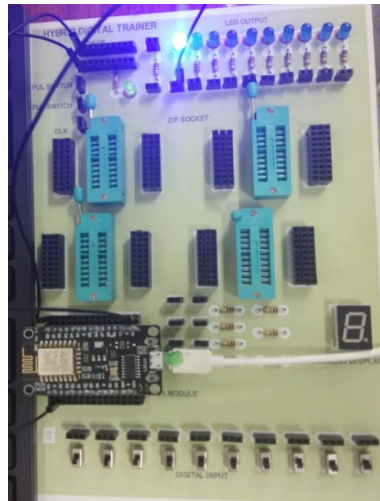
Table 2: Truth table for a two-input AND gate

Input		Output
A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

Meanwhile, Figure 6 shows the test result for OR gate using Digital trainer prototype with HC, ZIF Socket and the Wi-Fi module and the MIT App Inventor. For the MIT controller as in Figure 6, when the button for Input A and B are LOW or "0", the output is "0" from the MIT App Inventor.

Fig. 6 : OR gate experiment results using HC Digital Trainer with Wi-Fi module and MIT App Inventor

Therefore, from a couple of laboratory experiment, it shows that the effectiveness of the Digital trainer prototype with HC, ZIF Socket and the Wi-Fi module using the MIT App Inventor. The outputs of the experiments are also functionally verified against the output of the current trainer in the Laboratory. The performance of the current trainer and the existing type are favourably comparable. The result indicates that various components of digital devices, combinational and sequential circuit could be demonstrated experimentally.

4. CONCLUSIONS

In this experiment, the Digital trainer prototype with HC, ZIF Socket and the Wi-Fi module and MIT App Inventor for digital electronics laboratory has been tested. The main improvement for this digital trainer is to alter the current digital trainer in term of costing and ease to use. The ZIF socket which enables the student to easily loading and unloading the IC repeatedly from the trainer without damage the IC. Therefore, the longevity of IC can be offered. Besides that, by using the female header connector to replace the conventional breadboard, the student able to remove the solderless female to female jumper wire easily from the trainer without worrying the core of the jumper will be stuck or broken in the breadboard. Furthermore, this Digital trainer prototype with HC, ZIF Socket and the Wi-Fi module provides the basic idea of Internet of Things (IoT) by using the Wi-Fi module and MIT App. The digital trainer is tested to be useful to experiment in the digital electronics laboratory. Therefore, an inexpensive and affordable digital trainer is built up and carried out.

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SUPPORT VEST : AN ANALYSIS STUDY TO MONITOR FORCE AND MOTION FOR HUMAN POSTURE VIA IOT

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ABSTRACT

Inaccurate posture is an issue that turns out to be progressively wide-spread in the present world. It can prompt short and long haul torment in the back and neck regions, and has additionally been connected to gloom. Current way of life encourages poor posture, particularly due to the expanding measure of time individuals spend sitting. A poor situated posture can likewise influence an individual's stance while standing and strolling. Muscle memory assumes an imperative job in this, as the body becomes acclimated to being inaccurately situated. Along these lines, to address ones posture and maintain a strategic distance from the previously mentioned dangers, a right sitting and standing position must be set up furthermore, prepared .Wearable innovation can be a way to accomplish this point by always estimating the wearer's body stance and giving input on right or wrong stance. This theory gives an account of issues of postures and how to measure it using sensors by using a support vest .It depends on the possibility that each human has a 'flexpoint', a point where the body twists when one sluggards. At the end of the day: it is unthinkable to have a poor posture and keep the front of the body straight This technical paper proposes an end-to-end system to help improve monitoring vest treatment by continuously observing the amount of force inside the vest. This device is very compatible to bring along anywhere since the device is attached on vest only. There is also an on /off button to connected it with Internet of Things (IOT)via WiFi connection to show the reading in Blynk Application in Handphone.

Keywords: Posture, Support Vest , Force , Internet of Things(IOT),Wireless Fidelity(WiFi).

1. INTRODUCTION

   Bad postures happens because of daily habits, mental attitude and stress , muscle tension and muscle weakness. There are few methods that can be done as a treatment to prevent bad postures from happening such as exercise , chiropractic and yoga but it has the cons of commonly forgotten habits of repeating bad posture averagely everyday. The best solution of overcoming this issue is by wearing a support vest which is cheaper and with low risk. This project focuses on wearable sensors and technology use to monitor the right posture and helps to prevents the conditions from worsening . A support vest is invented with Force and Motion Sensors to identify the right posture angles . Activity such as walking , standing , sitting and running is done for variations proportions of force and motion data to be collected . This data will be implementing through a Blynk Application to identify different trends and patterns associated with the activities performed by the respondent. The problem that has been deduced from bad postures is mental and physiological effects which causes breathing problems , indigestion and disruption in blood flow. The objectives of the project are To improvise the condition of human from going into bad posture to good posture. To monitor the effectiveness of vest wear by correlating the forces and motion with a multi-modal sensor and to provide a healthy lifestyle. The scope of the project would be headed to the age group of (15-50) years old for both male and female. It is to identify is the supports vest would be comfortable to be worn by human. Sensors that monitors the force and motion will be embedded in the vest in order to build them in further. The analysis will be tabulated in graphical to review on the force and motion.

2. METHODOLOGY

The solution in this project study are using software and hardware. This chapter will explain about the whole research methodology process for this project. It consist about the project block diagrams, hardwares and softwares used and project illustration.

2.1 Block Diagram of the Support Vest

Fig. 1. Block diagram of Support Vest project which contains both software and hardware
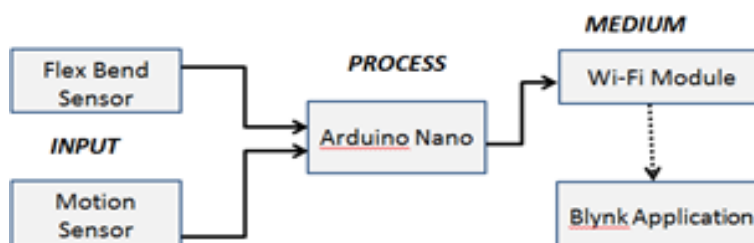
There is several hardware components and circuit used in this project. For instance , a Motion Sensor is used to detect motion and Force Sensor for the exerted pressure acts upon the Support Vest. A Wifi-Module is used to transmit the raw data collected from the sensors to Blynk Application which shows the display.

2.2 System Flowchart

Fig. 2. Operation of Force and Motion Sensors.
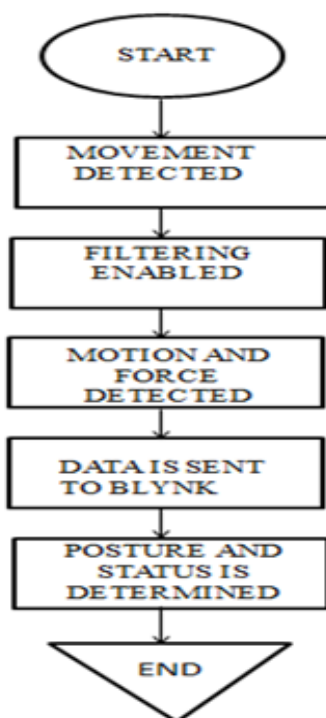
The Fig. 2. shows a simplified flow chart of the normal operating mode. This helps to detect the posture. The diagram explains that the motion and force is detected and filtering was enabled , a specify activity detection such as walking is detected and the data was collected and sent to the Mobile Application (Blynk) .

2.3 Development of the device

Fig. 3. Above pictures shows where the sensors are embedded in Support Vest.

3. RESULTS AND DISCUSSIONS

Data collection is a key part to the achievement and exactness of this task. All information accumulation identifies with the information being gathered from the vest worn by the participants. . In this examination, I gathered information in test situations from Participant testing.

3.1 Participants Testing

Table 1

Participants	Awareness before Vest	Awareness after Vest	Increased Awareness while not wearing Vest
01	2 times / week	6 times / hour	Yes
02	3 times / day	1 time / hour	Yes
03	1 - 2 times / day	3 times / day	Yes
04	2 times / day	3 - 4 times / day	Yes

Explains the number of participants , the awareness before and after vest and whether did it increase awareness while not wearing the vest. These questions were asked to the participants on how they felt before and after wearing the vest.

Table 2 : Explains the observation and days of vest has been worn by the four participants

Participant	Occurrences of Poor Posture before Vest	Occurrences of Poor Posture after Vest	Days of wearing the vest
01	2	2	12
02	6	3	10
03	10	4	14
04	6	4	10

Table 3 : Minimum and Maximum Values.

STATUS	X	Y	Z	FLEX
WALKING	175.78-206.52	143.34-194.20	162.38-207.01	0.09-21.69
STANDING	203.52-256.16	179.96-233.6	175.01-277.04	0.09-6.659
RUNNING	191.70-212.47	155.52-197.86	174.45-245.98	0.09-12.19
SITTING	204.26-251.05	186.12-237.98	205.12-302.16	0.09-17.32

The table above shows the Minimum And Maximum Value Of 4 Participants Performing 4 Activities which is Walking , Standing Running and Sitting. The highest and lowest value of X-axis is taken to determine the status.

3.1.1 Motion Analysis

Fig. 5. Sitting X-axis
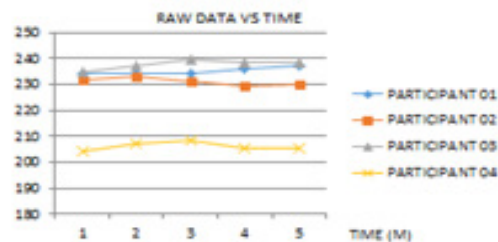
Fig. 6. Standing X-axis
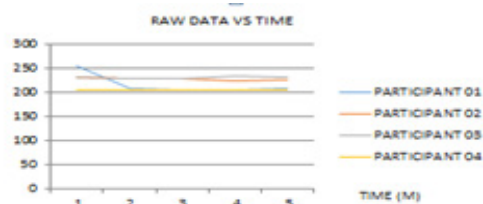
Fig. 7. Walking X-axis
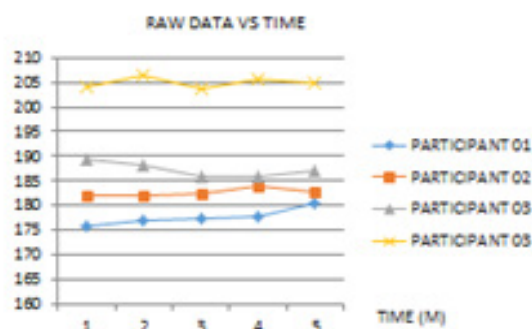
Fig. 8. Running X-axis

The above Figure 5, 6, 7 and 8 explains about the Sitting X-axis , Standing X-axis ,Walking X-axis and Running X-axis. This is known as Motion Analysis because it determines the status .The graphical view of the status shows in a same form where it all corresponds. Whereas for status determination x-axis has been taken into count to determine the status. The reason why x-axis is used to determine because the position of how sensors are mounted into the vest. Moreover there is only a minimal change in between Standing and Sitting status thus a Gyro sensor should be added in circuit.

3.1.2 Flex Analysis

Fig. 8. Flex value and Status.

FLEX VALUE	STATUS
0.09- 6.65	Very Good Posture
6.66-12.19	Good Posture
12.20-17.32	Satisfactory Posture
17.33- 21.69	Poor Posture

The above figure shows the range of Flex Value that has been determined by using 4 Participants. It is understood the lower the value of Force exerted the better is the posture .Users can use this as a guide line to determine their posture effects .This will be a very promising results after a long term usage. The Support Vest can change your habits of maintain poor posture to good ones.

3.1.3 Good Posture Analysis.

Fig. 9. Shows a table of flex of Candidate A

RUNNING	WALKING	STANDING	SITTING
2.3395	0.09	0.09	0.09
3.58381	0.09	0.09	0.09
3.261429	0.09	0.14	3.998095
1.969048	0.09	0.09	0.14
2.591905	0.09	0.09	5.367143
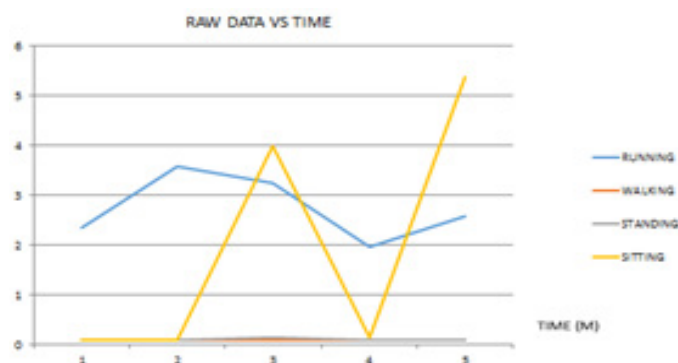
From the observation the highest flex value that has been emitted by Candidate B is more than 20 (Raw Data). This observation is taken for 5 minutes duration. Comparing to the previous table flex has helped to identify between good and bad postures , for instance Candidate A has a better body postures and frame compared to the other participants .This is because the lower the value of flex the better is the body postures

4. CONCLUSIONS

In conclusion, this work set out to structure an answer for improve the wearer's act dependent on a novel methodology. The created plan indicates potential, be that as it may, leaves space for further enhancements. I accomplished a general exactness of movement acknowledgment of a 100%. Patients were told to wear the vest for 1 hours every day at first, bit by bit expanding to 5 hours per day. This was demonstrated by the examination, as consistence was seen to increment from the postures of the participant following a month.The vest is also portable and easy to use along and safe to use.

ACKNOWLEDGEMENT

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PUBLIC BUS MONITORING SYSTEM

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ABSTRACT

Public bus is one of the major usage in Malaysia before the launch of e-hailing taxi services. As Malaysia getting into modernization in terms of technology, most of the time, user does not know when the bus will arrive or where is the current location of the bus. Hence, to ensure the public bus remain useful to the society, a public bus monitoring apps was created. In this way, user will be able to estimate when the public bus is arriving and manage to avoid wasting time of waiting. This facilities can open more option to the user to use e-hailing services or a public bus services. Two apps was developed, one for driver to submit the location of the bus and other apps for bus user to monitor the location of the bus. The testing of the apps shows that the apps can eliminate the uncertainty to the user whether to wait for the bus or to choose other services such as e-hailing for their transportation.

Keywords: Bus monitoring apps, Transportation in Malaysia

1. INTRODUCTION

Public transportation systems play an important role in the way people move around their communities. One of the public transport that is being used by people these days is public bus. Public bus is one of the major usage in Malaysia before the launching of hailing rides such as taxi and Grab. Since Malaysia is getting more modernize in terms in technology, Malaysian public bus is degraded. So in order to ensure that Malaysian public bus will continue to devalue, we created an Android application that can track public buses around a city in real time with the help of GPS technology.

Taking public transportation such as public buses can be a little burdensome to certain people such as office workers and students since it is hard to estimate the arrival of the bus at bus stops. They have to wait for a long time as they do not know when the bus will be arriving. As a result, these people often find themselves spending their pocket money on a more expensive transportation such as Grab and taxi. Besides, people still have to physically move to the nearest bus station to get the complete information of the buses such as bus numbers, ticket fare, routes and stops which is very inconvenient in this golden era of technology.

This application will make sure that citizens or passengers are able to estimate when the public bus arrives and this can avoid wasting time for long hours. User will be able to estimate bus arrival time by tracking the bus in real time using the GPS feature [1]. As the bus driver turns on GPS and the apps, user will get to know the location of the bus and able to make decision when they should wait for the bus. Last but certainly not least, passengers can get a complete information about the busses around the city through our application.

There are a need for this type of apps as passenger do not know the route of the bus. The passenger also do not know when will the bus arrive and the current location of the bus. The other reason are, there are no live-tracking map apps for bus passengers in Malaysia yet. Passengers need to wait for a long time at pick-up points for busses to arrive and need to go to bus stations to get the complete information about their bus.

The significance of this apps development is to help people to manage their time efficiently by saving their time from waiting for buses that are far away from them [2]. And gives people complete information about the buses without having to go to the nearest bus station.

Objectives of study are,
i.   To design a mobile application that can monitor the bus location in real time
ii.   To develop a mobile application that can monitor the bus location in real time
iii.   To test if the system can get an accurate location of the bus

Scope
There are 2 apps are been build, User Apps and Driver Apps.

User Apps
- Users can locate the live location of buses around the city accurately in real time   through the GPS map feature when they are online
- Users can view the bus routes on the map
- Users can track the selected bus routes on the map
- Users can get the complete information of the buses around the city
- Driver Apps
- Bus drivers are able to transmit the bus current location through GPS when they are online

Suleyman Eken, et al. [3] mentioned that many people using public transport buses have experienced time loss because of waiting at the bus stops. In his paper, he proposed a bus tracking system that any passenger with a smart phone or mobile device with the QR (Quick Response) code reader can scan QR codes placed at bus stops to view estimated bus arrival times, buses' current locations, and bus routes on a map. Anyone can access these maps and have the option to sign up to receive free alerts about expected bus arrival times for the interested buses and related routes via SMS and e-mails.

Pankaj Verma, et al, [4] stated in their study that GPS could be used in many applications and it is possible to follow routes and locations driven a vehicle by means of GPS. The tracking system can inform you the location and route travelled by vehicle, and that information can be observed from any other remote location. It also includes the web application that provides you exact location of target. This system enables us to track target in any weather conditions. Main objective is to design a system that can be easily installed and to provide platform for further enhancement.

Based on M.B.M. Kamel, et al, [5] a vehicle tracking system based on GPS and GPRS is proposed. The location of the vehicle is retrieved using embedded GPS sensor. A modified coding method is used to encode and compress location data before it is sent to offer cost effective usage of network traffic. The privacy of the transmitted data is guaranteed using a simple security mechanism. The encoded and encrypted location data then send to tracking server using GPRS technology. The authorized user can track a vehicle using a secure web interface.

There was a previous project from government of India that makes a system called Public Transportation Monitoring System. This system used to track all the public transportation. However, building this system requires a lot effort from many sectors and huge amount of money.

Thus, this project purposes is to develop a less costly application to monitor the public bus and merely need smartphone to achieve the goal. It only requires the application installed on smartphone to achieve the goal.

2. METHODOLOGY

For this project, Iterative Model shown in Figure 1 has been chosen as reference. This method were chose as it focus more on the design rather than documenting. Besides, by using this model it is less costly to change requirements as compared to other models. Last but not least, this model was used to improve the apps step by step by tracking the defects at early stages. This avoid the downward flow of the defects.

Figure 1 : Iterative and Incremental Model
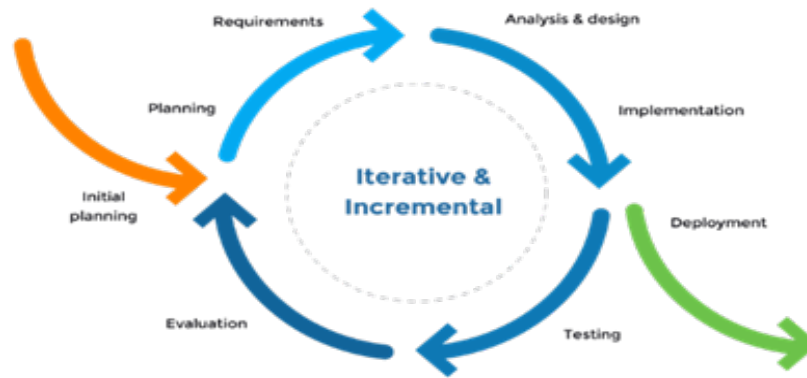
A. System Requirement Phase

In this phase, started by take note all users requirement and documented it to ensure that this project will be succesful. The proposal consist Gantt chart. The Gantt chart is to guide the system developers to perform system development. And start planning on what software to use such as Android Studio, Firebase and Google Maps for our application.

B. Design and Development Phase

In this phase, all the required user interface, input, output, and processes will be done. Firebase is been used as our database platform. The database will be created and connected to our application. The application will be built through Java programming. Besides, for the overall application, Android Studio was used. This phase is used to make sure the interface for the user and the output from the earlier phases are done fully and precisely according to the proposed design and processes.

C. Testing Phase

In this phase, functional testing like unit testing and system testing is been used. Testing also check if they is an error exist, if there is, a necessary repeat on a certain phase will be done.

3. SYSTEM DESIGN AND DEVELOPMENT

A. System Requirement
Functional Requirement
- A user shall able to find driver location when passenger apps is on
- The user of driver apps has to turn on GPS location to ensure passenger can detect the driver location
- A user of passenger does not need GPS to know the driver location.

Non Functional Requirement
Product Requirement
- The apps shall be able to use normally (Monday-Sunday, from 6am to 10pm) to all drivers who use the application. Downtime during normal working hours shall not exceed five seconds.

Organizational Requirement
- User of passenger application shall able to detect driver location
- Driver application won't be able to detect passenger location

Efficiency Requirement
- User of passenger shall have enough storage to install the application
- Smartphone user shall have GPS device to optimize the efficiency and performance of the application
- User of smartphone must have at least minimum of Android System 4.0 till 7.0
- It is easy to install on smartphone since it is application

Performance requirement
- User of driver application shall have GPS device included in smartphone to allow passenger to detect driver location

Space requirement
* May malfunction if memory of the smartphone is full. To avoid malfunction, needed memory space at least 200mb.
* User shall not have problem downloading application since the size of downloading is small which size is 10mb.

B. Design and Development Phase

Design Phase

Figure 2 : Overall Design
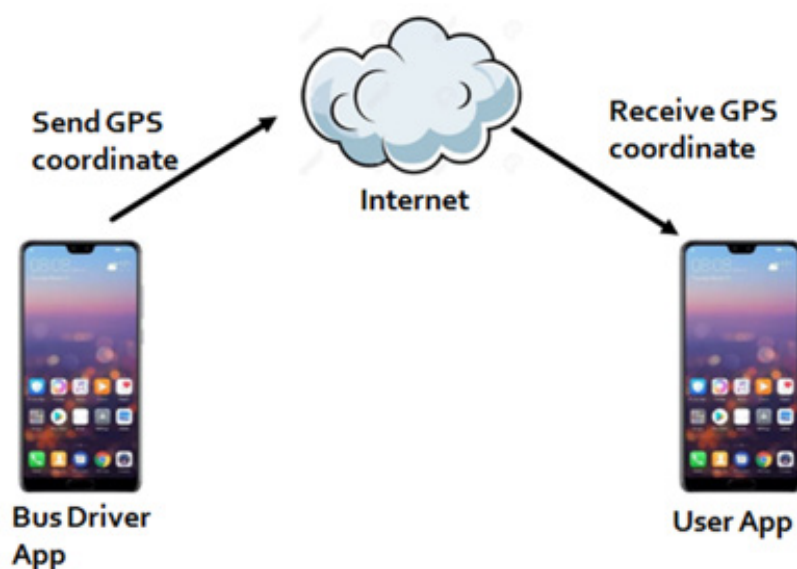
Overall design shown in Figure 2 consist of driver apps to send GPS coordinate and the Firebase database to temporary store the latitude and the longitude values. The user/passenger apps will then retrieve the latitude and longitude value and display it at the maps in the form of bus icon moving in real time.

Development Phase

Two apps which are driver apps and user/passenger apps was been develop with user interface shown in Figure 3 below.

Figure 3 : Driver Apps and User/Passenger apps
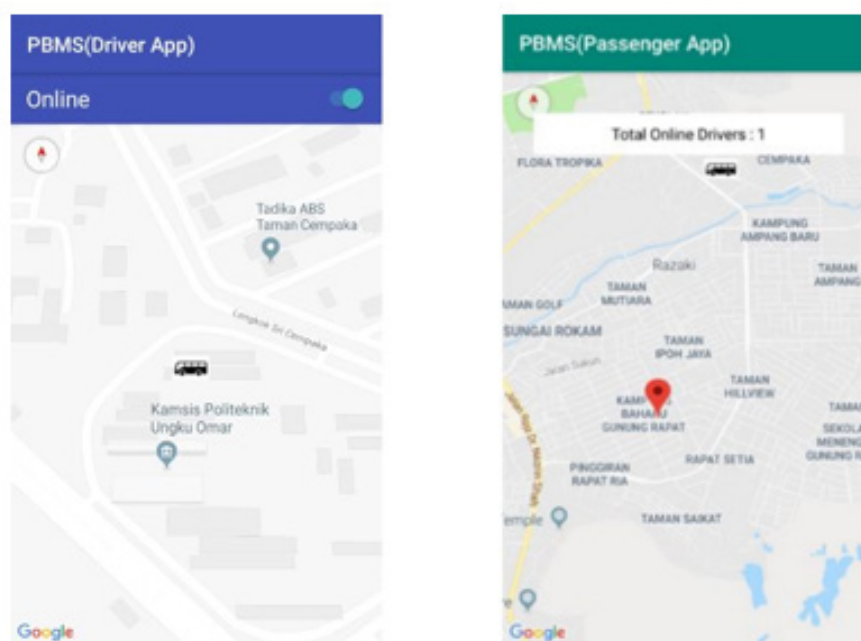
To store the live location latitude and longitude, Firebase database is been used as shown in Figure 4.

Figure 4 : Firebase Database for the system
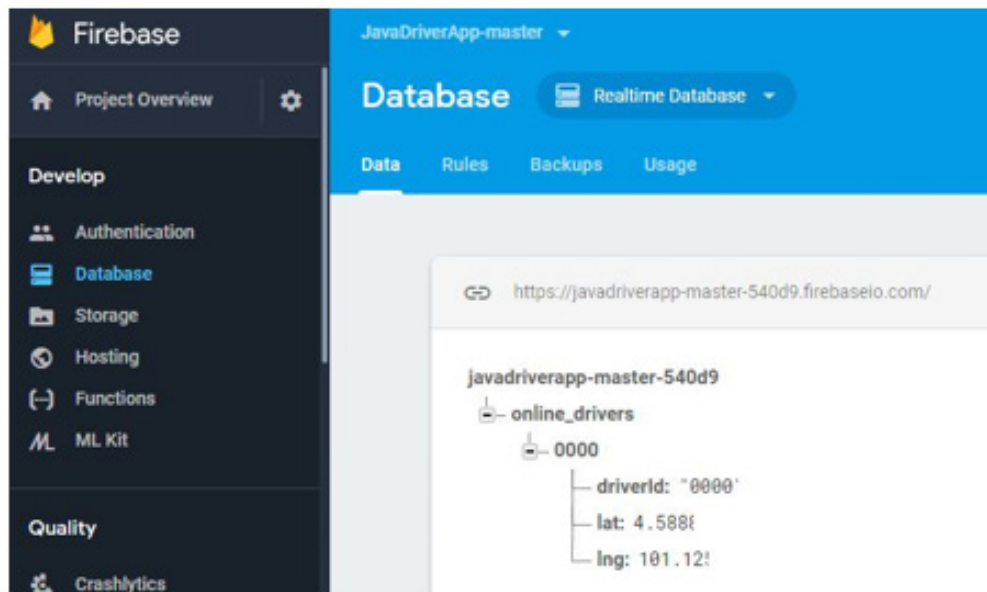
System Configuration

Driver App's Main Function
The main function of driver apps is to read the location of the driver and send it to Firebase database. The coding segment for that purpose is shown in Figure 5.

Figure 5 : Send to real time database

The driver apps also have google maps as its user interface and will show and update the driver's current location in the google map. The coding for this purpose is shown in Fig.6.

Figure 6 : Show and update bus location in google map

```
public CameraUpdate buildCameraUpdate(LatLng latLng) {
    CameraPosition cameraPosition = new CameraPosition.Builder()
            .target(latLng)
            .tilt(TILT_LEVEL)
            .zoom(ZOOM_LEVEL)
            .build();
    return CameraUpdateFactory.newCameraPosition(cameraPosition);
}

/**
 * @param position where to draw the [com.google.android.gms.maps.model.Marker]
 * @return the [MarkerOptions] with given properties added to it.
 */

public MarkerOptions getDriverMarkerOptions(Location position) {
    MarkerOptions options = getMarkerOptions(new LatLng(position.getLatitude(),position.getLongitude()));
    options.flat(true);
    return options;
}

private MarkerOptions getMarkerOptions(LatLng position) {
    return new MarkerOptions()
            .icon(BitmapDescriptorFactory.fromResource(R.drawable.car_icon))
            .position(position);
}
```

User/Passenger App's Main Function
User/passenger apps will get driver's live location data from firebase database. The coding for this purpose is shown in Figure 7.

Figure 7 : Show/update bus location in google map in user apps

```
@Override
public void onDriverAdded(Driver driver) {
    MarkerOptions markerOptions = googleMapHelper.getDriverMarkerOptions(new LatLng(driver.getLat(), driver.getLng()));
    Marker marker = googleMap.addMarker(markerOptions);
    marker.setTag(driver.getDriverId());
    MarkerCollection.insertMarker(marker);
    totalOnlineDrivers.setText("Total Online Drivers :" String
            .concat(" ") String
            .concat(String
                    .valueOf(MarkerCollection
                            .allMarkers()
                            .size()))));
}
```

To show user/passenger's current location, the coding is shown in Figure 8.

Figure 8 : Show and update bus location in google map

```
private void showOrAnimateUserMarker(LatLng latLng){
    if (currentLocationMarker == null)
        currentLocationMarker = googleMap.addMarker(googleMapHelper.getCurrentLocationMarker(latLng));
    else
        MarkerAnimationHelper.animateMarkerToGB(
                currentLocationMarker,
                new LatLng(latLng.latitude,
                        latLng.longitude),
                new LatLngInterpolator.Spherical());
}

public MarkerOptions getCurrentLocationMarker(LatLng position) { return getMarkerOptions(position, resource: 0); }

private MarkerOptions getMarkerOptions(LatLng position, int resource) {
    BitmapDescriptor bitmapDescriptor;
    if (resource != 0)
        bitmapDescriptor = BitmapDescriptorFactory.fromResource(resource);
    else
        bitmapDescriptor = BitmapDescriptorFactory.defaultMarker();
    return new MarkerOptions()
            .icon(bitmapDescriptor)
            .position(position)
            .flat(true);
}
```

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To display the bus current location, the coding is shown in Figure 9.

Figure 9 : Display And Update Bus Current Location

4. TESTING AND RESULT

Unit Testing Plan
There are two parts to be tested which are Driver app and Passenger app. Driver app will be tested if it can send location information to Firebase database while the Passenger app will be tested if it can receive driver's location information from the database.

Driver App Test
Driver apps was tested to see whether the latitude and longitude value was receive and in real time in the firebase database. To do the testing, the driver will turn on the driver's apps and drive around the Ipoh city in Malaysia. Shown in Figure 10 and Figure 11 are the real time value of the driver location before and after the driver's apps is turned on.

Before driver goes online

Figure 10 : Before driver goes online
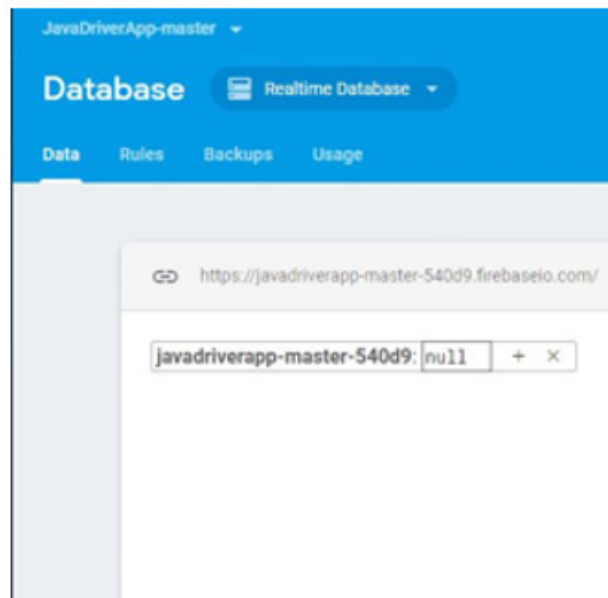
After driver goes online

Figure 11 : After driver goes online
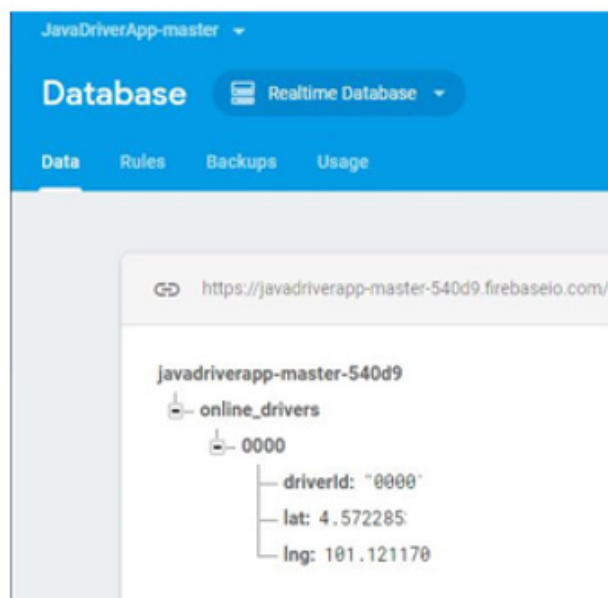
Passenger App Test
After driver's app was tested. User/passenger test was been taken. To do the testing, after the driver's apps is been turn on, and the passenger's apps was success-fully showing the current location in real time of the bus as shown in Figure 12.

Figure 11 : After driver goes online
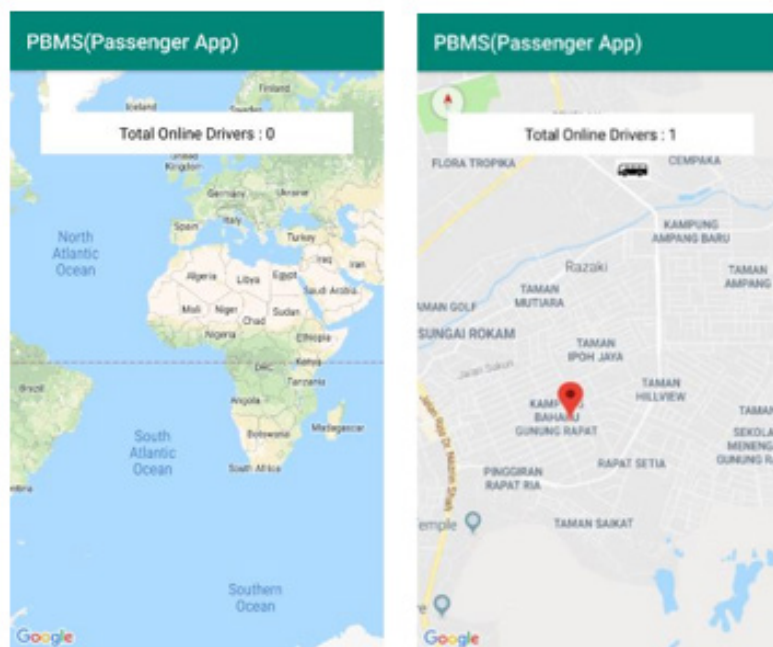
Advantage of the project are the passenger was able to detect location of the bus. The system use real-time database and it's easy to use and friendly to passenger. And it's easy to install the application on android smartphones.

5. CONCLUSION

The apps which consist of driver apps and user/passenger apps was successfully been develop. This mobile application is able to track the public bus using the GPS tracking system to let user know the current location of the bus. Therefore, the user can able to estimate the arrival time of the bus. Furthermore, the apps system is low-cost as it doesn't require any external hardware for location tracking. It give an opportunity for public bus to upgrade it service and to have healthy competition with other well-known transportation such as grab.

ACKNOWLEDGEMENT

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EMPOWERMENT OF ASNAF : A CASE STUDY ON ZAKAT DISTRIBUTION AT MAIPk

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ABSTRACT

This study examines the effectiveness of zakat distribution in asnaf empowerment program for the poor and needy implemented by Perak Religious Council and Malay Customs (MAIPk). Zakat organization needs to continuously acquire knowledge in various monitoring aspect of any projects aims at reducing poverty. By embedding learning as a package for zakat assistance, it is hoped that it will reduce the dependency of zakat beneficiaries on zakat assistance. Hence this study also investigates whether the organizational learning culture has help zakat organization in reducing zakat beneficiaries' dependency on zakat assistance. The methodology of this study is mixed methods of descriptive research based on document analysis on previous annual reports of MAIPk from 2009 to 2013, interview with CEO of MAIPk and related literatures on zakat from previous researchers. Data from each annual report are collected and statistically analyzed as comparisons. The findings revealed that MAIPk has been very proactive in implementing many poverty alleviation projects. Innovative distribution's success depends on changes made to the beneficiaries' living standards such as with respect to income, health and education. Lack of knowledge and attitude of zakat beneficiaries too contributes significantly to the success and failure of zakat assistance scheme. As such, zakat managers should place an emphasis on training zakat managers of how to manage and monitor projects awarded to poor aptitude level beneficiaries to ensure the project is a success. MAIPk also needs to have knowledgeable and experience staff for their zakat distribution to be successful.

Keywords: Perak Religious Council and Malay Customs, Asnaf Empowerment, Zakat Distribution, Zakat Issues, Learning Organization

1. INTRODUCTION

Zakat or almsgiving is an annual obligation for all practicing Muslims who have the financial means and fulfill the nisab (threshold figure) in giving some percentage of their specified components of wealth to the poor and needy (Abu Bakar A.A.et al., 2014). It is the personal responsibility of Muslims to ease economic hardship and eliminate inequality of other Muslims. In modern management of zakat, practitioners must be knowledgeable in order to be creative and innovative in their work activities that can assist them to achieve the objectives of zakat. According to Abdul Hamid (2003), various modern Muslim dilemmas can be solved through the implementation of ijtihad. Ijtihad is a critical legal thinking in search of new answers for new problems (Abd-allah, 2006). With ijtihad in practice, various technologies and techniques for management of zakat can be implemented to suit modern demands without sacrificing the initial objectives of zakat (Abdul Rahim, 2005; Mujaini, 2005a). However according to some scholars, ijtihad has not been fully practiced by some zakat organizations and that explains why some of them take less initiative to make improvements in their management of zakat funds. For zakat organization, learning should not be confined to zakat managers only but to the whole organizational system including zakat beneficiaries and payers. By embedding learning as a package for zakat assistance, it is hoped that it will reduce the dependency of asnaf on zakat assistance. The case study site for this research is zakat organization situated in the State of Perak, Malaysia known as Perak Religious Council and Malay Customs or Majlis Agama Islam dan Adat Istiadat Melayu Perak (MAIPk).

The objectives of this study are: (1) to examine the effectiveness of zakat distribution in enriching the poor and needy in Perak (2) to investigate whether the organizational learning initiatives have help MAIPk in reducing zakat beneficiaries' dependency on zakat assistance through their zakat assistance package (3) to identify the issues and challenges of zakat distribution which are faced by MAIPk. The following questions are constructed in order to answer the objectives of the study: (1)(i) how much is the percentage of zakat collection as compared to zakat distribution (ii) what is the weightage of zakat distribution on zakat recipients of the poor and needy as compared to total distribution of zakat by MAIPk? (2) what are the organizational learning initiatives done by MAIPk in reducing zakat beneficiaries' dependency on zakat assistance of the poor and needy through their zakat assistance package? (3) what are the issues and challenges of zakat distribution faced by MAIPk?

2. METHODOLOGY

This case study is based on an impact study of data for five years from 2009 to 2013 gathered from MAIPk's Annual Reports. The data is analyzed using Microsoft Excel to produce accurate presentation and comparison from year to year. Interview was also conducted with the CEO of MAIPk, Dr. Amiruddin Muhamed, and a few officers at MAIPk in order to study the management practice of ijtihad as a way to increase its efficiency in distribution of zakat.

The theoretical framework is based on the literature review: (1) classification of zakat recipients (2) priority in zakat distribution to asnaf of poor and needy (3) determining the poor and the needy using had kifayah (4) empowerment of poor and needy to alleviate poverty.

3. RESULTS AND DISCUSSIONS

This chapter discusses on the data and interview gathered.

3.1   Question 1 is constructed in order to achieve the first objective of this study which is to examine the effectiveness of zakat distribution in enriching the poor and needy by MAIPk through an impact study of data for five years from 2009 to 2013.

3.1.2   Zakat Distribution Analysis
The following Table 1 shows the figure on the distribution of zakat for five years from 2009 to 2013.

Table 1: Total distribution of zakat from 2009 to 2013

Asnaf	Distribution of Zakat (RM)				
	2009	2010	2011	2012	2013
1 Faqir	26,678,035	35,155,332	40,537,690	46,033,000	54,300,221
2 Miskin					
3 Amil	6,588,607	7,688,580	11,150,888	10,901,251	13,495,035
4 Muallaf	2,102,258	2,052,031	2,399,514	2,884,435	4,819,459
5 Ghorimin	377,941	322,293	685,769	473,393	951,880
6 Ibnu Sabil	648,700	587,304	939,617	615,388	621,514
7 Fisabilillah	23,106,997	19,417,327	21,497,036	21,186,275	27,453,684
8 Riqab	-	-	-	-	-
TOTAL	59,502,538	65,222,867	77,210,514	82,093,742	101,453,684

From the above data on zakat distribution, MAIPk does not distinguish between hardcore poor (faqir) and needy (miskin). MAIPk's distribution of zakat is divided into seven unequal parts (except riqab) with a major allocation on faqir and miskin. The seven asnafs (recipients of zakat) are: (1) faqir (hardcore poor) (2) miskin (needy) (3) amil (zakat administrator) (4) muallaf (reconciliation of heart) (5) ghorimin (debt-ridden) (6) ibnu sabil (wayfarer) (7) fisabilillah (in the cause of Allah). Riqab is not considered an asnaf, a ruling by the Perak's state mufti that slavery in the true sense no longer exists in this modern age. At this moment, this is MAIPk's stand on the issue of riqab. Other states in Malaysia interpret riqab as mental slavery, for instance, those who were forced into prostitution and have to pay money for their release. According to Mahamud (2011), in other states, riqab was defined as a slave while in Selangor, Negeri Sembilan, Terengganu and Pahang, broader definition of riqab is used.

MAIPk's distribution of zakat focuses on the asnaf of faqir and miskin, indicated by its large allocation as shown on Table 1 : Total distribution of zakat from 2009 to 2013. This is proper as faqir and miskin should be the greatest priority of zakat. Another large allocation under faqir and miskin went to haemodialysis scheme to help kidney disease patients for dialysis treatment. The treatment of dialysis can cost a patient nearly RM3,000 a month. MAIPk helps them because these people can easily fall into poverty due to high cost of treatment.

Table 2 on zakat distribution as a percentage of total collection indicated that total zakat distribution was RM59.5 million in 2009, RM65.2 million in 2010, RM77.2 million in 2011, RM82.1 million in 2010 and RM101.5 million in 2013. This represents an increment of 9.61% from 2009 to 2010, 18.38% from 2010 to 2011, 6.32% from 2011 to 2012 and 23.58% from 2012 to 2013. The average increase year on year is 14.47%. As for ratio between distribution and collection, distribution was 95.53% of zakat collected in 2009. The ratios drop to 92.80%, 88.32% and 81.49% for 2010, 2011 and 2012 respectively. The ratio of distribution to collection then had increased to 92.38% in 2013.

According to Mohd Nor et. al. (2011), one of the main reasons of low percentage of zakat distribution is due to the practice of paying zakat at the end of the year. It was reported at certain states; about 50% of the zakat was collected in the final weeks of a year. Due to the time constraint and under staffing, these funds were not distributed in the same period. However, it is expected that these unallocated funds to be distributed to the eligible asnafs in the following year.

Table 2: Total distribution as a percentage of total collection

Year	Total Collection (RM)	Total Distribution (RM)	Distribution/Collection As a %
2009	62,285,131	59,502,538	95.53
2010	70,282,296	65,222,867	92.80
2011	87,419,398	77,210,514	88.32
2012	100,739,047	82,093,742	81.49
2013	109,825,143	101,453,684	92.38

As a comment on the distribution and collection data in Perak, the table above clearly indicates a slight gap between collection and distribution data, that each year, not all collected zakat money are distributed. The balance of the percentages are found by analyzing the financial reports within each annual report. The balance of undistributed zakat or known as surplus zakat income in Income Statement for Zakat was treated as fund and reserves in equity under Balance Sheet Statement. In the perspective of Shariah, the treatment of surplus zakat income is acceptable because it is treated in the equity and not use for expenditures such as building public facilities which clearly is prohibited.

3.2   Question 2 is constructed in order to achieve the second objective of this study which is to investigate whether the organizational learning initiatives have help MAIPk in reducing zakat beneficiaries' dependency on zakat assistance of the poor and needy through their zakat assistance package.

A change in the way of thinking via the process of learning makes it possible to think of better ways of performing things. According to Burns and Scapens (2000), failure to implement change may occur if no change in mindset occurs. Changes in the way of thinking in the distribution department of MAIPk can be seen objectively. The results of these have led to a major revamp in the nature of services given to beneficiaries.

Traditionally MAIPk only gave cash assistance on a monthly basis and the task was seen to end once the beneficiaries had received their assistance. No emphasis was given on follow ups. The change in mindset and openness which was initiated by the Chief Executive Officer (CEO) of MAIPk, Dr Amiruddin bin Muhamed who stressed the importance of transformation in the way we think and work to face current challenges. This is supported in the interview with the CEO of MAIPK on 18 June 2015:

"When I joined MAIPk on 02.01.2014, I really see this thing (effectiveness of zakat distribution). I want to do the transformation and we cannot be slow. We have to make a quantum leap. We cannot just sit in the office and take it easy, and wait for the application form. No wonder people are angry with us. Why are there still many more poor Muslims, recipients are incapable, do not know the procedure, afraid to meet government officials, did not know to read and write? These are the things that prevent them from reaching our offices."

Dr. Amiruddin further explained: "In the application form, asnaf has to get support from the leaders or heads of villages, those who do not get along due to political difference and so on will be left out. So we do transformations on 19/02/2014, I launched "Skuad Prihatin Asnaf" (Team for Concerned Asnaf), its an integrated work to ensure the fairness of zakat distribution. So starting from that, I want to give a new focus to my staff and we move to each areas of MAIPk's 17 religious administrations. No more sitting in the office, although in weekend or weekdays affected if there was an emergency, we have to go out and find the asnaf. The people appreciate what we did and give positive feedback. Our zakat recipients rose to 2,000 last year only, those are the hardcore poor who were previously left out and have no access to us. Our staff will fill out the application form for them. Approval was immediate and no more red tape. And thank God, this is our approach to ensure that zakat distribution is fairly done".

With the transformation, MAIPk now categorizes beneficiaries into productive and non-productive beneficiaries. Each recipient is treated differently: the nature of assistance and amount received differs. Non-productive beneficiaries will continue to get assistance from MAIPk until they die. Usually they are the elderly with no family members or are sick with no ability to work. Productive beneficiaries are those with the ability to work and earn a decent living if given the chance. These beneficiaries are taught to live and survive and not to be too dependent on the cash assistance. MAIPk also provides beneficiaries with shelter in the form of temporary or permanent homes depending on their level of need. At the same time, MAIPk has initiated programs that can provide beneficiaries with necessary skills. With those skills the beneficiaries should be able to earn a living and support their families. They are given assistance in the form of capital to set up own business. However, the self-sufficient skills and business assistance given to them may still take the beneficiaries nowhere. Most of them still remain beneficiaries.

A study by Md. Ramli, et al. (2011) also highlighted the issue of asnaf's attitude in receiving capital aid from zakat institution in Malaysia. They found that some of the recipients of the capital aid did not possess the right behaviour to become entrepreneurs thus affecting their business performance. This study is consistent with Ahmad, et al. (2010). They reported that overall, only 6.9% out of 537 respondents that received capital aid from zakat institutions in Selangor and Kuala Lumpur managed to pass the kifayah (threshold) level of poverty. Coping with the consequences of change made in the nature of services to beneficiaries made MAIPk realized that they needed to do more than just giving assistance.

MAIPk has started on a program called Economic Empowerment Program of Asnaf which may help in changing the attitude of beneficiaries from being too dependent on zakat assistance into being independent, self-sufficient and able to support their families. According to the CEO of MAIPk on the interview: " Economic empowerment programme for asnaf is an extension of MAIPk's program on economic and social development. But before this, the assistance is given in the form of capital which was not organized, just approved at a meeting and was given without proper monitoring. There was no proper method for helping these people. The assistance was based on what the recipients want, but the recipients themselves did not know how to use the equipment, so this problem raised the issue of capital equipment are sold, idle and not in use. In 2014, MAIPk has rebranding and changed the name to economic empowerment program for asnaf which involved the assistance from A to Z. We are giving them fishing rod and not fish alone. We also tell them what fish bait to use, how to use the fish rod and which areas that have many fish. Alhamdulillah, the program has shown success, the most important is monitoring them and recipients have built a good relationship with the monitoring officer and the experts who helped them. So, the program is no longer called Capital Assistance Scheme, instead, it is now known as Economic Empowerment Programme for Asnafs." Furthermore the CEO explained that last year there were 25 asnafs under this program who had distinguished success and no longer receive capital assistance (no longer asnaf). MAIPk has published a book on the success of this program with the purpose to show and promote to the public that the zakat money are well spent. The best model that MAIPk uses to eradicate poverty is Rasulullah s.a.w. who did not only aim to feed the poor temporarily, but also to teach them, raise their spirits, and broaden their minds. This is what MAIPk wants to apply in the Economic Empowerment Program for Asnafs.

Beneficiaries with ability to sew must joint sewing workshop in addition to other assistance they receive. Beneficiaries who have ability to run small scale businesses such as muslimah spa (spa for muslim women), laundry, bakery, sauce manufacturing, handicrafts, salted fish, hawkers and so on are given business capital assistance depending on their needs. At the same time beneficiaries must attend training programs such as basic Islamic knowledge for spiritual understanding, motivational courses, basic financial management and basic entrepreneurial skills. MAIPk also monitors their activities closely until they can be independent. However, MAIPk realizes that not all beneficiaries have business abilities. The non-business-savvy beneficiaries are trained for skills such as sewing and motor vehicles. MAIPk has established sewing workshop in Bercham and similarly in Grik district, spa is open for motor vehicles. For motor vehicles' spa, MAIPk take and train youngsters and provide the equipment. This project is a collaboration with Department of Manpower.

3.3   Question 3 is constructed in order to achieve the third objective of this study which is to identify the issues and challenges of zakat distribution which are faced by MAIPk.

The following are the issues and challenges faced by MAIPk based on the observations and interviews with the CEO of MAIPk and senior manager at MAIPk as well as zakat recipients. First is staffing issue at MAIPk. Currently at MAIPk, one officer has to manage various tasks at the same time. Their responsibilities are heavier than their job specification. Every year, zakat collections, zakat payers and zakat distributions are in needs for creative and innovative demands to increase the efficiencies of zakat collection and distribution. Second, lack of collaboration between zakat institution and other agencies. Information gathered from annual report of MAIPk has stated there are only few collaborations has been done. In order to expand the collaboration, MAIPk needs to coordinate with other government agencies such as other states Islamic councils, NGOs such as Yayasan Bina Upaya, Tekun, Amanah Ikhtiar Malaysia, Yayasan Basmi Kemiskinan and other agencies. Similar suggestion was proposed by Md Hassan et al (2012) where a new model of "Microfinance Modus Operandi for Zakat Institution" has been presented. It was expected that by collaborating with other microfinance institutions such as Amanah Ikhtiar Malaysia (AIM), the zakat institution will be more efficient in distributing zakat funds. Microfinance institution as well as state Islamic council and zakat institutions have similar goals and missions, which is to help the poor and needy. Third, poor attitudes among zakat recipients. The previous studies have shown that majority of zakat recipients are still trapped in poverty even though they have been zakat recipient for many years. One of the reason behind this failure is due to poor attitudes and self-weaknesses of the zakat recipients themselves. It is not fair only to blame on zakat institutions alone because zakat institutions have important roles in managing the zakat funds. However, the actions should be taken more aggressively and proactively as the economy situation locally and globally have effect on the cost of livings which keeps increasing every day, and yet the level of income has not changed much and worst of all, it keeps declining.

Most of zakat recipients are under negative surroundings, low motivation, lack of self-esteem and even lack of self-value. More efforts need to be done in order to solve the roots of the problem. Many related expertise in Malaysia such as NGOs, associations, academic institutions, government agencies, so that many initiatives can be organized by zakat institutions without incurring extra costs. It just needs several discussions and signing off Memorandum of Understanding or Notes of Understanding. Academic institutions such as universities, corporations and other companies can fulfil their Key Performance Indicator (KPI) on Corporate and Social Responsibility (CSR).

4. CONCLUSIONS

The finding revealed that MAIPk has been very proactive in implementing many poverty alleviation projects. The incidence of poverty cannot be benchmarked on low income family only. Poverty consists of deeper problems such as sick mindset, poor attitude, lack of knowledge or skills as well as ignorant and indiscipline. Distribution activities success depends on changes made to the beneficiaries' living standards such as with respect to income, health and education. It is important to understand the effects of welfare reform on beneficiaries and their financial status. This needs to be embedded in planning the programs. However, although some distribution activities in MAIPk may presently not turning out to be that successful but this does not mean they cannot be successful in later years. As such zakat managers should place emphasis by training zakat managers on how to manage and monitor projects awarded to poor aptitude level beneficiaries to ensure project's success. MAIPk needs to have knowledgeable and experienced staff for their zakat distribution activities to be successful.

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PERSONAL PROTECTIVE EQUIPMENT (PPE) MOBILE APPLICATION

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ABSTRACT

Personal Protective Equipment commonly referred to as "PPE", PPE is equipment used to minimize exposure to hazards that cause serious injury and illness. This study aims to identify the negligence factor in the use of PPE among construction workers and to enforce the use of PPE at construction project site using PPE mobile application developed. The PPE mobile application will not only function as information, but also as a law enforcement device for both workers and safety officer. In conclusion, PPE mobile application is able to improve the safety awareness and reinforce PPE usage at construction site.

Keywords: PPE, mobile application, safety, construction site, enforcement

1. INTRODUCTION

Workers at construction sites are most likely exposed to hazards and safety issues as depicted by accident at workplace statistic in Malaysia (Hamid et.al., 2008). To prevent accident and incident resulting hazards towards construction workers, Hazard Identification, Risk Assessment and Risk Control (HIRARC) is implemented at workplace. Thus, Hierarchy of Control (HoC) is implemented in an organization and widely spread as it is the popular concept to mitigate and eliminate hazard at workplace as agreed by Manuale, (2006), Card et. al. (2012) and Hettinger et. al. (2013). Controlling hazards should start from the source that contributing risks. This method is known as engineering control and if this does not work, then the hazards can be controlled in between of the path of the sources of hazard and the worker. This technique is known as administrative controls. However, if this method failed, personal protective equipment must be applied at the workers level in order to protect them from hazards (DOSH, 2008).

Personal protective equipment (PPE) is any equipment which is intended to be worn or held by a person who is at work and which protects against one or more risks to health or safety and any additional accessories that are designed to meet that goal (Reese, 2017). According to Ulang, Salim et al., (2014), Personal Protective Equipment (PPE) is the equipment that is needed for protection to the person from any hazard in workplace.

According to Omar Mat Piah, Deputy Director General of Occupational Safety, Occupational Safety and Health Department (DOSH), a total of 99 deaths were recorded at construction sites nationwide 2016 compared with 88 deaths in 2015 (Sinar Harian, 2017). This fatality figures contributed by construction workers accidents such as falling at height and falling objects. This scenario shows that the usage of PPE is still lacking among construction sites employee.

Referring to Part 5, Section 24, of Occupational Safety And Health Act 1994, an employee at workplace shall be taking care of his or herself and other persons who may be affected by their act or omission, to make use of any protection or clothing provided by employer at all time and to obey the regulation and instruction of occupational safety and health established by the employer. Noncompliance to Section 24 of Act 514, a person shall be found guilty on conviction, be liable to a penalty of not more than RM1000 or imprisonment not exceeding three months or both.

The use of PPE in the construction industry is necessary to guarantee the safety of the workers. PPE is considered as the last line of defense in HIRARC hierarchy. As according to The National Institute for Occupational Safety and Health (NIOSH), PPE is place at the very bottom of the hierarchy as shown in Fig 1. Even so, a proper usage of PPE could have given a sense of protection from hazards and save lives. However, Liberati, Peerally, & Dixon-woods, (2018) stated that once hazards have been identified, of course, organizations need to introduce risk controls to mitigate or eliminate risk of harm.

The aim of this research is to identify negligence factor on PPE usage among construction workers and to enforce PPE usage using PPE mobile application developed. This era of modernization, millions of people around the globe are using smartphones in their lives. The number and kind of applications have booming quickly with the release of touch screen phones with relatively large displays (Tracy, 2012).

Figure 1 : Hierarchy of Control
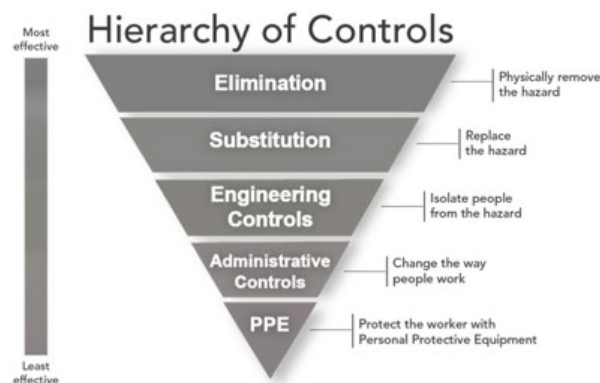
Source (NIOSH, 2015)

Then, mobile application has been selected as the platform to build an application that is able to improve and enhance the use of Personal Protective Equipment (PPE). Adolph, (2012) stated that mobile application are add-on software for handheld devices, such as smartphones and personal digital assistants (PDA).

Safety in construction needs something new in the modern era in line with the widespread use of mobile phones. So, PPE Mobile Application is developed to assist construction sites authority such as OSH officer, site engineer, site supervisor and etc. who are responsible in monitoring the labor force at work place. This PPE application could be used widely for safety supervision at construction site and other work places.

2. METHODOLOGY

2.1 Development

To develop PPE mobile application system, a suitable approach has been used to ensure systematic development process. In this project, Mobile Application Development Lifecycle has been chosen as the guideline. There are five (5) major phases process in order to develop the app. Intel IT has created a mobile application development framework: this framework defines specific activities, tools and resources, to support the planning, development and deployment of mobile applications (Doolittle & Architect, 2012)

2.2 Discovery / Identification Phase

PPE mobile application is an ideation outcome of an observation held at a construction site in Genting, Pahang. Information was collected and problem that has arisen at site was identified. It can be seen that the construction workers do not use PPE properly and efficiently. This negligence will put the workers at risk of injury or death if accident occurs as workers working at height.

A study on developing mobile application is conducted towards the pursuance of the development proposed solution. In this stage, the suitable software and hardware to be implemented is to be considered in order to develop the application. The software that will be used is an android platform and hardware applications are integrated to develop an inventory. Android platform is chosen because the supervisor and safety officer of the studied construction site are using android smart phone. The usage of cloud storage to store inventory information is also analyzed that it will suits the inventory application that can be used to develop mobile application. Yan (2017) stated that cloud computing has become one of the hottest terms of the 21st century emerging technology, effectively changed the people's understanding of the storage, improved the way files are stored.

2.3 Design Phase

In this phase, the initial design ideas of the application will be created and proposed based on user requirements and conformance. The important part of the design phase is to create the storyboards of user interface interactions. This is where the explanation on how the application functions and the parties involved which is the administrator and the end user. To make the design phase easier, firstly a simple prototype is created. The important step is to design an interface because it can interact with user using an application as a communicator. A good design interface can attract the attention of user to use the application. The prototype interfaces are as shown in Fig 1 and Fig 2.

Fig. 1. Prototype Interface 1
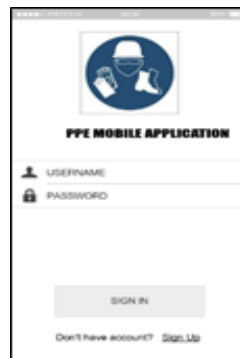
Fig. 2. Prototype Interface 2
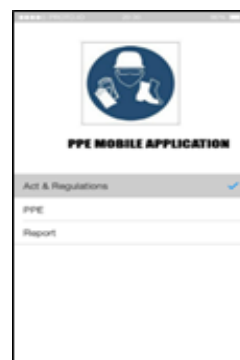
2.4 Development Phase

As in development phase, the application system and design is developed according to the needs and requirements of the user. Notepad ++ is used to develop the system and JavaScript is used as the main programming language. Ahmed, (2014) stated that basically JavaScript is a computer language which is used in most of the web browsers like Chrome, Firefox, Netscape, Safari.It is mainly used for establishing interactions via interfaces. Then, ripple emulator is used to test the inventory application. Next, the codes are uploaded to cloud server using firebase, then converted and transformed to (.apk) file format. Firebase is a platform for mobile and web application with tools and infrastructure which allows developers to build high quality applications. Firebase consists of features that developers can use together to meet their needs (Shashank Gupta, 2016). But Firebase is considered as web application platform (Galajda & Janečková, n.d.),. Lastly, the inventory application could be installed to any android devices.

For design application development, researchers are focusing on the actual creation of design specifications. This also includes creating or obtaining the specified media in the design of the application and developing course materials and installing it. The structure and content of the course is built. The creation of storyboards, infographics and programming are combined in the development phase. The actual production of content, information and materials developed are based on the design phase. The PPE mobile application provides some features such as language selection, information selection and report features. PPE mobile application has several language options according to the user's preferences as shown in Fig 3 and 4.

Fig. 3 : Languages Selection Features
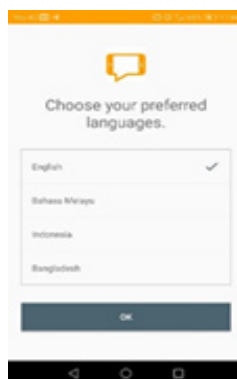
Fig. 4 : Main Menu in Malay
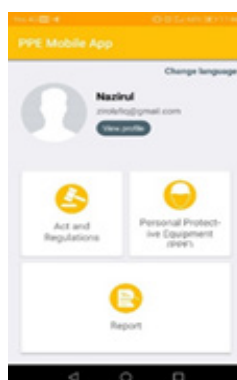
The information selection interface will provide user with information about Act & Regulations and Personal Protective Equipment. In the Act & Regulations interface, Act 514 and Act 139 are installed in the app for references. Fig 5 and Fig 6 below show the information selection for Act & Regulations interface.

Fig. 5 : Act and Regulation Interface

Fig. 6. Act and Regulation Information Interface

Other than that, PPE mobile application's users can choose Personal Protective Equipment interface to learn more about PPE, types of PPE and how to use PPE properly. Fig 7 and Fig 8 below show the information selection for Personal Protective Equipment.

Fig. 7. PPE Information Feature 1

Fig. 8. PPE Information Feature 2

The main features of PPE mobile application is the reporting features. The feature provides the user a platform to report any action or activity that leads to accident or incident. Only user with access permission is allowed to use the PPE mobile app. The report submitted is treated as confidential between user and administrator. The report is received by the administrator directly through WhatsApp. For this version, the administrator who will be receiving the report is the Site Safety Supervisor and Site Officer. Fig 9 and Figure 10 below show the report features in PPE mobile application.

Fig. 9. PPE Report Feature 1
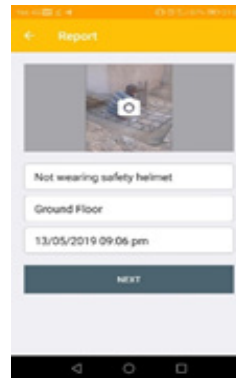
Fig. 10. PPE Report Feature 2

2.5 Testing and Maintenance Phase

In this phase, the mobile application that have been through a development phase will be tested at the construction site. Firstly, a testing will be done using a Ripple Emulator. Each function including the cloud database will be tested using actual android device before it is ready to be integrated into a single application. The usability and functionality of the app is tested to ensure that the PPE mobile application works as planned in the implementation phase. The mobile application will be fully tested in the testing phase. Any changes or improvements to this application will be made before the next phase.

2.6 Implementation Phase

Meanwhile in this stage, two employees have been selected to assist in testing the implementation of the PPE mobile application on construction sites. Subsequently, the Mobile PPE application is installed on the selected employee's android device. Then, the method of using the application is explained to the employee and they are asked to use the application if they find any workers who do not use the PPE while working. The users have also been given guidance on how to make a report using the application. The implementation procedure is briefly described below:

i.   Install the application in the worker's and officer's mobile phone.
ii.   Register the employee as the user of this application.
iii.   Briefly explains how to use this application.
iv.   The trial period for using this application at the construction site is for two weeks.

3. RESULTS AND DISCUSSIONS

The PPE mobile application was tested and implemented at the construction site for two weeks. As a result, several reports have been received from the selected workers using the app. Figure 11 (a) and (b) below shows the reports received through administrator WhatsApp.

Fig. 11(a) & (b). Report using PPE Mobile Application

(a)   (b)

Consequently, 6 experts in their respective fields were selected to validate the survey conducted. This expert endorsement has been carried out with Project Managers and Site Safety Supervisors from various companies and construction site to find out their opinions as experts on the development of PPE mobile applications to enforce PPE usage in construction sites and improving PPE understanding. The experts will provide validation of the effectiveness of the development of this application. The expert survey is divided into 3 main parts to be filled up by the expert. Part A questions are related about the quality of the system. In Part B is about Information Quality. Lastly in Part C is about the Usability of the PPE mobile application. The result for each part of the survey are as shown in Table 1, 2 and 3.

Table 1 : Result for Part A

Score	Needs to be used in the construction industry.	Will increase awareness of the PPE usage.	Will improve safety at the construction site.	Can help the safety officer in monitoring the safety of employees
Strongly disagree	0	0	0	0
Do not agree	0	0	0	0
Agree	16.67%	66.67%	50%	0
Strongly agree	83.33 %	33.33%	50%	100 %

Part A consists of four questions as shown in Table 1 above. The expert valuators' responded to the need of PPE Mobile Application used in construction industry where highest number indicates a 5 respondent chose strongly agree that represent 83.33% while 1 respondent chose agree that represent 16.67%. The majority of respondent strongly agree the need of this PPE Mobile Application in Construction Industry because currently there is no other technology used in order to enforce PPE usage and surveillance towards the construction workers at the studied project site.

Four respondents (66.67%) chose agree that PPE Mobile Application will increase awareness of the PPE usage among workers, while 2 respondents chose strongly agree that represent 33.33%. During toolbox session every morning, workers are briefed regarding the PPE mobile application implementation. After 2 weeks of implementation there are awareness changes among workers as PPE usage has increased. 3 respondents chose agree that represent 50% while another 3 respondents chose strongly agree that represent 50% to the fact that PPE Mobile Application will improve safety at the construction site. 100% of the expert valuators' strongly agree that PPE Mobile Application can help safety officer monitoring the workers while at work. This shown that the respondents strongly agree that PPE Mobile Application can help safety officer monitoring workers at construction site.

Table 2 : Result for Part B

Score	The mobile application provides accurate information.	The mobile application provides sufficient information	The information given in the mobile application is understandable.	Able to improve the usage of PPE and the safety awareness at construction site
Strongly disagree	0	0	0	0
Do not agree	0	16.67%	0	0
Agree	33.33%	50%	33.33%	50%
Strongly agree	66.67%	33.33	66.67%	50%

As shown in Table 2, there are 4 questions given to the expert valuators'. The respondents chose strongly agree was 4 represent 66.67 % while 2 more respondent chose agree that represent 33.33% whether PPE Mobile Application provides accurate information. This is because, the report are generated in real time and send through Whatapps application to the safety officers.

For the second question, the result of PPE Mobile Application provides sufficient information. The result shown that 3 respondent chose agree representing 50% as the highest percentage. Then 2 respondent chose strongly agree representing 33.33% and 1 respondent chose disagree that representing 16.67%. Therefore it is suggested to provide more information regarding occupational safety, health and environment for further research.

Thirdly, the result of the information given was understandable. Majority of respondent chose strongly agree representing 66.67% while others 2 respondent chose agree representing 33.33%. Lastly, the result of PPE Mobile Application is able to improve usage of PPE and safety awareness. The fair result shown 3 respondent that indicates 50% chose strongly agree and 50% more chose agree.

Table 3 : Result for Part C

Score	PPE Mobile Application is easy to use.	The interaction with the application is clear and understandable.	The application is able to be navigated.	The appearances of the system is attractive.
Strongly disagree	0	0	0	0
Do not agree	0	3	0	16.67%
Agree	50%	33.33%	33.33%	50%
Strongly agree	50%	66.67%	66.67%	33.33%

3 out of 6 respondents chose agree while others chose strongly agree in term of the application easy usage. This shown the percentages is 50% for agree and 50% for strongly agree. This proves that the application is simple to understand and user friendly.

Secondly, the majority of respondents which is 4 respondents chose strongly agree indicates the 66.67% responded towards interaction in PPE Mobile Application is clear and understandable. Thirdly, respondents chose strongly agree was 4 indicates 66.6% while 2 respondent chose agree that indicates 33.33% towards the application is easy to navigate event for the first time user.

Lastly, the respond towards the appearance of the PPE Mobile Application is attractive shows that 3 respondents agree and 2 respondent strongly agree with the appearance which represent 50% and 33.33%. 1 more respondent respond with disagree represent of 16.67%. Therefore this indicates that there are chances of upgrading the interface of the application for further research.

4. CONCLUSIONS

As a conclusion, PPE mobile application could help to improve the safety awareness and also help safety officer or supervisor monitoring the workers at construction site. This study successfully creates a new PPE Mobile Application that provides information and also can be enforced at site construction. Other than, this study emphasizes the solution as one of enforcement mobile application. This mobile application is created in order to help the officer especially Site Safety Supervisor and Site Supervisor in monitoring the workers at construction site. This research limitation is, it only applied to construction site PPE usage among the workers. For further research, the PPE mobile application could be expended to all types of hazards for all occupational safety, health and environment hazards existed.

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MODAL ANALYSIS WITH TRIMMED NURBS FINITE ELEMENTS

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ABSTRACT

Trimmed NURBS patches are used in many computer aided design programs and they are used in IGES format for surface representation. A recent enhancement of LS-DYNA allows computations with isogeometric shell finite elements based on trimmed NURBS. Moreover, LS-PrePost supports import of IGES files into LS-PrePost as trimmed NURBS, creation of trimmed NURBS finite elements and defining loads/boundary conditions for these elements. The goal of this research is to explore capabilities of the codes above for modal analysis of plate structures, focusing on performing modal analysis to a plate with five circular holes using quadratic trimmed NURBS. The CAD geometry was created by using Rhinoceros and the IGES file was imported into LS-PrePost as trimmed NURBS. The refinement for the geometry was using h-refinement method. The behaviour of the trimmed NURBS-finite elements were compared with the results achieved from standard element formulation. Results for 100 eigenmodes were extracted and compared with two types of standard shell formulation, ELFORM 16 (linear fully integrated shell element) and ELFORM 20 (quadratic fully linear assumed strain C0 shell). For a plate with holes, trimmed NURBS finite element with reduced integration and consistent mass matrix (INT0 CMM) produces good results for all boundary conditions and better than standard shell formulation.

Keywords: Trimmed NURBS Finite Elements, LS-DYNA

1. INTRODUCTION

Computer Aided Design (CAD) is the utilization of computer programs to create, modify, analyze or optimize a design. CAD geometry is exact and several thousand analyses of CAD designs are performed every day. CAD geometry is supplanted by Finite Element Analysis (FEA) geometry during engineering analysis process (Cottrell, Hughes, Bazilevs, 2009). This conversion is vital because geometry in CAD is commonly based on splines such as B-Splines and Non-Uniform Rational B-Splines (NURBS) whereas the geometry in FEA is generally based on Lagrange polynomials (Cottrell et al., 2009). The re-parametrization of the CAD geometry is time consuming (Cottrell et al., 2005, 2009) and may lead to errors in the geometry (Cottrell et al., 2005, 2009) owing to the fact that the mesh is only an approximate geometry as can be seen in Fig.1. Additionally, serious bottleneck happens in mesh refinement procedure where it requires interaction with initial CAD geometry (Cottrell et al., 2005, 2009).

Fig. 1. CAD geometry

Fig. 2. FEA geometry

Isogeometric analysis (IGA) provides an option to the traditional engineering analysis process that transforms CAD geometry for use in FEA. The main idea of IGA is to employ the same functions used to describe the geometry in CAD into FEA (Cottrell et al., 2005). Along this line, no model transformation is required and refinement can be performed on the analysis model while the exact geometry is saved in every refinement level (Cottrell et al., 2005). There are a lot of research activities in isogeometric analysis concentrated on the use of NURBS as basis function. The smoothness of the NURBS guarantees higher accuracy contrasted with Lagrange polynomial which is regularly used in conventional FEA (Cottrell et al., 2005). IGA enhance the overall engineering product development process by consolidates CAD and FEA into one (Cottrell et al., 2005, 2009).

Despite the fact that IGA is an exceptionally encouraging innovation, there are a few issues identified corresponding to the geometric modelling in CAD software. In commercial CAD software, trimming allows the creation of complex shape geometries. Trimming technique is used to crop unwanted surface areas and the remaining geometry is known as a trimmed geometry. Nevertheless, it is difficult to implement IGA on trimmed geometry because computing integral on trimmed element is challenging and according to (Marussig, Hughes, 2017) there is no canonical way to deal with trimmed models, neither in analysis nor in design, at least so far.

Nowadays, there are a lot of FEA software packages available for academic and industrial usage such as LS-DYNA, ANSYS and NASTRAN. A recent improvement of LS-DYNA allows computations with isogeometric shell finite elements based on trimmed NURBS (Hartmann, Benson, Lorenz, 2011; Hartmann, Benson, Nagy, 2016). Furthermore, LS-PrePost supports import of IGES files into LS-PrePost as trimmed NURBS (Hartmann et al., 2011; Hartmann et al., 2016), creation of trimmed NURBS finite elements and defining loads/boundary conditions for these elements.

2. METHODOLOGY

This paper focused on performing modal analysis to a flat plate with five circular holes using quadratic trimmed NURBS. The CAD geometry was created by using Rhinoceros and then the IGES file was imported into LS-PrePost as trimmed NURBS. The refinement for the geometry was using h-refinement method. This method decreases the element size and consequently increases the number of elements while the order of the shape function remains constant. The behavior of the trimmed NURBS-finite elements were compared with the results achieved from standard element formulation. A summary for this case study is given in Table 1.

Fig. 3. Plate with five circular holes
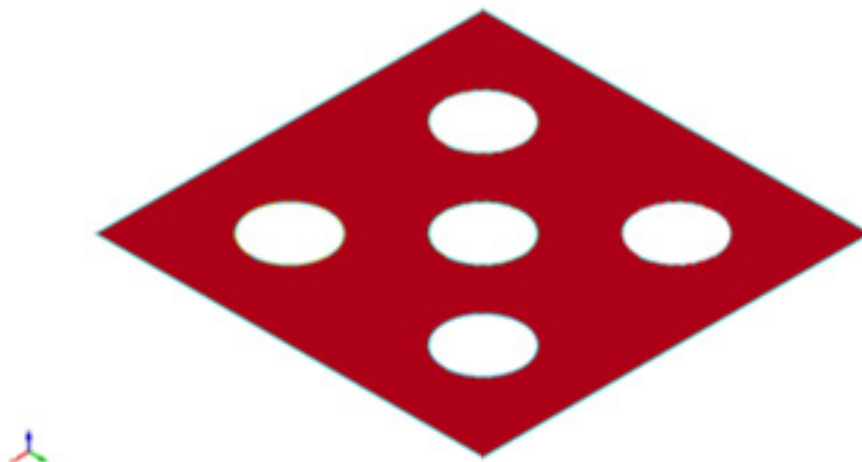
Table 1 Summary for the case study

	Trimmed-NURBS finite elements	ELFORM 16	ELFORM 20
Reference Solution			0.25 mm
Mesh size	4 mm	4 mm	4 mm
	2 mm	2 mm	2 mm
	1 mm	1 mm	1 mm
Polynomial order	2	1	2
Integration rules	Full integration	Full integration	Full integration
	Reduced integration	Reduced integration	Reduced integration
Mass matrix types	Row sum LMM	LMM	LMM
	Diagonal weighting LMM	CMM	CMM
	CMM		
Boundary condition	Fixed one end	Fixed one end	Fixed one end

3. RESULTS AND DISCUSSIONS

Results for 100 eigenmodes were extracted and compared with two types of standard shell formulations:
• ELFORM 16: linear fully integrated shell element
• ELFORM 20: quadratic fully integrated linear assumed strain C0 shell

However, this paper focused only for first ten eigenmodes because there is some loss of accuracy in the higher modes (Cottrell, Reali, Bazilevs, Hughes, 2006; Hughes, Evans, Reali, 2014).

Fig. 4 shows trimmed-NURBS finite element methods give less error compared with standard shell formulation especially ELFORM16 for mesh size 1 mm. Reduced integration with consistent mass matrix provides lowest error among other trimmed-NURBS formulation. Trimmed NURBS finite element with consistent mass matrix produces more accurate result rather than lump mass matrix. Interestingly, full integration with row sum mass matrix produces slightly equal result with uniformly reduced integration with diagonal weight mass matrix method. Overall, trimmed NURBS with reduced integration and consistent mass matrix gives the highest accuracy result for this case. Again, Fig.5 reveals that trimmed-NURBS finite element with reduced integration and consistent mass matrix produces the best result among all for mesh size 2 mm. As shown in Fig.6, trimmed-NURBS finite element with reduced integration and consistent mass matrix also provides the best result for coarse mesh 4 mm.

Fig. 3. Fixed one end: mesh size 1 mm
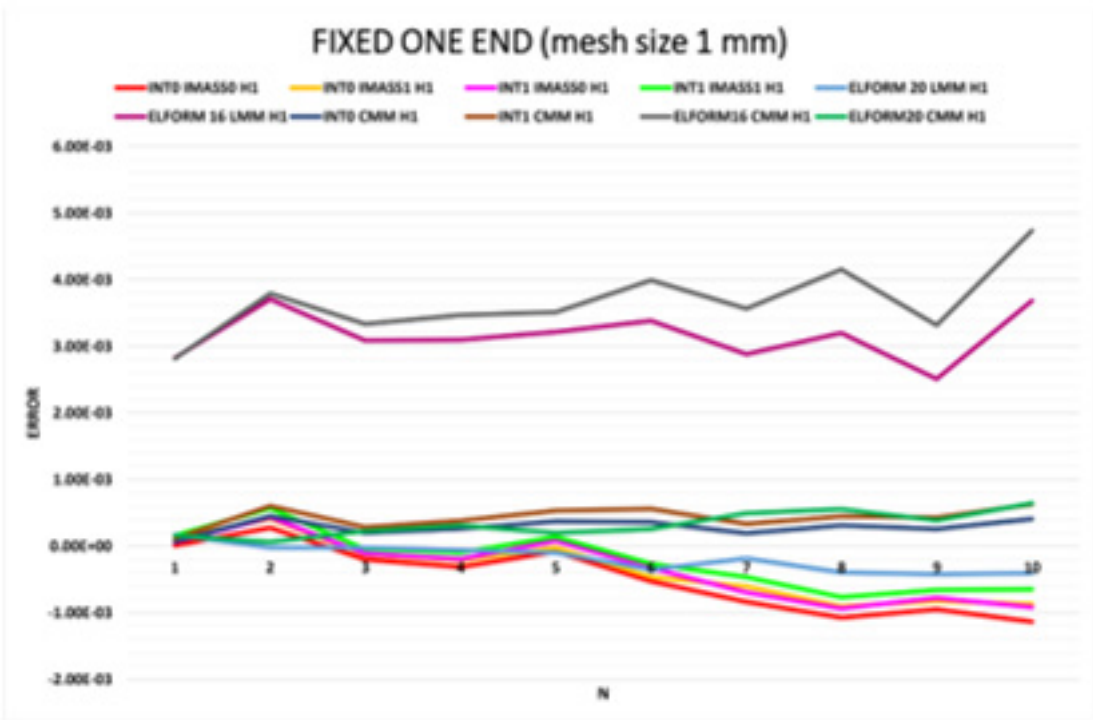
Fig. 4. Fixed one end: mesh size 2 mm
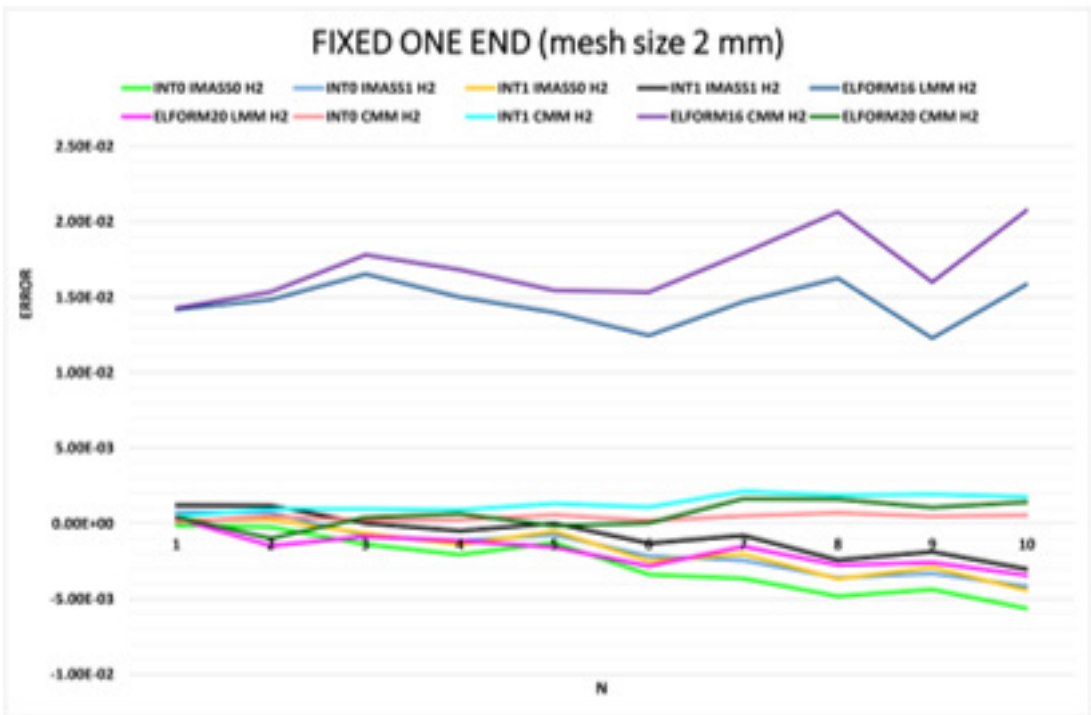
Table 2 presents the computational cost for fixed one end flat plate with five holes. It is clearly shown that the computational cost for trimmed-NURBS finite element is higher than ELFORM16 and ELFORM20. Decreasing the mesh size will lead to an increase in computation time of factor 1.5-3.4. Using consistent mass matrix requires more space storage than lumped mass matrix. By comparing all figures and table, it can be realized that an average element mesh size 2 mm produces good result for trimmed-NURBS finite element. The result for trimmed- NURBS finite element with 2 mm mesh size is better than standard element formulation with an average 1 mm mesh size.

Fig. 5. Fixed one end: mesh size 4 mm

Method	DOF	Mesh size	CPU time	Total memory
INT0 IMASS0	54 228	1 mm	33 s	47 MB
INT0 IMASS1	54 054	1 mm	33 s	47 MB
INT1 IMASS0	54 228	1 mm	33 s	49 MB
INT1 IMASS1	54 054	1 mm	34 s	49 MB
INT0 CMM	54 228	1 mm	34 s	47 MB
INT1 CMM	54 228	1 mm	36 s	49 MB
ELFORM16 LMM	48 120	1 mm	9 s	4.36 MB
ELFORM16 CMM	48 120	1 mm	10 s	4.4 MB
ELFORM20 LMM	48 120	1 mm	10 s	4.475 MB
ELFORM20 CMM	48 120	1 mm	10 s	4.514 MB
INT0 IMASS0	14 520	2 mm	10 s	15 MB
INT0 IMASS1	14 232	2 mm	10 s	15 MB
INT1 IMASS0	14 520	2 mm	10 s	15 MB
INT1 IMASS1	14 232	2 mm	10 s	15 MB
INT0 CMM	14 520	2 mm	10 s	15 MB
INT1 CMM	14 520	2 mm	11 s	15 MB
ELFORM16 LMM	12 132	2 mm	5 s	2.294 MB
ELFORM16 CMM	12 132	2 mm	6 s	2.303 MB
ELFORM20 LMM	12 132	2 mm	5 s	2.322 MB
ELFORM20 CMM	12 132	2 mm	5 s	2.332 MB
INT0 IMASS0	4 038	4 mm	6 s	5.97 MB
INT0 IMASS1	3 966	4 mm	6 s	5.97 MB
INT1 IMASS0	4 038	4 mm	6 s	5.97 MB
INT1 IMASS1	3 966	4 mm	6 s	5.97 MB
INT0 CMM	4 038	4 mm	6 s	6.172 MB
INT1 CMM	4 038	4 mm	6 s	6.291 MB
ELFORM16 LMM	3 234	4 mm	5 s	1.902 MB
ELFORM16 CMM	3 234	4 mm	5 s	1.902 MB
ELFORM20 LMM	3 234	4 mm	5 s	1.902 MB
ELFORM20 CMM	3 234	4 mm	4 s	1.902 MB
ELFORM20 LMM	748 428	0.25 mm	186 s	47 MB
ELFORM20 CMM	748 428	0.25 mm	198 s	48 MB

Several comparisons of mode shapes between trimmed NURBS finite element and standard formulation (Fig.6 – Fig.9) reveal the smoothness of trimmed NURBS finite element and the geometry of hole is exact.

Fig. 6. Mode 10: ELFORM16 CMM H2
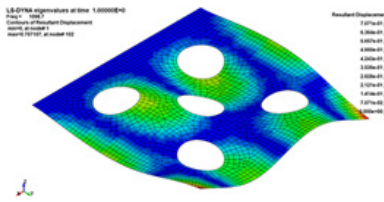
Fig. 7. Mode 10: ELFORM20 LMM H2
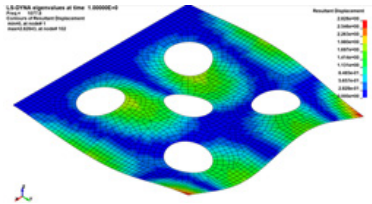
Fig. 8. Mode 10: INT0 CMM H2
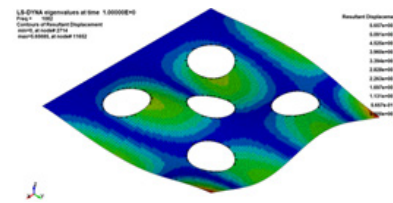
Fig. 9. Mode 10: INT1 IMASS0 H2
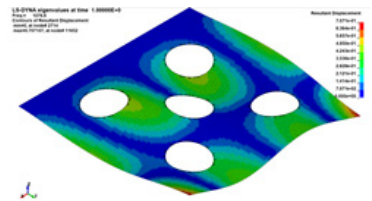
4. CONCLUSIONS

This paper concerned with the modal analysis of trimmed NURBS finite element using LS- DYNA. After the results were analysed, this research makes the following conclusions:

1.   For a flat plate with fixed one end boundary condition, trimmed NURBS finite element with reduced integration and consistent mass matrix (INT0 CMM) is able to gives the most accurate result.
2.   The suitable average mesh size for a flat plate with holes is 2 mm. This element size produces good result. The computation time is almost same with average element size 1 mm for standard element formulations
3.   The best option of lumping mass matrix for trimmed NURBS finite element is diagonal weighting.
4.   Trimmed-NURBS finite element is much more robust and accurate than standard finite element formulation ELFORM16.

Overall, trimmed NURBS element performs well with reduced integration and consistent mass matrix for a flat plate. Several suggestions for future works are:

• This paper only focused on quadratic order trimmed NURBS finite element. Therefore, an important area of future research is raising the order and compare the accuracy and computation cost as well.

• Since this research only valid for single NURBS patch, future works could be done for multipatch NURBS because usually one needs to use many NURBS patches to model complex geometry.

• Another area for further exploration is to set a boundary condition around trimmed surface for trimmed NURBS finite element. Currently, it is difficult to set a boundary condition at the trimmed surface. Thus, a research about this area is important to be carried out later.

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WORK BASED LEARNING (WBL) IN MALAYSIAN POLYTECHNIC TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET) SYSTEM

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ABSTRACT

Industrial revolution 4.0 (IR 4.0) had started to be implemented in several countries including Malaysia. The revolution wants strong engagement between institutions and industries to connect the requirement of industries and high skill of graduate students. One of the potential methods that could help connect both of this is Work Based Learning (WBL) to conduct Outcome Based Education (OBE) program. In this study, the Malaysian polytechnic student was follow the WBL programme, recognized relationship with an external organization/employer and the student undertaking work in various forms of engagement. The effectiveness of WBL programme in improving student's hard and soft skill was evaluated through observation and interview. SWOT analysis than used in order to show the ability and WBL sustainability of the programme. Most of the students shows their ability on improving their skill especially on work, communication and project management. This study potential to improve the quality of WBL programme by Malaysian polytechnic in order to serve industries with high skill workers. However, this system must be supported by flexibility of curriculum, good delivery methods and feedback, assessment, partnership with industries or internal and innovative teaching and learning program.

Keywords: WBL, TVET, T&L Revolution Industry 4.0, Malaysian Polytechnic

1. INTRODUCTION

In the era of Revolution Industry 4.0 (IR 4.0), the landscape of technological education is transformed and the rapid development in technology changes the way of teaching and learning (T&L) process especially in Technical and Vocational Education and Training (TVET) [1]. The effectiveness of TVET depends on how the educational process is delivered to students and Work Based Learning (WBL) could guarantee the success of this program [2]. The combination of workplace training with class oriented learning in WBL enhance the relevance of TVET by providing students with practical skills and working experiences. The philosophy of WBL is based on the concept that students need to be involved in real working situation and at the same time linked the theory and practice in a balanced and meaningful ways [3][4]. According to Rasul et al (2014) industries and TVET institutions not only shared the benefits of WBL but this approach also gives positive impact on T&L culture [5]. WBL approach in TVET started at 1960s and rapidly grew in the middle of 1990 and it focuses on business, engineering and nursing education [6]. In Malaysia, formal WBL approach was implemented first by community colleges and followed by polytechnics [5]. According to Rokimah et al (2014), the WBL model used in Malaysian polytechnic is a structured T&L activity involving work experiences and industrial environment based on three main core elements consisting of students, institutions and industry. These three core interrelationships are to achieve the objectives in producing knowledgeable and highly skilled students in order to meet the needs of industries[7-9].

Collaboration with the industries and the education institutions are the major rising concern in many developing countries like Malaysia. International recommendations of the United Nations Educational, Scientific and Cultural Organization for the improvement of technical education and vocational training systems systematically referred to the need to forge closer links between training and the labor market. Work-based Learning (WBL) is the most pronounced linkage [10]. Politeknik Ungku Omar as a TVET institution takes the initiative to collaborate with the industries in Work-based Learning implementation.

In 2014, Polytechnic Ungku Omar (PUO) commenced WBL program of Bachelor of Manufacturing Engineering Technology in Supply Chain Management for undergraduate study and this program was run on a work-based basis learning in collaboration with several related industries. Therefore, this study focuses on identifying the effectiveness of WBL program in Polytechnic based on the student's perspectives and experiences. This study also aims to provide potential improvement of WBL program to be more effective in the future.

Politeknik Ungku Omar as a TVET institution offers its first bachelor degree in Mechanical Engineering Department. Bachelor in Manufacturing Engineering Technology (Supply Chain Management) (BMS) consists of two disciplines areas, which are Manufacturing Engineering Technology and Supply Chain Management. It is a 4 year programme for diploma in Mechanical Engineering Department leavers.

Table 1. Number of semesters for BMS for polytechnic leavers.

1st Semester (Sem)	2nd Sem	3rd Sem	4th Sem	5th Sem	6th Sem	7th Sem	8th Sem
Exempted		Polytechnic Campus				WBL	

Most of the Supply Chain management courses offered during WBL while manufacturing engineering technology, which consists of 70 percent of credit hours, is offered in polytechnic classrooms. The program started on September 2014 Session for its first cohort. The student admission is once a year during September Session.

WBL in Bachelor in Manufacturing Engineering Technology (Supply Chain Management) (BMS) is an approach of teaching and learning in real working situation. It is a structured curricular activity during internship. It gives chances to the student interact effectively with personnel in industry. The job scope of each course are the main activities in the area.

Courses offered in WBL for Bachelor in Manufacturing Engineering Technology (Supply Chain Management) (BMS) are

For 7th semester courses
i) Project 1
ii) Purchasing
iii) Transportation
iv) Quality Control

For 8th Semester courses
i) Project 2
ii) Warehouse Management
iii) Logistics

Fig. 1. WBL Industries Partnership
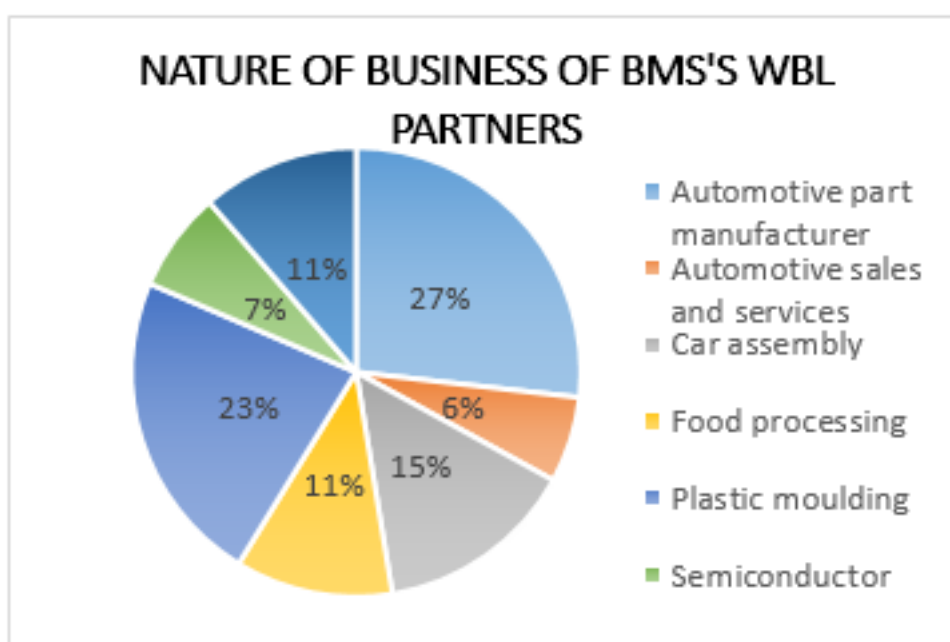
2. METHODOLOGY

SWOT analysis is the most important tool for decision makers in strategic management process, because it enables the managers to discover and collect the facts that resulted from internal and external analysis. This analysis can be a good base for strategy formulation, but it is not non-defect. It includes no means of analytically determining the importance of factors or assessing the fit between SWOT factors and decision alternatives and is mainly based on the qualitative analysis.

3. RESULTS AND DISCUSSIONS

The students of Bachelor in Manufacturing Engineering Technology (Supply Chain Management) (BMS) graduated 2018. Two cohorts had already graduated and are active industrial players for manufacturing and supply chain areas.

Fig. 2. Graduates Employability for First Cohort
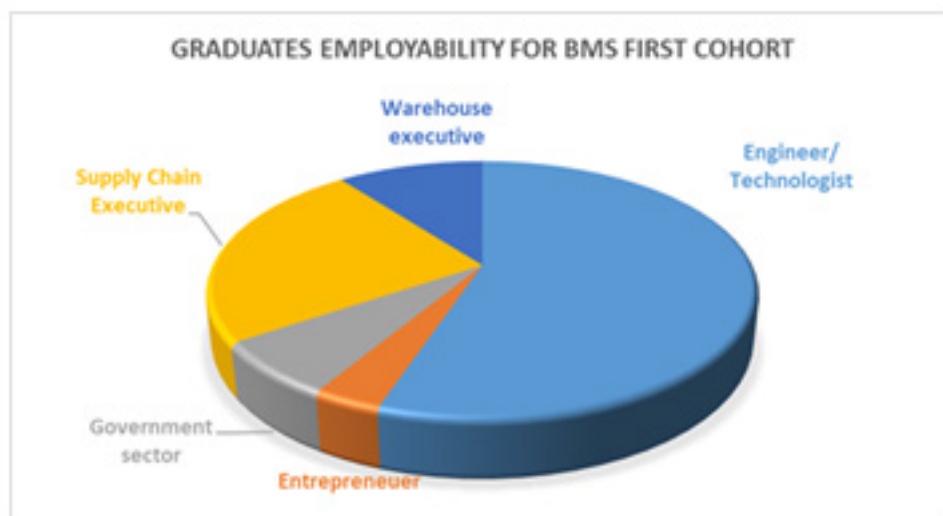
Fig. 3. Graduates Employability for Second Cohort
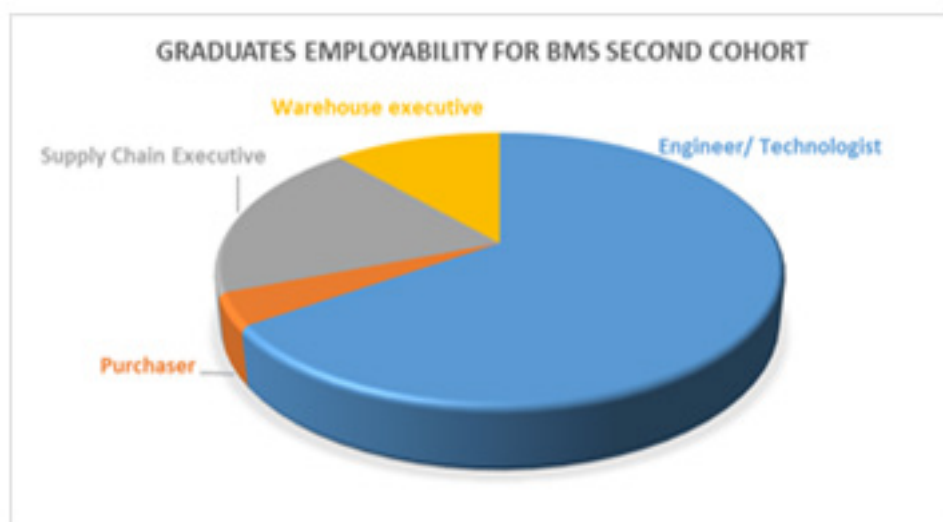
Fig. 2 and Fig. 3 show the employability of graduates of first and second cohorts for Bachelor in Manufacturing Engineering Technology (Supply Chain Management). The employability of graduates is 100%. Most of them are in manufacturing industries and hold various positions in the industries.

Fig. 4. Company satisfaction on WBL Implementations.
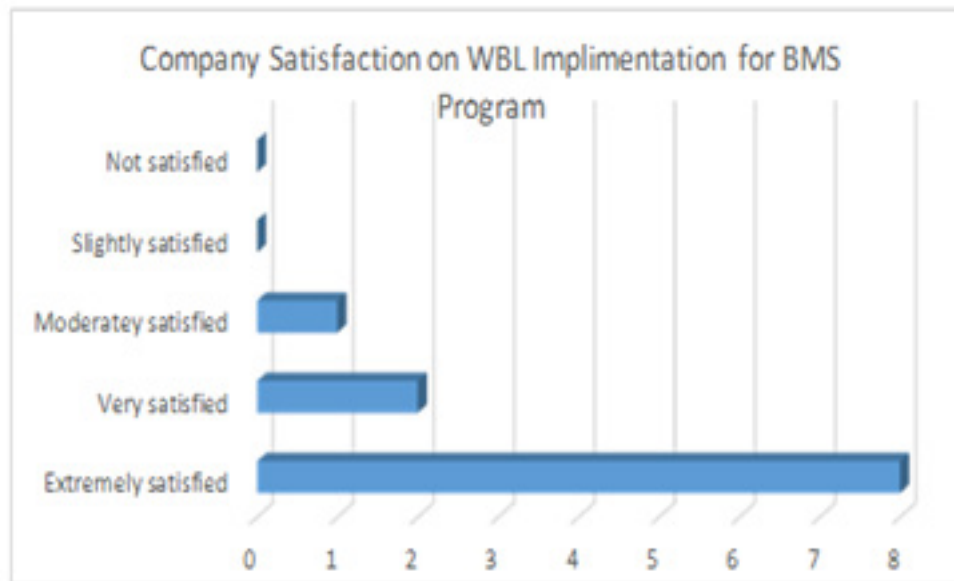
In order to get the result and data for SWOT analysis, questionnaires have been distributed among 11 industry partners take part in WBL for Bachelor in Manufacturing Engineering Technology (Supply Chain Management). Figure 4 shows, 8 out of 11 industries are extremely satisfied with the implementation of WBL in their company. It shows that WBL is a good approach to fulfil the gap between TVET institution and the industry. Two out of 11 are very satisfied and one is moderately satisfied. There are rooms for continuous improvement. The company concern about student's time management, lack of supervision and general job scopes need to update with each company practices.

3.1 Strength

3.1.1 Graduates

In the apprenticeship program in WBL, the students with technical knowledge will be able to get a job in the industry. The enhancement of employability & economic stability will be ultimate ambition in this regard. WBL for Bachelor in Manufacturing Engineering Technology (Supply Chain Management) has employability rate of 100%. It seems the programme and collaboration with industries give added value to the graduates. The graduates are used to the working situation and can easily adapt to the environment. BL polishes the self-development of the students [11]. Proper attitude and psychological setup such as motivation are required to integrate new technologies in real situation [12]. The collaboration indicates the relations between theories and practical thing that is required for the job and enhance the employability skills. The success of the WBL depends on supporting learning experience of these collaborations and highly on suitable matches between the student's field of study and the industry field [13-14].

3.1.2 Academic Staff and TVET Institution

From the observation activities, the academic staff obtained the opportunity to gain knowledge and new technologies implemented in industry. It also will eliminate the gap between theoretical and real practical imposed in industry. The collaboration increase the knowledge as well as the skill of the TVET people. The TVET institutions will have the link with their home industries to determine their standard and to develop their own curriculum. In most emerging economies, educators and industry operate in different worlds and often have little contact with each other [15].

3.1.3 Industry

Industry organizations and associations have been more actively participating in TVET from developing policies to deliver training because they now acknowledge that linking industrial production with training is the most effective way to increase productivity. Industry now view this collaboration as the best way to prepare their trainees for future employment. The industry can absorb the graduates without prior training cost for new recruitment. WBL gives extra workforce for the industry and it will compensate high labor turnover of the company [16].Another benefit for the company is the solution for the company's problems. Project research and innovation based on the real company's problems. Project 2 requires students to do some research and get the solution to improve company management.

3.2 Weakness

Lot of money involved for observation purposes. As a government institution, the expenses for operational and management come from the government pocket. It will face uncertainty based on number of students and allocation for WBL. Mostly companies involved in WBL are in Selangor, it will lead difficulty to supervise project progress and the sustainability of the programme. Supervising and monitoring by institution is carried out three times a semester. The Polytechnic curriculum created by academics with little or no understanding of industry requirements or local needs. The job scopes are designed based on general knowledge of the subject matters. The job scopes may not be suitable for some industries and it will lead to difficulties in monitoring and supervising processes. These students are allocated to the industries which have strong collaborations with the educational institutions.Thus, it becomes very difficult for students to be allocated to their desired companies. This in turn brings about logistic problems to the students. The allowances given by industries to these students are very minimal.

3.3 Opportunities

TVET institutions need to strengthen links with industries to improve networking between academia and industries to create a better understanding of each other's needs and to identify how they can be met through the industry programs. The TVET institutions will have the link with their home industries to determine their standard and to develop their own curriculum. In order to get the up to date technologies and best practices in industry, academic staff from TVET institution can take part for industrial attachment in the industry in Lecturer Attachment in industries [17]. It gives more chances to explore and gain the knowledge to share with students in a classroom.

3.4 Threat

Lack of employer incentives from the government has also discouraged industry participation. The government has not provided sufficient financial incentives and reward programs to encourage industries to collaborate with TVET institution. This has demotivated industries to continue supporting WBL implementation.It also not adequate and as a result they become demotivate to provide training to the students. Collaboration with the industries is hard to sustain because of the difficulty to be controlled by an administrator. The administrator should have special interest in the objectives of collaboration. The administrators of both institutions might have special control unit to ensure the smooth program in both of the places.

4. CONCLUSIONS

The successful implementation of any WBL collaboration can be condensed into some key factors: clarify the purpose; follow function, involve the right people and get it in writing. Industry mentors and TVET institution supervisors are key factors in the successful implementation of the WBL program. They can be seen as the bridge in the industry-TVET institution working relationship [18]. The supervisor is in the position to strike a balance between the requirements of the degree award and industry needs and ensure the candidate is not torn between the two as the meeting point in the industry needs and requirements may have to be negotiated sometimes. The students feel Work-based Learning provides them with the real experience that they can link to the theoretical knowledge that polytechnics have exposed them to. Observation and analysis indicate these Work-based Learning do improve student's soft skills as expected. One of the major features of WBL collaboration is its emphasis on the preparation for trainees' employment. Benefits are observed on both sides although there are issues to cope with of various procedures. Issues relating to the sustainability of the collaboration initiatives are mainly the continuity of governance, a better understanding of multiple collaborators' needs and ensuring commitment in collaborative programs [19]. Successful collaboration can be achieved with the right environment and supportive organizational structure; a win-win partnership towards mutual benefits for both sides [20].

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CHANGES IN PROFITABILITY DUE TO THE AMENDMENT IN THE RETURNS OF RECEIVABLES AND CASH FLOWS IN PT. SURYA TOTO INDONESIA

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ABSTRACT

The objective of this study is to find out how the changes that occur in profitability due to changes in accounts receivable turnover and cash flow turnover at PT. Surya Toto Indonesia. The analysis of correlation coefficients, linear regression test, Hypothesis Test and test coefficient of determination was used as methods for studies. The results showed that the value of F_count of 7.653 is greater than F table which is 4.46, meaning that there is a contribution between the accounts receivable turnover and cash turnover simultaneously to ROA. From the results of the regression analysis it is also known that the independent variables have a significant effect on the dependent variable.

Keywords: Profitability, Receivable Turnover and Cash

1. INTRODUCTION

With the existence of free trade in Asia which is often referred to as MEA (Asian Economic community) requires companies to continue to innovate products, improve employee performance and expand their businesses so they can continue to survive and compete. To be able to maintain its business the company should be able to get the maximum profit from every sale of products made. In addition to maintaining the viability of the company, working capital management is also an indispensable component of the company to maintain liquidity, solvency and profitability. Profitability reflects the company's ability to generate profits. High profitability can support the company's operational activities to the maximum. Thus, one way that can be done to determine the high or low profitability of a company is to look at the effectiveness of working capital management carried out by the company.

Cash and receivables turnover is a working capital management that must be considered in the company's operational activities so that the face-to-face company can operate smoothly. Cash turnover is a period of cash spinning starting at the time when the cash is invested in working capital with the highest level of liquidity. This means that the greater the amount of cash the company has, it means that it is likely that the turnover will be lower.

Companies with cash that always increases every year, means the amount of cash embedded is smaller so that the flow of funds back into the company more smoothly. The smooth flow of funds can increase subsequent sales volume. High sales volume can increase profitability. And vice versa, the lower the turnover rate means the longer the time bound in working capital, means that cash management is less efficient and tends to reduce profitability.

Besides cash, another component is accounts receivable, not a few companies that sell their products on credit to customers. Credit sales of this kind are often done by companies in order to increase the number of sales of their products in the market, given the increasingly competitive situation.

The issue of receivables becomes important when the company must assess and consider how much the optimal amount of receivables. Given the importance of these receivables, company receivables must be managed efficiently with costs incurred due to the existence of receivables. PT. Surya Toto Indonesia, Tbk. is one of the companies engaged in sanitary products, fittings and kitchen systems as well as other activities related to these products. In an effort to face increasing competition the company continues to innovate and develop products in order to continue to be able to survive and develop. The way to do this is to continue to increase sales both in cash and on credit so that cash circulation and accounts receivable turnover at the company becomes important to pay attention to. The following is a summary analysis of PT. Surya Toto Inodonesia, Tbk. period from 2007 to 2016.

Table 1. Summary of Analysis of Ratio FinanceSummary of Analysis of Ratio Finance

Year	Cash Turnover	Receivable Turnover	Profitability		
				ROE (%)	ROI (%)
2007	12,43	5,29	9	17	6
2008	11,85	5,78	8,8	31	18
2009	6,10	4,39	25,2	31	18
2010	5,70	4,41	23,8	29	16
2011	6,43	4,42	21,87	26	16
2012	7,61	4,23	22	23	14
2013	7,56	3,89	18,5	24	145
2014	12,20	4,07	18,8	23	14
2015	18,15	4,17	15,64	10	6
2016	13,11	4,03	9,7	17	6

Source: Preliminary Survey, 2018

Yanivi S. Harahap and Nurwahyu (2005: 42) state that: The higher the level of cash turnover means the faster the return of cash into the company. Thus the cash will be used again to finance operational activities so that it does not interfere with the company's financial condition. Lukman Syamsuddin (2010: 49), states that: The higher the level of accounts receivable turnover means the faster the funds invested in receivables can be billed into cash.

Referring to the description above, the writer wants to analyze and to find out how changes profitability due to changes in the accounts receivable turnover and cash flow turnover at PT. Surya Toto Indonesia, Tbk. the.

Identification of   problems

Based on the description and table above shows that changes in profitability are caused by many variables (factors) including cash turnover and accounts receivable turnover. Financial ratio analysis at PT. Surya Toto Indonesia, Tbk. which is unstable (fluctuating) during 2007 to 2016.

Restricting the problem

Considering the number of variables (factors) that cause changes in profitability, so that this research is more focused, the research in this paper is limited to changes in Return On Assets caused by changes in the Gases Turnover and Receivables Turnover.

Formulation of the problem

Taking into account the identification and limitation of the problems above, the following problems can be formulated in this study:

1)   Are there any changes in Return On Assets due to changes in the cash turnover ?
2)   Are there any changes in Return On Assets due to changes in receivables turnover ?
3)   Is there a change in Return On Assets due to changes in the cash flow and receivable turnover together ?

Overview of Theory and Framework

Theory Review

G.R. Terry (2010: 16) stated that management is a typical process consisting of planning, organizing, mobilizing, and controlling actions to determine and achieve goals through the use of human resources and other resources. According to Rivai (2010: 2) management is the science and art of managing the process of utilizing other resources efficiently, effectively and productively is the most important thing to achieve a goal. According to Hasibuan (20161: 2), management is the science and art of regulating the process of utilizing human resources and other resources effectively and efficiently to achieve a certain goal.

From a number of definitions above, it can be concluded that management is a process or activity ranging from Planning, Organizing, Acting, and Controlling to achieve predetermined goals effectively and efficiently.

Irham Fahmi (2015: 2) argues that financial management is an amalgamation of science and art that discusses, examines and analyzes how a financial manager uses all company resources to find funds, manage funds and divide funds with the aim of providing profit or prosperity. For shareholders and business sustainability (sustainability) for the company. Horne, James C. Van and John M.Wachowics Jr. (2012: 2) in his book entitled Fundamentals of Financial Management which has been translated into Principles of Financial Management states that financial management is related to the acquisition of assets, funding and asset management based on several general objectives.

According to Sofyan S. Harahap (2010: 105), financial statements are reports that describe the financial condition and results of operations of a company at a certain time or a certain period. According to Mamduh M. Hanafi and Abdul Halim (2009: 63) Financial statements are reports that are expected to provide information about the company, and combined with other information, such as industry, economic conditions, can provide a better picture of the company's prospects and risks. Financial statements according to the Indonesian Institute of Accountants (2009: 1) are financial statements covering part of the financial statement process. Complete financial statements usually include a balance sheet, income statement, statement of changes in equity, statement of changes in financial position (which can be presented in various ways, for example, as a statement of cash flows / statements of funds flows), notes and other reports and explanatory material that are an integral part from financial statements. n to sales, total assets and own capital". Raharjaputra, (2009: 195): "Profitability is the company's ability to obtain profit or profits, which has to do with sales, total assets, and own capital". ROA shows the company's ability to generate profits from the assets used. ROA is the most important ratio among the existing profitability ratios. ROA is obtained by comparing net income to total assets. Systematically ROA can be formulated as follows:

Receivables turnover is an activity ratio that measures a company's ability to use available funds as reflected in capital turnover. The accounts receivable turnover ratio provides an overview of the quality of the company's receivables and how successful the company is in its collection. The faster the accounts receivable turnover indicates that capital can be used efficiently. This is in line with the statement made by Munawir (2012: 75) namely "The higher the circulation of receivables, shows that working capital invested in receivables is low. On the contrary if the ratio is lower means there is over investment in receivables so that requires further analysis, the cause is possibly because the credit and billing departments are ineffective or there may be a change in lending policy. According to Kasmir (2010: 141), "The cash turnover ratio is the ratio between sales and the average amount of cash that is functioning to measure the level of adequacy of the company's working capital needed to pay bills and finance sales". Nafarin (2007: 308) argues that "Relatively small amounts of cash will enhance cash cycles and increase profitability, but with less (too small) cash can disrupt the ability to pay (illiquid) when there are bills, which in turn will also disrupt profitability"Framework for Thinking

Thinking framework is a research flow so that it is easy to understand based on the theories of the variables used in research. As for this study entitled "changes that occur in profitability due to changes in the accounts receivable turnover and cash flow turnover" so that the theoretical framework of thought is as follows:

1).   Changes in ROA due to changes in the accounts receivable turnover
Ratio of receivable turnover or also called Receivable Turnover Ratio / RTO is a ratio that uses net credit sales or net sales to the company's average receivables.
2).   Changes in ROA due to changes in cash turnover
The ratio of cash turnover or also called cash turnover ratio / CTO is a benchmark used against the net sales of a company against the average cash owned by the company.
3).   Changes in ROA due to changes in accounts receivable turnover and cash turnover
Aulia Rahma and Reddy (2011) state that working capital management consisting of cash turnover, accounts receivable turnover has a positive and significant effect on company profitability. Based on the theories above, the framework in this study can be described as follows:
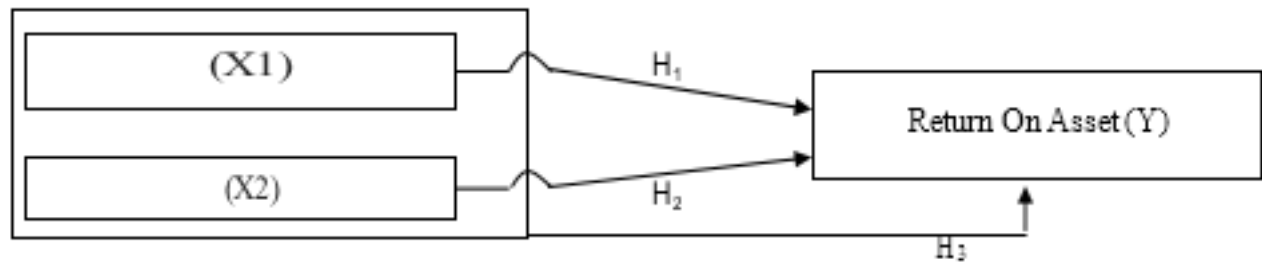
Hypothesis

According to Sugiyono (2013: 64) Hypothesis is a temporary answer to the research problem formulation, where the research problem formulation has been stated in the form of questions, said to be temporary because the answers given are only based on relevant theories, not yet based on empirical facts obtained through collection data.
Based on the picture above to conclude the following hypothesis are formulated:
1)   H1 = Allegedly there was a change in ROA due to changes in the accounts receivable turnover
2)   H2 = It is suspected that there is a change in ROA due to changes in cash turnover
3)   H3 = It is suspected that there is a change in ROA due to changes in accounts receivable turnover and cash turnover.

Research Methodology

This research is quantitative descriptive, which is conducting research that illustrates the financial condition of a company expressed in the form of numbers. Analysis unit in the study is the analysis of financial statements of PT. Surya Toto Indonesia. from 2007 to 2016.

Data Analysis Methods

The analytical method used in this analysis includes:
1)   Correlation Coefficient Analysis
Correlation coefficient analysis is a statistical method used to determine and determine the direction and strength of the relationship between two or more variables.

Table 2. The Interpretation of Correlation or Coefficients

Interval		Description
Positive	Negative	
r = 0,00	-	There is no correlation
0,00 < r < 0,20	-0,20 < r < 0,00	The correlation is very weak
0,20 < r < 0,40	-0,40 < r < 0,20	Weak correlation
0,40 < r < 0,60	-0,60 < r < 0,40	Correlation is quite significant
0,60 < r < 0,80	-0,80 < r < 0,60	Strong correlation
0,80 < r < 1,00	-1,00 < r < 0,800	Correlation is very strong
r = 1,00	r = -1,00	Perfect correlation

Source: Sugiyono (2012: 184)

2)   Linear Regression Test

Priyatno (2014: 148), states that "multiple linear regression analysis is used to determine the effect or linear relationship between two or more independent variables with one dependent variable". According to Sugiyono (2010: 277) the formulation of the multiple regression equation itself is as follows :

$$Y = a + b_1X_1 + b_2X_2 + e$$

3)   Hypothesis Test

According to Sugiyono (2013: 84), there are 2 types of hypotheses, namely the statistical hypothesis and the research hypothesis. The difference between the statistical hypothesis and the research hypothesis, is the existence of significance in the statistical hypothesis, while the research hypothesis does not use significant words.

4)   Test the coefficient of determination

The coefficient of determination test aims to measure how much the independent variable can explain the dependent variable. The formula of the coefficient of determination (KD) is as follows :

$$Kd = r^2 \times 100\%$$

Analysis and Discussion

Correlation test

1) Partial Test

Table3
Partial Correlation Test Results
Correlations

		Roa	Cash Turnover	Receivables Turnover
Pearson Correlation	Roa	1,000	-,690	-,467
	Cash Turnover	-,690	1,000	,058
	Receivables Turnover	-,467	,058	1,000
Sig. (1-tailed)	Roa	.	,014	,087
	Cash Turnover	,014	.	,437
	Receivables Turnover	,087	,437	.
n	Roa	10	10	10
	Cash Turnover	10	10	10
	Receivables Turnover	10	10	10

Source: SPSS version 23.00 output

a) The value of the Pearson Correlation accounts receivable turnover against ROA is -0.467. The value of r = -0.467 in the range of -0.60 to -0.40 means that it is included in the strong enough correlation category, with a significance value of 0.087.
b) Pearson Correlation value of cash turnover towards ROA is -0,690. The value of r = -0.690 in the range of -0.80 to -0.60 means it is included in the category of strong correlation, with a significance value of 0.014.

2) Simultaneous Test

Simultaneous Correlation Test Results Model Summaryb

Model	R	R Square	Ajusted R Square	Std. Error of the Estimate
1	,812a	,659	,562	0,4108

Source: SPSS output 23.00
a. Predictors: (Constant), Receivables Turnover, Cash Turnover
b. Dependent Variable: ROA

Based on the table above, the value of R = 0.812. This value is included in the range of 0.80 to 1.00. This shows that the simultaneous correlation between accounts receivable turnover and cash turnover variables on ROA is very strong.

4.2 Regression Test

Table 4. Multiple Linear Regression Test Results Coefficientsa
Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,475	106		4,476	,003
	Receivable Turnover	-,040	,021	-,429	-1,941	,093
	Cash Turnover	-,010	003	-,665	-3,009	,020

Dependent Variable: ROA
Source: Multiple Linear Regression Test Results using SPSS Version 23.00

Referring to the table above, the linear regression equation can be arranged as follows: $Y = \alpha + bX^1 + bX^2 + ei$
From the table 4 and linear regression equation above, it can be said :
a)   A constant value of 0.475 is known. This shows that the accounts receivable turnover and cash turnover are constant or equal to zero, the amount of profitability measured by ROA of 0.475
b)   Coefficient X^1 of -0.040 states that each addition of one unit of accounts receivable turnover will reduce profitability measured by ROA by 0.040.

c)   Coefficient X^2 of -0.010 states that each additional cash turnover by one unit will reduce profitability measured by ROA of 0.010.

4.3 Hypothesis Test
1)   Partial t test aims to examine the effect of each independent variable (cash receivable turnover and cash turnover) on the dependent variable (ROA). The results of the regression coefficients analysis can be seen in the table below:

4.3 Hypothesis Test
1)   Partial t test aims to examine the effect of each independent variable (cash receivable turnover and cash turnover) on the dependent variable (ROA). The results of the regression coefficients analysis can be seen in the table below:

Table 5. Partial t Test Results
Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,475	106		4,476	,003
	Receivable Turnover	-,040	,021	-,429	-1,941	,093
	Cash Turnover	-,010	003	-,665	-3,009	,020

a.   Dependent Variable: ROA

Referring to the table above it is known that accounts receivable turnover has a t-count of -1,941 while t-table -2,365 so that t-count <t-table with a variable significance level of
0.093 is greater than the significance level of 0.05. Then it can be concluded that partially the accounts receivable turnover has a negative but not significant effect on ROA. Whereas the cash turnover has t-count of -3.009 while t-table -2.3365 so that t-count> t- table with a variable significance level of 0.020 is smaller than the significant level of
0.05. So it can be concluded that partially cash turnover has a negative and significant effect on ROA. The results of this study are in accordance with research conducted by Irman Deni (2016) which states that cash turnover has a negative and significant effect on profitability partially.

2)   Test F or Anova (Simultaneous)
The F value in Anova table is to see whether the model used is correct or not. The results of the analysis in this F Test can be seen in the following table :

Table 6. F Test Results (Anova)
ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	242,205	2	121,103	7,653	,017b
	Residual	110,766	7	15,824		
	Total	352,971	9			

a.   Dependent Variable: ROA
b.   Predictors: (Constant), Receivables Turnover, Cash Turnover Source: F Test Results using SPSS Version 23.00

Based on the above table, it is known that the F_count value is 7.653 which is greater than F_table which is 4.46 so that Ho is rejected. Thus Ha is accepted, namely there is a contribution between the accounts receivable turnover and cash turnover simultaneously against ROA. The significance value of 0.017 <0.05, the regression model can be used to predict the value of ROA. From the results of the regression analysis it can also be seen that together the independent variables have a significant influence on the dependent variable. This is in accordance with research conducted by Oktary Budiyansyah and Ni Ketut Purnawati (2015). His research concluded that cash turnover and accounts receivable turnover together- the same effect on profitability.

4.4 Test Coefficient of Determination

Table 7. Determination Coefficient Test Results Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,812a	,659	,562	,04108

a.   Predictors: (Constant), Receivables Turnover, Cash Turnover
b.   Dependent Variable: ROA
Source : Determination Coefficient Test Results using SPSS Version 23.00

From this table it is known that the coefficient of multiple determination (R2) = (0.812) ² = 0.659 or 65.9% shows that 65.9% of the changes in ROA are due to changes in the cash receivables turnover and cash turnover, while 34.1% is due to changes in other variables not examined.

Conclusions

The results showed that both partially both accounts receivable turnover and cash turnover had a negative effect on profitability (ROA), by providing a change of 65.9%
Suggestions
1)   From the results of this study, companies should be more effective in managing accounts receivable to achieve high profitability, and companies are expected to increase the amount of cash turnover, in order to be able to use cash as efficiently as possible to be effective and efficient in cash control.
2)   For the next researcher, it should be able to add independent variables to find out the changes that occur in ROA or add units of analysis and also examine different companies.

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AUGMENTED REALITY (AR) GAMIFICATION APPLICATION IN TECHNICAL & VOCATIONAL EDUCATION TRAINING

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Politeknik Ungku Omar

ABSTRACT

Nowadays, Augmented Reality (AR) introduces interactive experience of real world environment. This paper presents the development of gamification application in augmented reality for Technical & Vocational Education Training (TVET). This approach is based on the client/server architecture. On the server side, the standard academic software Easy AR platform is used for real time pattern recognition processing, enabling the quick Augmented Reality application creation. Adobe Animate technology is used to get a well-designed friendly graphical client interface. The implementation of this application provides students in an amusing and straightforward way, all the information they required to both facilitate and increase their learning process. The computer-generated content that overlays the real-world environment is relates to the laboratory practices and equipment. Besides that, this application has incorporated innovative features that make augmented reality sensible. The findings revealed that the nearly true environment simulation can attract students and enhance their understanding in the training's area.

Keywords: Augmented Reality (AR), Gamification, Education Technology, Real-time environment

1. INTRODUCTION

Recently, the emerging technology on Industrial Revolution 4.0 (IR4.0) has influence the teaching & learning strategies. New technologies surrounding gamification and augmented reality are giving educational institutions new and innovative ways to engage and motivate, and offer different strategies to pique a student's natural desire to learn (Chen, Saad, & Yin, 2018). Gamification in (Stott & Neustaedter, 2013) refers to the application of game design elements to non-game activities and has been applied to a variety of contexts including education.

Various elements have been used in gamification to increase user engagement. Examples of these elements include points, badges, leaderboards, and storyline (Moreira, Durao, Pereira, & Ferreira, 2017). Educational institutions are interested in gamification of education, where educators create gamified learning environments to enhance learner engagement and improve learning outcomes (Pascoal & Sofia, 2018)(Camba & Contero, 2015). Given the potential of gamification of education, educators are interested in identifying game design elements that have been used to gamify education as well as the impact on learner outcomes.

The use of conventional games in education has been a widely accepted as method of learning for many years, but as technology evolves, so does the level of engagement students have with the games they are playing in class. In this new era (Chen et al., 2018), the system of grading students is like a game anyway – students are given the opportunity to make achievements and go up levels until they eventually proficient.

In the other hands, games provide students with a more incremental sense of achievement, offering badges, trophies, points and the chance to 'unlock' achievements, rather than assessments and grades (Nah, Telaprolu, & Rallapalli, 2013). As a student makes small gains and earns points or badges, the sense of motivation and achievement is constant and small, rather than being a long haul with a big test at the end (Süncksen et al., 2018). A really important factor in this kind of achievement system is the allowance of students to experience trial and error – by allowing students to make mistakes and fail in a low-stakes environment, they can learn by doing and experimenting (Eleftheria, Plessa, Chatziparadeisis, Tsolis, & Tsakalidis, 2013). The word 'failure' is a terrifying one for students, but it is a necessary part of the learning process.

There are other benefits of gamification using AR in education. By giving students a new way to engage with the course material, there is a possibility to alter their own perceptions of themselves when it comes to learning and assignment (Dicheva, Dichev, Agre, & Angelova, 2015). A student who has a hard time fitting into a classroom environment can try a different persona in a game setting and has the freedom to experiment within that. If explored correctly, this can be a boost to a student's self-confidence and a real motivating factor (Korn, Buchweitz, Rees, & Bieber, 2019).

Of course, the gamification of education brings with it challenges and pitfalls. Students are smart, and normally will not respond well to games where the learning is sneaked into the gaming session (Gopalan, Zulkifli, & Aida, 2016). There is also the issue in TVET education that when a student is made to play a game, some of the freedom and fun of the game evaporates – it becomes more and more like assignment. Games that are created specifically for technical vocational education and training need to look closely at these problems and find creative solutions to properly complement coursework. Hence, this paper surveys the effects of gamification in TVET training with application of Augmented Reality (AR) in which 3D virtual objects are integrated into a 3D real environment in real time.

2. METHODOLOGY

Augmented reality, or the addition of a layer of digital media to enhance the real world around us, offers a similar set of benefits and drawbacks to gamification in education (Sirakaya & Çakmak, 2018). The technology associated with augmented reality has a real wow factor and the novelty is immediately engaging for students. But there are deeper, more ongoing benefits with augmented reality, and tools are being created to provide engaging learning strategies for students.

Educators are already using geotagging and airtagging to let students find extra digital information in real locations using smartphones, a technique that can be used on field trips or in scavenger hunts and gives the student a real sense of discovery (Barkova et al., 2018). Augmented reality can also be used to visualise diagrams or concepts – for example, students could see a real life model of the networking system mirroring their own when they look at certain screens.

2.1 System Overview

EasyAR is a cross-platform AR SDK. The Operation Systems which support this application are Windows 7 and above (7/8/8.1/10), Mac OS X, Android 4.0 and above as well as iOS 7.0 and above. Besides that, EasyAR SDK is compatible with Android 8.0 (Android O), the latest version of Android at the point of EasyAR SDK 2.1 release. EasyAR SDK is also compatible with iOS 11, the latest version of iOS at the point of EasyAR SDK 2.1 release.

Generally, EasyAR do not rely very much on system APIs, so if there are newer version of Android/ iOS release, EasyAR will most likely work smoothly on those systems. In this project, the operation system to develop the Easy AR platform is windows 10 and created for Android 8.0 whereas this type of OS is widely used by students and educators. For the pilot test, a couple of topic is selected to be embedded with AR gamification activities which are the OSI model and network topology.

The survey was conducted in Mac - April 2019. In this study, the population of this study is 26 students pursuing Diploma in Information Technology, offered in Polytechnic X. The set of question was taken of respondents' personal experience and their individuality providing a detailed and extensive picture of the situation. During the data collection period, quantitative data were obtained using a questionnaire. This questionnaire uses Likert scale with five possible answers options. This selection uses five stages because it can represent accurate answer compare to respondents with only four stages.

This pilot study was conducted to test whether the AR gamification items could provide reliable understanding among students and enhance their excitement and motivation during classes.

3. RESULTS AND DISCUSSIONS

3.1 Focus Group

Previously, most of the AR learning games focused on primary school students and middle school student (Krevelen, Poelman, & Section, 2010). Meanwhile in this study, focused on students in first and second semester. One potential explanation for this could be that AR learning games can have a positive influence on younger students because they are more evocative and align better to the kind of games they are playing at home. AR technology can provide advantages in reflecting the concept of knowledge in the real world environment, allowing students to observe the objects in real-time (Pascoal & Sofia, 2018). The real-time feature of AR enables students to receive feedback or see results immediately, which is favorable for subjects like Network . This section discusses the results obtained from the survey among the students after they experienced the AR gamification in Technical Vocational Education Training (TVET).

Fig. 1 : The Environment to Use AR Learning Games
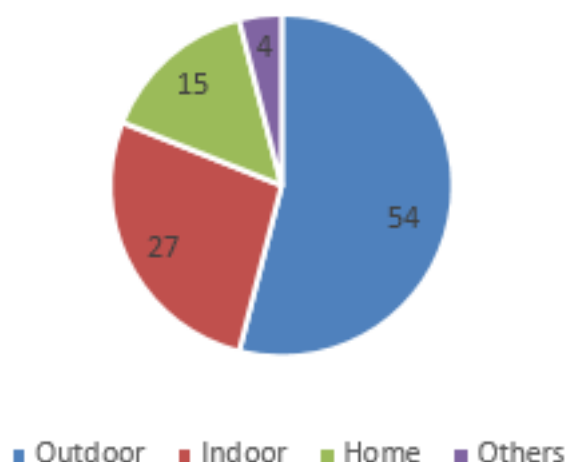
Regarding to the "environments" to use AR learning games in figure 1, the significant preference from the survey in using AR learning games are outdoors and in the classrooms. Playing outside is one of the advantages of AR learning games compared to other serious games, which may stimulate interest and excitement in students but it could be difficult for the teacher to control the learning process, and the safety issues should be considered as well. The AR learning games played in the classroom allowed students to play face-to-face and under the guidance of their lecturers (Subakti & Jiang, 2018). Students get in control and could solve problems and collaborate with their classmates, and they could immediately get help and feedback from their lecturers when they need explanations.

3.1.1 The effects of gamification with AR application in TVET

Gamification using AR with no limits for the environment helps students a lot in enhancing their understanding towards certain topics or courses. Nevertheless, AR learning game that was designed specifically for playing at home with the help of parents is not suitable for tertiary level. Students, especially younger students, spend more time with mobile phone. Therefore, it can be effective to design AR learning games that students can play anywhere without limitations. It may encourage them to study more spontaneously and in a more fun way. In addition to that, their learning achievement and motivation are increasing as in Table 1.

Table 1 : Effects of AR Gamification Application in TVET

Components	Effects	Percentage
Learning achievement	**Achieve learning gains**	**52%**
	Enhance learning efficiency	**16%**
	Enhance cognitive skills	**16%**
	Decrease cognitive load	**10%**
Motivation	**Enhance fun, interest, enjoyment**	**78%**
	Enhance engagement	**42%**
	Enhance satisfaction	**40%**
	Enhance willingness to learn	**38%**
	Provide positive attitude	**56%**
	Enhance confidence	**46%**
	Enhance attention	**38%**

Under the components of learning achievement, half of the response for gamification using AR application led to the effective outcomes in achieving learning gains in terms of learning content (e.g. AR for OSI layer and AR system for network topology). The positive effects also included the enhancement of learning efficiency and cognitive skills like problem-solving skills, critical thinking skills, and multitasking skills. For the moment, the use of AR application could reduce the cognitive load of students, while on the contrary, students felt frequently overloaded and confused due to the big amount of materials and tasks during the game play. The rest of the respondent either found AR games were ineffective in the learning achievement.

The motivation components involved engagement, satisfaction, fun, enjoyment, interest, attention, confidence and positive attitudes of students and AR-based educational game. Previous studies (Khan, Johnston, & Ophoff, 2019)(Digimedia, 2018) frequently reported that students described the learning experience with AR games as joyful and playful as they had fun playing AR games to learn school knowledge (Chookaew, Howimanporn, Sootkaneung, & Wongwatkit, 2017). The survey also found similar result that most of the students initiate gamification using AR application as fun, interesting, or enjoyable and engaged them more than traditional learning methods. In addition to these two effects, gamification with AR application in technical training were also evaluated to "enhance satisfaction" (40%), "enhance the willingness to learn" (38%), "enhance attention" (38%), "enhance confidence" (46%), and "enhance positive learning attitude" (56%).

4. CONCLUSIONS

The benefits of augmented reality are not just centered on novelty –the technology can increase the potential for conversational learning. As in the observation, diploma students learn better in groups and augmented reality educational tools help to provide a more 3D focal point for students to gather around.

Gamification and its different educational applications has been explored thoroughly to enhance Skill Development with Games and Augmented Reality. The pros and cons of gamification and augmented reality are numerous and complex. This paper identify specific ways in which these technologies can help students connect with their coursework and enhance the learning experience in TVET. On the other hands, it also address some of the main trends in the gamification of education and possibilities for serious games in the development of learning in professional certification environments. In the future, authors will include the ways that digital media can enhance gamification level in education, and developing analytical thinking skills through the use of games based on programming concepts.

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SYSTEM MONITORING ROOM SECURITY USING RASPBERRY PI BASED OF APPLICATION ANDROID TELEGRAM

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ABSTRACT

In a company there is a special room that is not permitted by other people to enter it, except an employees or workers who work in that room. One of them is a warehouse room, where there are usually valuable objects or secret files inside. Efforts to safeguard security are carried out in various ways to improve security at work. The design of this tools using Raspberry Pi microcontroller, Pi Camera module, PIR sensor and python programming, aims to develop security systems by applying Raspberry Pi technology and using of PIR sensors as a detection of movement. This tool works when there was a motion detected by the PIR sensor, after that Raspberry Pi gave a command to the Pi Camera to take the picture and the picture sent to the telegram. The result of applying the PIR sensor when it was detects a motion reaches a maximum distance of 875cm and when it was sending images with different color resolutions, it took 11.35 seconds for a resolution of 1280x960 pixels and 5.34 seconds for a resolution of 320x240 pixels.

Keywords: Raspberry Pi, Pi Camera, Telegram, Security, PIR Sensor, Python

1. INTRODUCTION

In general, in a job there is a special room that is not permitted by other people to enter it, except only employees or workers who work in the room. One example is a warehouse room, where there are usually valuable objects or secret files inside. Efforts to safeguard security are carried out in various ways to improve security in work such as the existence of a safe by having a combination number lock system, which is placed in a room with a certain security system, or a building guarded by several security employees. But along with technological developments, the mode of theft of valuables also continues to grow. Therefore, efforts are needed to continue to improve security security system technology. The author tries to make a room safety monitoring system using the Raspberry Pi based on the Android telegram application with the aim to create a notification system directly when there is a detection of the presence of someone entering the room, developing a conventional CCTV camera system from the form of a video file into an image file, for reduce the use of storage and to provide security to employees or workers in the room.

2. LITERATURE REVIEW

A. Monitoring System

A monitoring activity is based on the desire to look for matters relating to events or events, both regarding who, why they can occur, related public resources, policies and also the impacts that have occurred or must be anticipated as well as other matters relating to activities. record structurally.

B. The Concept of security

Security in general can be interpreted as providing protection and providing security against threats from hazards that can be detrimental, either physically to a person or to the environment.

C. Passive Infrared Receiver Sensor

PIR sensor (Passive Infrared Receiver) is a sensor commonly used for alarm systems in homes or offices. PIR sensor is a sensor that detects infrared signals emitted by the body of a human or animal that has heat in its body. The PIR sensor can respond to changes in the infrared signal emitted by the body of a human or animal that has heat in its body. PIR is a combination of pyroelectric crystals, filters and Fresnel lenses. This sensor is very sensitive to changes in temperature in the body of humans or animals that have heat in the body with a detection angle of less than 1200.

In Figure 1 is the distance or angle of detection of the PIR sensor.

Figure 1 : PIR sensor detection angle
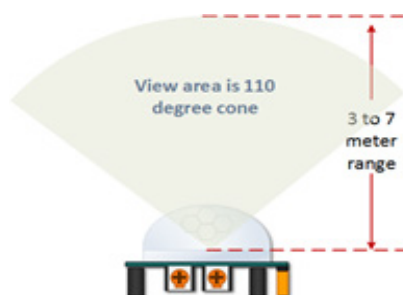
D. Raspberry Pi

Raspberry Pi is a micro-sized computer like a credit card developed by Raspberry Pi Foundation, UK. The latest Raspberry Pi is the Raspberry Pi 3 model B, the latest version has the Broadcom BCM2837 chip which embodies an ARMv8 core CPU (Cortex-A53). This chip has 4 cores and a 1.2 GHz clock speed which is a 64-bit system, raspberry Pi has 26 GPIO pins which help to connect to low-level peripherals and expansion boards. In Figure 2 is the physical form of the Raspberry Pi 3 model B.

Figure 2 : Raspberry Pi 3 Model B

E.   TCP/IP Protocol

TCP / IP (Transmission Control Protocol / Internet Protocol) if translated is the Transmission Control Protocol / Internet Protocol, is a combination of TCP (Transmission Control Protocol) and IP (Internet Protocol) protocols as a group of protocols that regulate data communication in the process of exchanging data from one computer to another on the internet network that will ensure data transmission reaches the destination address.

F.   Camera

The camera is a set of equipment that has a function to capture an object into an image that is the result of projection on the lens system. In Figure 3 is Pi Camera, the camera module that I use to capture images.

Figure 3 : Pi Camera
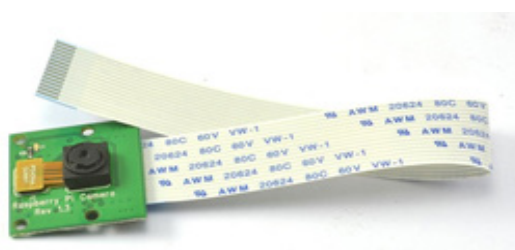
G. Android

Android is an operating system for mobile phones based on Linux. Android provides an open platform for developers to create their own applications and are used by various mobile devices. The author uses Android

3. RESEARCH METHODS

Object of research

In this study, the author tried to monitor a room with the camera capture method using a PIR sensor.

A. Modeling using block diagrams

The working principle of the system block diagram is that in the input column is filled with movement, meaning there is movement when there is movement or something moving or running will be used as input for PIR sensor detection, where the PIR, Pi Camera and Raspberry pi sensors are in the process column as circuit processing device, When there is movement in front of the PIR sensor, the PIR sensor will detect the movement, after that the raspberry pi that has been given a power supply of + 5vdc will receive the signal from the PIR sensor and process it to the camera to take pictures of the PIR sensor detection signal, Raspberry pi that has been connected to the SSID (service set identifier) will send images from the camera via internet access where the results of the image will be received on the smartphone that has been accessed by the internet and also installed telegram application, this smartphone and telegram are in the output column because as a result of processors of this circuit. In Figure 4 is a system block diagram.

Figure 4 : System Block Diagram
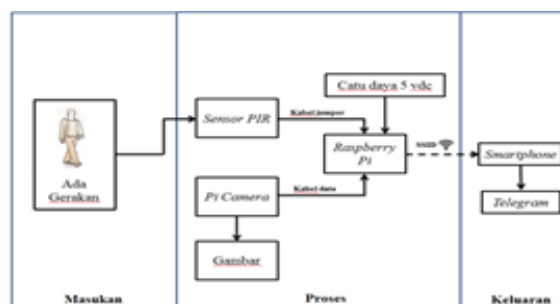
B. Modeling Using Process Flow Diagrams

Process flow diagrams are diagrams that are intended to describe operational processes to a system that will later be created, and if one day there is a problem it can help to solve the problem. The workings of the process flow diagram is by starting the initialization of the PIR sensor and the camera, after that it enters the PIR sensor condition. Are there any movements detected by the PIR sensor or not. If there is a motion detected by the PIR sensor, the PIR sensor will detect the motion by giving a signal that will be processed in the Raspberry Pi and Pi Camera will take a picture, after that the Raspberry Pi that has been accessed with the internet will send the image to the smartphone that has been installed telegram. The smartphone will get a notification and the image will appear in the telegram application. But if there is no movement, the PIR sensor will return to the initialization position again. In Figure 5 is a process flowchart picture

Figure 5. Process Flow Chart
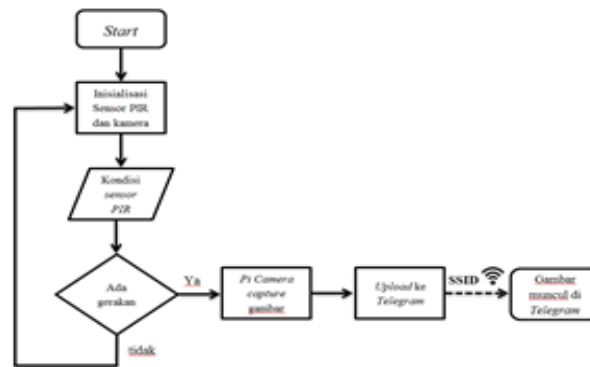
C. Hardware Design

Hardware design is made to design the physical model of the system that has been created. In Figure 6 is hardware design.

Figure 6 : Hardware design
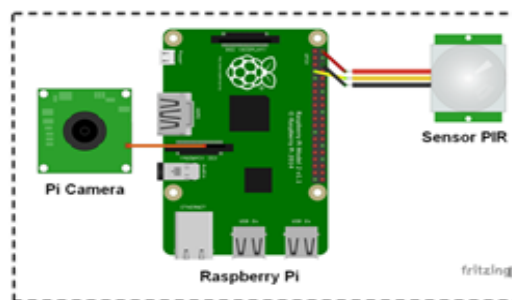
D. Hardware Design

Hardware design is made to design the physical model of the system that has been created. In Figure 6 is hardware design.

Figure 7 : Channel Denipibot
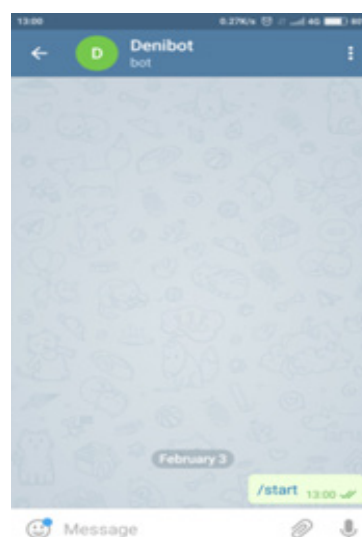
4. TESTING AND ANALYSIS TOOLS OF MEASUREMENT

A. Setting time passive infra red sensor

PIR, and measurement of 210 cm continued – 875 cm. On the graph 3 is measurement on passive infra red sensor delay distance 210 cm – 875 cm

Graph 3 : measurements on passive infra red sensor delay distance 210 cm – 875 cm
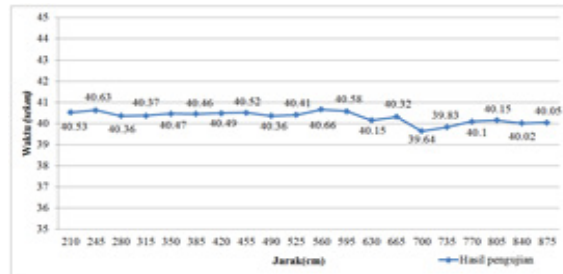
Based on the graph of 3 measurements on passive infra red sensor delay distance 210 cm – 875 cm. The average time of the results obtained was 40.3 seconds, and it brings the most out of the distance sensor PIR 875 cm, beyond the characteristics of the datasheet that is 7 metres.

A. Testing shipping pictures

This test is done to find out the pause time at the time of the delivery of images to the telegram android application.

Graph 4. testing delivery pictures
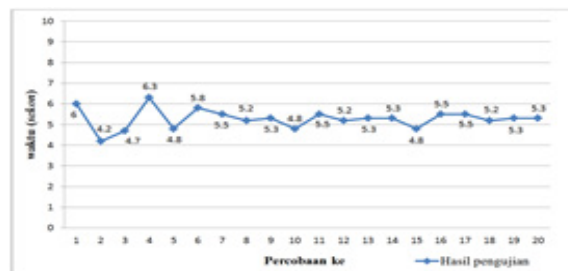
Based on graph 4 testing the delivery of images made with 20 times the experiment, the results obtained by the time for the delivery of images to the time average 5.27 seconds.

A. Testing the color resolution

This test is done to find out the pause time at the time of the delivery of images to the android applications with different color resolution.

Graph 5 : testing color resolution
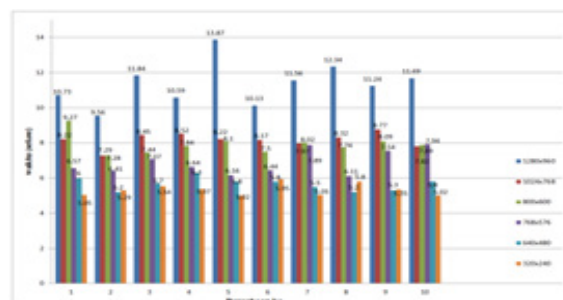
Based on graph 5 color resolution testing conducted with 10 times the experiments, obtained on the blue color or resolution 1280 x 960 pixels very dominate in the top of the charts, this is due to a resolution of 1280 x 960 pixels into the largest resolution used in this test, the greater the color resolution namely 1280 x 960 pixel, the longer the time required for delivery of the image and vice versa the smaller color resolution i.e. 1024 x 768 pixel or 800 x 600 pixel or pixels or 768x576 640 x 480 pixels or 320 x 240 pixels the faster the time needed for the delivery of images. At a resolution of 1280 x 960 pixel longest time results are obtained with a time of 13.87 seconds on the experiment. On a red or a resolution of 1024 x 768 pixels faster than a resolution of 1280 x 960 pixels, on the graph 5 testing color resolution, does not look significantly for 1024 x 768 resolution, on a green color or resolution of 800 x 600 pixels is faster compared to the 1024 x 768 resolution but at a resolution of 800 x 600 pixels on the trial longer than 1024 x 768 resolution, these differences may occur due to the speed of the internet is sometimes unstable, if taken average resolution 1024 x 768 is longer compared to a resolution of 800 x 600 pixels. On the color purple or a resolution of 768x576 pixels faster than a resolution of 800 x 600 pixels. At a resolution of 768x576 pixels, not look significantly stable enough on each time his experiments. Light blue on the color or resolution of 640 x 480 pixels faster than a resolution of 768x576 pixels and also not look significantly, quite stable at each time the experiment and the last one is the color of an orange or a resolution of 320 x 240 pixels, faster than with a resolution of 640 x 480 pixels, 320 x 240 resolution at the smallest resolution on this test. At a resolution of 320 x 240 obtained the fastest time i.e. 5.02 seconds on the experiment to the 5th and 10th.

B.   Testing the type of an object

This test is done to find out the PIR sensor detection capabilities against the object being detected. This testing is done by giving the movement by replacing the PIR sensor object with inanimate objects, animals and plants to find out which sensor PIR detection capabilities against the objects it detects. This testing is done by creating a movement by tying inanimate objects or plants with a strap or fastener and pulled on the sensor PIR detection distance is vulnerable.

Table 1 : Testing of this type of object

No	Object Type		
	Animal Cat	**Plant**	**Die Object**
1	√	X	X
2	√	X	X
3	√	X	X
4	√	X	X
5	√	X	X
6	√	X	X
7	√	X	X
8	√	X	X
9	√	X	X
10	√	X	X

Description =   √ : Detected
                X : Undetected

Table 1 is a table object type testing animals cats, plants and inanimate objects. Based on experiments conducted with 10 times the experiment, the results obtained that the sensor can only detect PEAR object animal cat that moves and can not detect the inanimate object or plant. This is due to the sensor PIR detects only heat energy of the object, the object of animals cats have thermal energy produced in the body by the PIR sensor because it is able to detect any movement of the object animal cat.

5. CONCLUSION

1. Based on the design, implementation and testing then the conclusion can be drawn as follows:
2. This tool works to provide information in the form of images via a smartphone by providing notification in the form of results capture camera from PIR sensor detection.
3. This tool is using android applications results in receiving the telegram image.
4. The application of the sensor PIR image obtained in shipping time for delivery of results from 5.27 seconds picture.
5. The application of sensor in measurement of PEAR setting time, it brings some value that is, the value of the variant = 3.2 value of standard deviation = 1.78 and the value of the standard error = 0.4.
6. The application of the sensor PIR detects a movement in achieving maximum distance 875cm.
7. The application of sensors of PEAR in the difference in shipping color resolution images, obtained time to resolution 1280 x 960 pixel is 11.35 seconds, and a resolution of 320 x 240 pixel color is 5.34 seconds.
8. In addition to detect movements of humans, PIR sensors can also detect moving animals i.e. cats and could not detect the object plants or inanimate objects that are digerakan.

5. CONCLUSION

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THEME 3 :

WORK, EDUCATION AND TRAINING

ERROR ANALYSIS OF POLYTECHNIC STUDENTS' ACADEMIC WRITING

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ABSTRACT

Having students to produce an organized, neat and error-free piece of writing has always been the lifelong dream of all ESL instructors. The purpose of this study is to identify the types and most common language errors in writing made by polytechnic students under degree program. Error analysis was done on 28 samples of students' essay. The most salient grammatical errors found in the students' essays were mismatch in Subject Verb Agreement. The data revealed that polytechnic students make different types of grammatical errors, and most of these errors were due to intralingual transfer. Furthermore, the findings and the results also showed that the English writing skill of degree students in polytechnic needs more reinforcement and development. It is hoped that the results of this study could be of much benefit for developing the English writing skill among polytechnic students.

Keywords: Error analysis, Grammatical errors, Writing.

1. INTRODUCTION

Errors in writing are unavoidable and it can be anticipated when examining the students' output. These errors may occur due to various factors such as interference errors, intralingual errors and developmental errors (Richards, 1974). However, for the language instructors, errors are beneficial in measuring the students' language performance. Error analysis has always been an integral part of research in ESL studies. Errors committed by ESL students are perceived as "systematic and reasoned" and by drawing upon these errors, language instructors can scrutinize the students' performance and development and "take the remedial action afterwards" (Shahrokhi & Lotfi, 2012).

Accordingly, this study aims to investigate types of errors committed by second language students in two different types of academic writing; article review and reflective essay. Writing is chosen as the main focus of this study as it is considered as one of the most important language skill that the polytechnic students need to acquire especially when they are studying for a degree.

Academic writing is important for them too as they will need to present their creative thinking and analytical skills by making readers understand what they mean to say in writing. Writing academically helps students to implement their theoretical knowledge into the practical world. Thus, the finding of this study is hoped to help language instructors to recognize students' difficulties in learning English as well as to assist in the application of suitable approach to teach beginning ESL students in acquiring better writing skills in English.

Errors in writing are often considered as an irritating factor to language instructors (Brown, 1994). Thus, this study attempted to identify the types of error and the most common language errors in order to get a closer look into these issue so that useful pedagogical instructions to teach writing for polytechnic degree students could be recommended. The errors can be categorized into interlingual which resulted from the students' application of the native language elements in their spoken or written performances of the target language. The Interlanguage was introduced by Selinker (1972) who views interlanguage as a series of overlapping systems characterized by having aspects from both first language (L1) and second language (L2) in the learner's verbal performance in L2. On the other hand, intralingual is defined as hypotheses about the English language which are built by language learner although he/ she has inadequate knowledge of it and only obtain it from text book or the classroom. Developmental errors however will occur when L2 students have deficient familiarity of the target language.

2. METHODOLOGY

This study employed a quantitative research method. In order to investigate the type and frequency of errors made by polytechnic students, this study adopts a quantitative approach by analysing errors made in students' writing based on Key List.

Due to the small number of respondents, the statistical data of the errors is not to be generalized. This quantitative approach was only chosen to identify errors, the type and its frequency and it was carefully planned to ensure that there is a complete randomization among only the students in the class and the students will be benefited from the result of the study

2.1 Procedures of Data Collection

Ellis (1994) suggests the following steps to conduct an error analysis research:

No.	Steps	Explanation
1.	Collection of samples of learner language	Deciding what samples of learner language to use for the analysis and how to collect these samples
2.	Identification of errors	Identifying the errors by underlying the errors the learner made
3.	Classification of errors	Grouping the errors that have been found and stating the classes of the errors
4.	Explanation of errors	Explaining the errors by establishing the source of the errors and calculating how often the errors appear
5.	Evaluation of errors	Evaluating the errors involves stabilizing the errors and drawing conclusion

2.2 Classification of errors

Each error was recorded according to its type in an individual error record form according to the Key List and the identified errors were classified into two categories: interlingual and intralingual. Under interlingual, the errors were further identified and classified in several specific components which are:
a. errors in spelling
b. errors by using native language
c. errors by using L1 structure
d. errors by omitting "Be" (was/were) in nominal sentence

For the intralingual category, the errors were further identified and classified into several specific components which are:
a. errors in spelling
b. errors by omitting suffix (-ed) in regular past verb
c. errors by using present "be" in past event
d. errors by using present verb in past event
e. errors in choosing wrong pronoun
f. errors in using wrong auxiliary verb
g. errors in omitting('s) as possesive marker
h. errors in adding "S" in singular noun
i. errors in omitting "s" or "es" in regular plural noun
j. errors in omitting "ing" in gerund noun
k. errors in using wrong preposition/ conjunction
l. wrong usage of "to"
m. wrong usage of articles
n. wrong usage of modals

In calculating the frequency of these each error, the following formula was adapted from the studies of Haryanto (2007) and was employed:

$$P = \frac{n1}{\sum N} X 100\%$$

in which,

P : percentage of each error

N1 : total of the given error

ΣN : total of the whole errors

3. RESULTSAND DISCUSSIONS

3.1 Results

This section discusses the grammatical errors categorization due to Interlingual and Intralingual Transfer

	INTERLINGUAL ERRORS	Frequency of Occurence	Percentage of Occurence	Most Com- mon
1.a	spelling error	1	0.2	16
1.b	using native language	1	0.2	16
1.c	using L1 structure	26	5.9	7
1.d	omitting "verb to be" in nominal sentences	29	6.6	5
	INTRALINGUAL ERRORS			
2.a	spelling error	47	10.7	2
2.b	omitting suffix (ed) in regular past verb or passive verb	41	9.2	3
2.c	using present "be" in past event	5	1.1	15
2.d	using present verb in past event	8	1.8	13
2.e	choosing wrong pronoun	13	3	11
2.f.	mismatch in (SVA)	108	24	1
2.g	omitting ('s) as possessive marker	7	1.6	14
2.h	adding "s" in singular noun	13	2.9	12
2.i	omitting "s" or "es" in plural noun	19	4.3	8
2.j	omitting "ing" in gerund noun	17	3.9	9
2.k	using wrong preposition/ conjunction	27	6.1	6
2.l	wrong usage of "to"	27	6.1	6
2.m	wrong usage of articles	15	3.4	10

Based on the findings, the occurrences of errors done by the polytechnic students in their writings are mostly caused by intralingual factors whereby the students failed to comprehend the general characteristics of rule learning. This caused faulty generalization, incomplete application of rules and failure to learn conditions and they are reflected in their writing. The highest error rates in this study came from the intralingual group and errors in SVA had the highest percentage which was 24%. A total of 108 errors related to SVA in were found in their writings out of a total of 441 errors. The errors were caused mainly by intralingual sources: overgeneralization, incomplete rule application, omission, and building of false concepts. The intralingual errors are explained as unrelated to the native language interference as they are led by the target language itself. This is due to the errors that normally occur when the students have acquired knowledge of the language but it is insufficient (Kaweera, 2013). As, the students can be considered language incompetent, these errors could be caused by ineffective traits of learning such as unawareness of the rules and restrictions or faulty application of rules.

From this study, the findings show that the native language interference was found only in a small proportion. As mentioned earlier, L1 interference happens whenever L2 students' syntactic understanding is transferred into their use of the target language. According to Dulay (1982), there is an automatic transfer that habitually occurs when students make use of their L1 structures in the target language. This statement is supported by Hashim (1999) who identifies that the automatic transfer is referred to as L1 interference/ language transfer/ cross-linguistic which explains the interference of the students' mother tongue when they use the second language in spoken or in written forms. Based on the findings, although the students are generally language incompetent, surprisingly, their writings are less influenced by their L1 except for certain phrases that have similarities with L2 in terms of its spelling. The other L1 influence that can be clearly found is the omission of "verb to be" in nominal sentences as their L1 does not require that to be in the sentences. Overall, the analysis of written essays shows that L1 does not play too much of a harmful role in polytechnic students' writing.

The data of interlingual errors and intralingual errors are analyzed from two types of writing from each student, an article review and a classification essay. The interlingual errors made by the participants are divided into four (4) subcategories: they are (1) wrong spelling, (2) use of Malay word, (3) use of L1 structure and (4) omission of "verb to be" in nominal sentences.

The types of intralingual errors made by the participants are: (1) wrong spelling, (2) omission of suffix (ed) in regular past verb or passive verb, (3) use of present "be" in past event, (4) use of present verb in past event, (5) wrong selection of personal pronoun, (6) mismatch in SVA, (7) omission of ('s) as possessive marker which consists of 7 cases (1.6%), (8) adding "s" in singular noun, (9) omitting "s" or "es" in plural noun, (10)

omission of "ing" in gerund noun, (11) use of preposition/ conjunction, (12) wrong usage of "to", (13) wrong usage of articles and lastly, (14) wrong usage of modals.

The highest error rates in this study came from the intralingual group and errors in SVA had the highest percentage which was 24%. A total of 108 errors related to SVA in were found in their writings out of a total of 441 errors.

4. CONCLUSION

The aim of this study is to at identify, categorize and analyse the type of grammatical errors made in polytechnic degree students' English essays and the sources of these errors. Accordingly, a number of different grammatical errors were found and the analysis showed that the students made grammatical errors due to two main reasons; interlingual and intralingual. The data revealed that polytechnic students make different types of grammatical errors, and most of these errors were due to intralingual transfer. Their essays also proved that the polytechnic degree students are facing major problems in writing even passable essays in English. It can be seen from their composition that they obviously have incompetent grasp of the basic tenets of English grammar. This study is believed to be helpful to revamp students' writing as the researcher found that English written by polytechnic students contained various types of errors and some of these errors could lead to readers' misunderstanding. These findings are hoped to result in a more successful teaching methods and useful teaching materials which can contribute to polytechnic students' writing improvement.

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FACTORS INFLUENCING THE LEARNING OF ENGINEERING MATHEMATICS 2 (DBM2013)

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ABSTRACT

Engineering Mathematics 2 (DBM2013) is a compulsory course for all engineering students in second semester at the Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA), Selangor. There is a concern because the rate failure of this course is higher compared to Engineering Mathematics 1 and Engineering Mathematics 3 courses for the past two sessions (June 2018 and December 2018). Hence, the objectives of this study are to determine the factors that may have influenced the learning for this course. The study involved 43 respondents of Diploma in Electrical Engineering (Controlling), DJK. The method that is being used to gather the information is by using online questionnaire. The analysis of the factors include the students' background, understanding scale, mathematics learning in secondary school, attitude towards mathematics and other factors that influence mathematics learning at PSA. It was found that the students' background, understanding scale and mathematics learning in secondary school are the greatest factors that influenced their learning in this course. The students' attitude remained positive towards mathematics learning. The students' attitude comprised of their confidence, awareness of mathematics and engagement. The findings also show that the Curriculum Information Document Online System (CIDOS) developed by the Department of Polytechnic Education and mathematics learning in the form of games will encourage students and can increase their interest in mathematical learning.

Keywords: Error analysis, Grammatical errors, Writing.

1. INTRODUCTION

Mathematics is very important in our daily lives as many activities, directly or indirectly, deal with mathematics. A good understanding in mathematics is essential for obtaining good employment. Individuals with high mathematical competency are needed to ensure a continued production of highly-skilled people to fulfill the demand by the industry, science and technology. Having a strong background in mathematics is crucial as it is a basic requirement in most of polytechnic programmed. Among the mathematics course in polytechnics, Engineering Mathematics 2 (DBM2013) is a compulsory course for all second semester engineering students' pursuing in Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA). A preliminary research has found that many students perceived calculus as having a high level of difficulty among any other mathematics courses. The contents of this DBM2013 course is more on calculus, differential and integration. An analysis of DBM2013 results over the past two sessions in PSA has shown an alarming rate of failure in the course. Therefore there is a need for some research on the factors that influencing the learning of this course.

Students come to Polytechnic with various ethnic and cultural backgrounds and also with different mathematics skill especially in Additional Mathematics. This reflects their level of understanding on certain areas or topics. There are also other factors which contribute to the difficulty in understanding Mathematics topics. This could be due to their study pattern during secondary schools and their attitude in studying mathematic itself. To overcome these kinds of problems, the lecturer must detect and investigate on the factors that contribute to the high failure rate in Mathematics.

The previous two sessions of students' final exam achievement which is June 2018 and December 2018, showed that among the three Engineering Mathematics courses, DBM2013 has the highest rate of failure. This study focused on the understanding levels of the topics in DBM2013 which consists of Exponents and Logarithms, Differentiation and Integration, and also the causes of difficulty of understanding during their learning mathematics in secondary school. This research focused on respondents from Diploma in Electrical Engineering (Controlling), DJK.

The objectives of the research are to identify:
- the students understanding of the topics learning in DBM2013
- the factors which contribute to difficulty in understanding mathematic during secondary school

2. LITERATURE REVIEW

Learning mathematics does not only involve thinking and reasoning, it is dependent on the attitudes of the learners towards learning and towards mathematics. Han and Carpenter (2014), state that attitudes consists of cognitive, affective and behavioural reactions that individuals display towards an object or the surrounding based on their feelings or interest.[1] From the researchers' point of view, there has been few research conducted in polytechnics focusing on mathematics high failure rate. However, the root causes of high student failures in mathematics in general have been extensively studied in literatures. Naidoo and Naidoo (2007) used a computer laboratory to create a learning environment that promoted interactive learning together with traditional learning.[2] The basic concept of teaching and learning mathematics must be understood by both students and lectures. Otherwise learning mathematics will be full of errors and misconceptions. When students see the importance of mathematics in real lives, they feel engaged, confident and connected to their learning. Mensah et al.(2013), stated that as such the three components of attitude, confidence, importance of mathematics and engagement are interrelated.[3] An important question that arises here is how an increased level of confidence, awareness of the importance of mathematics and engagement can be achieved so that students' attitudes towards learning mathematics become more positive? Teaching mathematics in a meaningful context could be the solution. Afari, Aldridge, Fraser and Khine (2013), investigated the impact of using one of mathematical games on college students' attitudes towards learning mathematics.[4] It can be concluded that students that used games found their lessons more interactive, got involved and enjoyed learning mathematics.

3. METHODOLOGY

The method that used to gather information regarding this study is through online questionnaire. The online questionnaire comprises:

Section A : Respondent Background
Section B : Understanding Scale DBM 2013
Section C : Mathematics Learning in Secondary School
Section D : Student Attitude on Mathematical Learning
Section E : Factors Influencing Mathematics Learning at Polytechnic (PSA)

The online questionnaires were distributed to Diploma of Electrical Engineering Controlling (DJK) students. The classes involved were DJK 2A, DJK 2B and DJK 2C. It is to clarify that the failure rate is high in Engineering Mathematics DBM2013 which:

- Due to the student coming from different demographic area and learning background in mathematics
- The student are given a set of questionnaire regarding their background, understanding topics in DBM2013 and the factors influencing them during learning mathematic in secondary school
- Enable the students and lecturers identify how to improve their learning styles in studying mathematics

3. METHODOLOGY

For the purpose of this research, we gathered a data from Electrical Engineering Controlling (DJK) students from 3 classes. Only 43 of them took part in this online survey. They came from different races and background. These 43 respondents are from rural and urban. Only 32 of them took Additional Mathematics during Sijil Pelajaran Malaysia examination. However, we found out that only 19% (6 respondents out of 32 respondents) achieved a grade C and above while 26 of them gets grade D and below. These are shown in Figure 1.

Figure 1: Respondents Grade in Additional Mathematics during SPM
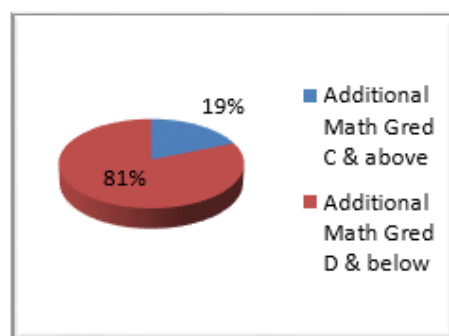
One of the factors that we investigated was their understanding of the topics in our DBM 2013 during their learning of mathematics at secondary school. Figure 2 represents the result that reflects their performance in learning engineering mathematic DBM 2013. Refer Figure 2.

Figure 1: Respondents Grade in Additional Mathematics during SPM
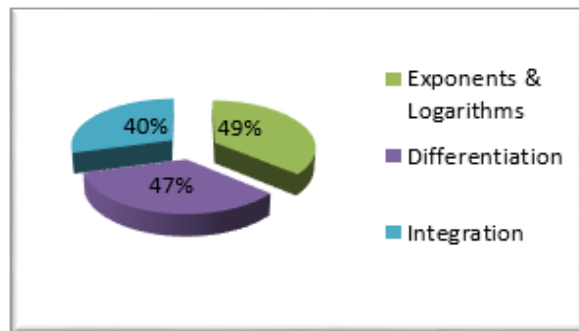
From Figure 2 above, only 49% of the students understand the topics of Exponents and Logarithms, 47% understand of topic Differentiation and 40% understand of topic Integration. It shows that not even half respondents of the students have a strong understanding in those mathematic topics during their learning mathematics at school. To investigate on how much their understanding during their learning of the same topics in DBM 2013, we divided into 3 levels, Very Poor (do not understand the topic), Poor (Understand the topic but not easy to apply) and Good (Understand the topic and can be applied). The result is shown in Figure 3.

Figure 3: Understanding topic during learning DBM 2013
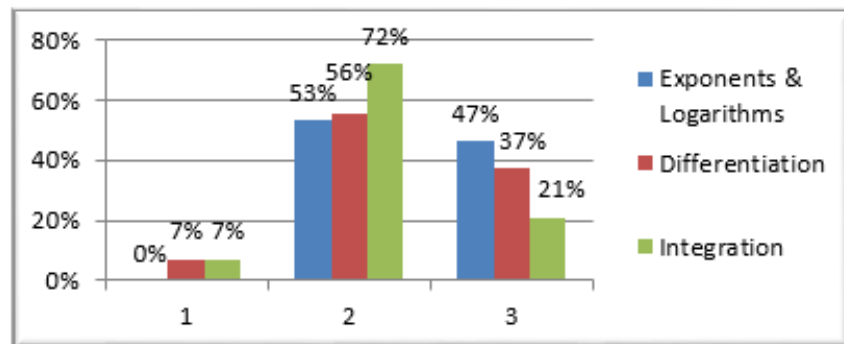
From Figure 3, it clearly shows that most respondents understand the topic (50% and above) but they cannot apply it during examinations. Figure 4 show that only 47% can apply the topic of Exponents & Logarithms, 37% can apply Differentiation while 21% can apply Integration. In addition, we want to know their attitude towards learning mathematic and the topics in DBM 2013. Majority of the respondents, 51% agree and 44% strongly agree that they like learning mathematic in general. But, when it comes to the topic itself, 26% and 33 % dislike Exponent & Logarithms and Calculus.

Figure 4: Students Attitude towards Mathematic Learning
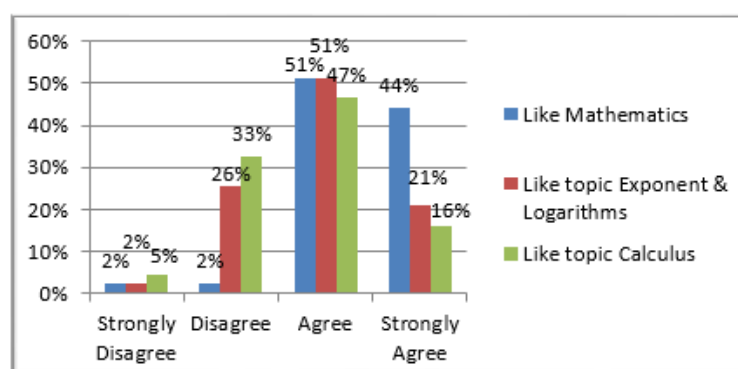
Figures 5,6 and 7, show that when it comes to the learning current mathematics at Polytechnic, most of the respondents understand the lecturer's approach. The respondents feel that the assessment given was sufficient and their response on the completed the assessments were high (more than 80%). This information shows that they have the correct attitude towards learning engineering mathematic DBM 2013. .

Figure 5: Easy to Understand the Lecturers Approach
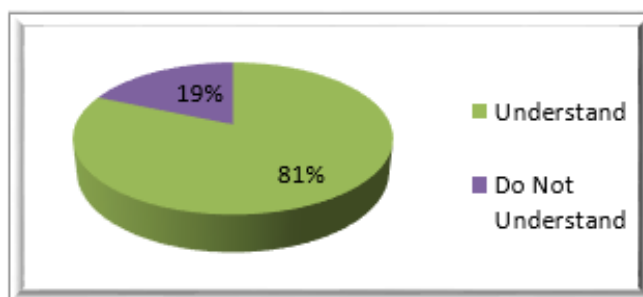
Figure 6: Sufficient Assessment Given
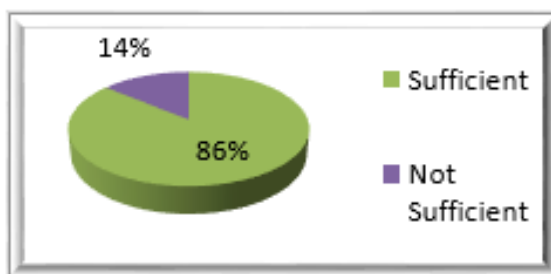
Figure 7: Complete All The Assessment Given
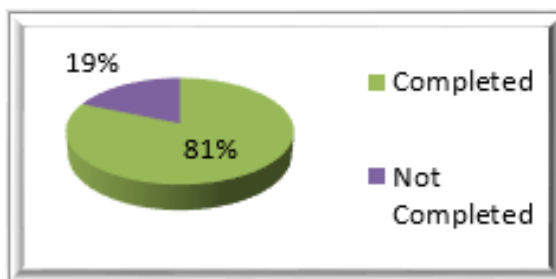
Figures 8 and 9 show results on application of CIDOS and learning mathematic in the form of games to attract students during classes and for them to improve their understanding in mathematics. In our survey, it shows that 60% of the respondents agree that CIDOS help them to improve the learning mathematics. While, 88% of the respondents agree and wants the technic of learning mathematics in the form of games.

Figure 8: Does CIDOS Improve Mathematical Learning
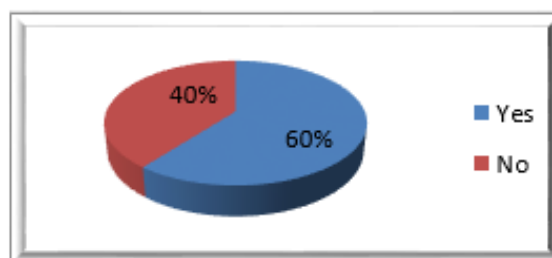
Figure 9: Does Learning in the form of games interactive and improve mathematical learning
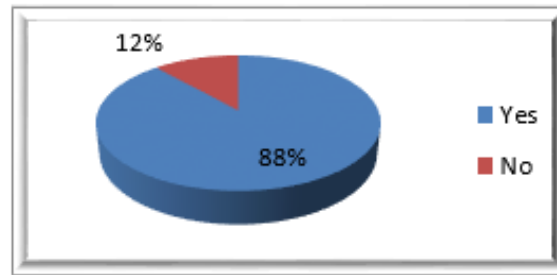
5. CONCLUSIONS

It can be inferred that the major factor that affected the high failure rate of DBM 2013 was that the respondents did not have strong basic knowledge during learning mathematics at Secondary schools concerning Exponents & Logarithms and Calculus (Differentiation & Integration). Basically, they like mathematic but lack of knowledge within the topics in DBM2013.

Another factor was that their understanding of those topics learning during classes do not help them to apply their knowledge. The exercise given was sufficient but they may need other methods or styles of learning to improve in mathematics.. They have a good attitude towards learning mathematics. They also like learning mathematics in the form of games which can be more attractive and help them improve their understanding in mathematics. CIDOS can also help them to improve their knowledge in mathematic.

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LEARNING STYLES OF POLYTECHNIC SULTAN SALAHUDDIN ABDUL AZIZ SHAH (DIPLOMA IN PACKAGING) STUDENTS

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ABSTRACT

The understanding of learning style preferences are very important to academicians in education environment. Students with different cultural backgrounds and various learning style sit for the same programme in polytechnic. Practices in teaching and learning seems to need vital improvement to help the education system more significant. The purpose of this study is to identify student's learning styles. Moreover, this study could help learners to improve their academic achievement by knowing their own individual learning style A questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. A survey design was used and the data were analyzed using the quantitative approach. Students taking the Diploma in Packaging, (DP) Mechanical Engineering Department from Politeknik Sultan Salahuddin Abdul Aziz Shah were selected as samples. Overall, the descriptive statistical test was used to answer the research questions, and the findings indicated that most students with a variety of learning style background preferred "Group" learning style. They are interested to do discussion and communicate between peers for the better understanding in education environment.

Keywords: Learning Style, Teaching and Learning, Academic Achievement, Education

1. INTRODUCTION

Perceptual Learning Styles of DP Students

Learning style issue has been discussed widely in education era. People talk about the key to success in academic, factors that influence to success and causes of failure in the academic. All these issues are seen as serious as every researchers try to find the root cause and try to come out with a solution. Commonly, student achievement is always said to have major relation with student's attitudes. According to Zakaria & Yusof [1], students' attitudes towards mathematics are closely related to their attitude towards problem-solving in general. However, the cause from other factors may be neglected and unseen. Hence, all factors that may contribute to student achievement should be studied. Lecturers also have to accept that the teaching style may differ with students' learning style. Students come from different demographic factors might be the cause they have different style in learning. Honigsfeld [3] found that gender is one of the several factors that influence students' learning style. The other factors included are age, culture, brain processing, creative thinking and academic achievement.

Realizing the differences, lecturers can vary their their teaching style to accommodate various learners needs in the class. Lecturers have to be creative to teach different learners to achieve the same goal. Based on Thomas & Amit [2] , by using learning style instruments to inform the choice of learning activities and approaches will enhance the effectiveness and quality of learning for students. Ariffin et al [7] discovered many studies found that learning is enhanced and the course performance improves when educators or teachers deliver course materials using the learning styles that are preferred by the students. Moreover, Kamuchee [8] realised that students and teachers will benefit if they are all aware of their differences in learning and teaching styles, and try to make adjustments for the differences.

The aim of this study is to identify the Perceptual Learning Style of DP students and to determine the learning styles category of DP students at PSA. According to Karthigeyan & Nirmala [6], since the students' success is influenced by the learning style as one of the predominant factors, teachers and educators should be aware of the identification the identification of their students learning styles.

2. METHODOLOGY

As a survey method is the most appropriate design for the research of the interested issue, this method was used. The information gained from the survey are the participants' basic demographic information and the major, minor and negligible learning styles of the students. Thirty students of DP cooperatively gave response by answering questions from the given survey form. They indicated their answers with each given statement on a 5-point Likert Scale. A quantitative descriptive methodology was utilized in this study.

Respondents of this study are from Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA) attending level 1. The focus group consisting of 14 females and 16 male students. All responses were received from the cooperative participants and all the data were encoded and analysed. The intentions of this study are to identify the students' learning styles of DP students and to determine the learning styles category of DP students at PSA.

This study has adopted Reid's Perceptual Learning Style Preference model [4-5]. Reid's perceptual learning style preference questionnaire (PLSPQ, 1987) is used as the instrument for this study.

Reid [4] has designed learning style model based on how students learn best using the several types of learning styles: visual, auditory, kinesthetic and tactile preferences. It also consist of two social aspects of learning: group and individual preferences. The questionnaire that consisted of 30 questions were distributed to students and they were explained the objective of the study before they answer the questions. They managed to complete within 20 minutes.

Reid [4] classified learning styles as Major, Minor or Negligible. Major is a preferred learning style, Minor is one in which learners can still function well while negligible is when the learners can do the learning and the learning process more difficult.

3. RESULTS AND DISCUSSIONS

As a survey method is the most appropriate design for the research of the interested issue, this method was used. The information gained from the survey are the participants' basic demographic information and the major, minor and negligible learning styles of the students. Thirty students of DP cooperatively gave response by answering questions from the given survey form. They indicated their answers with each given statement on a 5-point Likert Scale. A quantitative descriptive methodology was utilized in this study.

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3. RESULTS AND DISCUSSIONS

3.1 Results

The result of the study shown in Table 1

Table 1 : The indicator

Learning Style Preference	Score
Major Learning Style Preference	38-50
Minor Learning Style Preference	25-37
Negligible	0-24

3.1 Results

Figure 1 : Score by DP students regarding Reid [4]
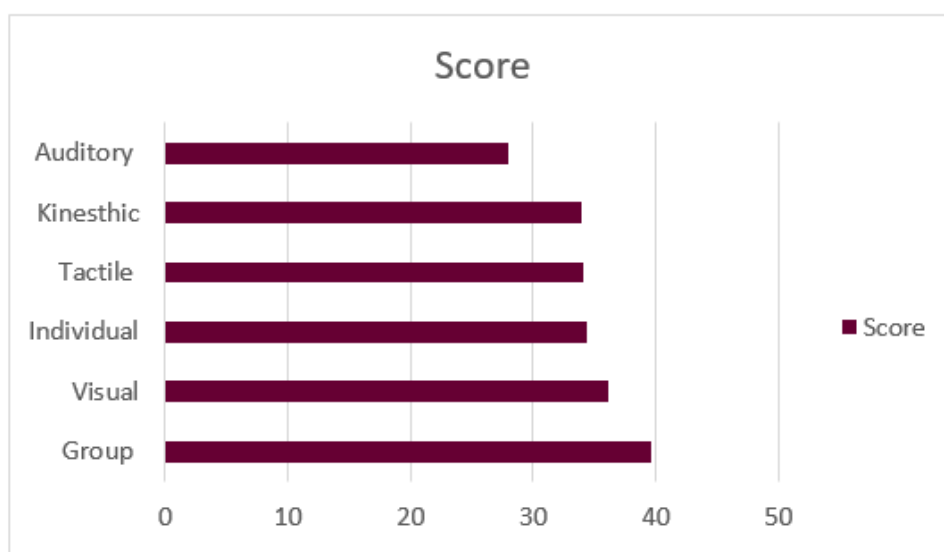
The result reveals that the most preferred learning style of DP, Mechanical Engineering students is Grouping learning style. The discussion and conclusion can be made regarding the instruments given to them. It defines that study in groups make them understand better because it provides a platform to exchange ideas or teaching technique. Learning in groups are able to encourage all participants to be get involved whether as a learner or an educator.

In addition, the implementation of assessment in presence is purposely designed to involve teamwork. Students will also get marks based on the active involvement by referring to the related rubric. By involving friends, a task can be asily accomplished and done.

Contrarily, the student's least preferred learning style is Auditory Learning Style. The value of mean shows 2.8 indicated that it is the least value compared to the other factors. Experiment, role-playing and participating in related activities are not the favourite activities for mechanical engineering students.

The results were ranked accordingly beginning from the most preferred learning style to the least. Group 3.960 (major), Visual 3.613 (minor), Individual 3.433 (minor), Tactile 3.407 (minor), Kinaesthetic 3.393 (minor) and Auditory 2.800 (minor).

Realising that most Mechanical students showed favour in group style, teaching style also need to improve based on the situation to match the students' needs. Activities, teaching tool and any other factors that contributes to encourage 'Group style' learner to involve need to be improvised. The stimulation they receive from group work helps them to learn and understand new information better.

However, the rest the students could not be ignored although they fall into minor learning style preference category. Some of the students with Visual learning style learn well by reading. They easily get the information and understand by reading without much oral explanation. Usually this kind of learners are able to learn alone.

Individual learners with mean score 3.433 manage to understand and get idea when studying alone. Learning by themselves is the most effective way and most of the time, they do not need others to make them understand the information.

Tactile learners with mean score 3.407 prefers to implement experiments and related activities to make them understand better. By touching and dealing with materials, they really help them to have the most efficient learning experience.

Kinaesthetic learner gives 3.393. Active participation in class activity really helps those who are Kinaesthetic learner to remember the information well. By experiencing situation by themselves, students are able to know and understand more about the situation rather than seeing or hearing the situation by others.

Very few students are under Auditory learner category as it falls as minor, 2.800. Not many Packaging students are categorised as students who learn by listening and conversing. Auditory learners like to hear and converse to get information well. Unlike visual leaners, auditory learners need to read aloud to listen before they can understand well.

In spite of mean, the score is also calculated based on Table 2[4]. The preferences are splitted into three categories according to the score. It indicates that above 38 is major, between 25 and 37 is minor and below 24 is negligible.

Table 2 : The learning styles category of DP students at PSA

Learning Style	Score
Group	39.6 major
Visual	36.1 minor
Individual	34.3 minor
Tactile	34.1 minor
Kinesthic	33.9 minor
Auditory	28 minor

4. CONCLUSIONS

The research is done among the students' learning style of Diploma in Packaging, Mechanical Engineering in Polytechnic Sultan Salahuddin Abdul Aziz Shah. Researcher found that the preferred learning style by DP student is Grouping Learning Style.

As mentioned by Reid [4], the learning style can be classified into three categories; major, minor and negligible, which can be calculated by the mean score. Major score means that the learning style is the most effective and suitable for the students. While minor learning style means ones still can learn well in that way. For negligible value, it defines the students may have difficulty applying the particular learning style.

The result showed that the mean score; Group 3.960 (major), Visual 3.613 (minor), Individual 3.433 (minor), Tactile 3.407 (minor), Kinaesthetic 3.393 (minor) and Auditory 2.800 (minor). Based on Table 2, it can be concluded that DP students could tolerate to all learning style as they haveGroup learning style as major score and minor score for the rest of them. None of the score was negligible indicated that students did not face any difficulties to apply any learning style during the learning process.

This study showed how important to know every students' learning style. The awareness among the students on their learning style is very important. Students should be aware of this issue for the purpose of their academic achievement. They have to realise their own learning style and other friends in order to get the maximum result in the learning process.

In conclusion, it is very important to identify the students' learning styles as it can benefit related parties and smoothen out the teaching and learning process. Teaching environment can be adjusted due to the suitable learning style to fulfill their needs in the classroom. In achieving the best result, identifying learning style may help to reach the goal.

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IMPACT OF SOCIOECONOMIC STATUS ON ACADEMIC ACHIEVEMENT AMONG STUDENTS OF POLYTECHNICS IN SELANGOR, MALAYSIA AREA.

Rosamiza Meor Razak, Nor Laila Hassan, Rahimawati Muhamad Yusoff
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ABSTRACT

Education is the essential weapon to bring changes in the society by making people wise and rational. Education is also considered imperative not only for the progress of individuals but also for the development of the community and nation. On the other hand, the term of Socioeconomic status is the combination of social status and economic status of an individual or family on the basis of income, education, profession, and material possessed, etc. in relation to others in society. This conceptual paper aims to discuss the impact of socioeconomic status on academic achievement among students of Polytechnics Institutions, specifically in Selangor, Malaysia. Research conducted examines the existence as well as the correlations between those two. Questionnaires will be used as instruments to collect primary data and will be distributed to students from three polytechnics which are Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA), Politeknik Sultan Idris Shah (PSIS) and Politeknik Banting Selangor (PBS) using Stratified Random Sampling method. Findings of this research will provide information about the socioeconomic impacts on the student's academic achievement, which is crucial for the management to formulate programs, especially for the low-density group (B40).

Keywords: Impact, Socioeconomic Status, Academic Achie

1. INTRODUCTION

Many studies have been conducted by researchers to investigate factors that influence student's performance on various education levels, including at school, college, and university. The quality of student's achievement remains at top priority for educators. Their performance plays a significant role in producing high-quality graduates. They are the backbone of the country [1]. The term of socioeconomic status (SES) is the combination of the social and economic status of individuals or families based on their income, education, profession, and material possessions and others related to others in society [2]. SES is one of the most researched and debated issues among educational professionals contributing to academic performance. The most common argument is that the socioeconomic status of students influences the quality of their academic achievement [3]. Most experts argue that the low socioeconomic status negatively affects the students' academic success as their basic needs remain unfulfilled, resulting in them not performing well academically.

According to some studies, poverty significantly affects the resources available to students. Due to lack of funds, many students struggle to achieve the same level of academic achievement that students do not live in poverty [4]. Studies in AMU schools also found that a positive and significant correlation between SES and academic performance of primary school students [5].

There are three sections of income class in Malaysia, namely 20 percent of the highest class (T20), 40 per cent of the middle class (M40) and 40 percent of the lowest level (B40). This study aims to identify the impact of socioeconomic status on academic achievement among students of Polytechnics Institution in Selangor. This research focuses on the three Polytechnics students who are Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA), Politeknik Sultan Idris Shah (PSIS) and Politeknik Banting Selangor (PBS). Researchers measure the students' academic achievement through CGPA and GPA of the current academic year, where the GPA is used to measure the students' performance [6].

2. LITERATURE REVIEW

Recent research by Faaz and Khan [7] which conducted a study of Academic Achievement of upper primary school students in relation to their socioeconomic status noticed the existence of a significant positive correlation between SES and Academic Achievement. Pearson's coefficient of correlation and t-test are the statistical techniques used to analyze the results. They selected 121 students from AMU school by using Simple Random Sampling Technique, and the score obtained by the students in the last examination was considered as Academic Achievement.

The students with a high level of SES perform better than the middle-class students and the middle-class students perform better than those with a low level of SES [8]. A study by M. Eaamon also confirms [9] that usually students who came from low socioeconomic status or area performed lower in their studies hence obtaining lower scores in comparison to other students. Another study found out that economic disadvantage potentially reduces the parent's ability to provide warm and sensitive parenting. This then most likely minimize their children's chance to have access for cognitively stimulating materials such as toys and books. Additionally, these children may also have lesser opportunities in gaining socially enriching experiences like involving in cultural activities [10]. Lower-income families tend to invest more in basic family needs like sufficient food and shelter rather than investing in child development, such as providing adequate learning materials. In contrast, families with high income can spend more resources for their children progress, therefore prominent to the success of their children academically as well as socially. Henceforth, this proves that SES does affect child academic achievement [11].

Apart from the financial stability of a family, children's academic achievement can also be linked to SES, which is a parent education issue [12] [13]. Parents' socioeconomic status, which includes their educational and professional qualification, revenue, and professional affiliation, is also associated with academic gain of students [14]. For example, lower-educated parents are less focused on education than parents with higher education, parents with higher education will invest some resources, both psychologically and financially, for their children's education compared to low-income parents. Low levels of parental education will also tend to provide a home environment that is not conducive to the learning process such as maintaining a quiet learning environment. These non-conducive conditions are likely to affect the child, leading to internal problems such as aggression, opposition, and hyperactivity [15]. A study conducted by A. Raychaundhari, M. Debnath, S. Sen, and B. Majumder [16], found out that the education of both parents is positively related to students' achievement. Educated parents can provide a better learning environment and facilities at home for their children to improve their study. It is also supported in other research stated that gender, ethnicity, and father's occupation are significant contributors to student achievement [17].

In another study indicated there is also the impact of low SES on academic achievement can be initiated among single parents or parents who are divorced [18]. This statement is true when associated with families who are experiencing stress due to insecurity also can increase the chance of family breakdown, divorce, so the cause of the child's development and thus affected their ability to learn declines. It is found that families with low parenting styles are composed of single parents with low SES that may be associated with their social and emotional well-being and affect the development of children's cognitive skills [19]. A study by Carlson and Corcoran [20] shows that children raised in single-parent families will have lower scores on cognitive tests and school achievement.

3. METHODOLOGY

This study will focus on socioeconomic status, taking into account, family characteristics of income, parental education, and parental marital status, either a single parent or both parent towards academic achievement. A study conducted by Mpho Priscilla Jama, Adriana Albertus Beylefeid and Mabokang Monnapula-Mapesela [21] found Spady's sociological theory, which was the first study of student retention in 1970, this study has linked the variables as is a family background and academic potential, normative congruence, grade performance, intellectual development and peer support. This conceptual framework is adapted from previous studies [22] [23] is, as shown in Figure 1 below.

Figure 1 : Conceptual framework
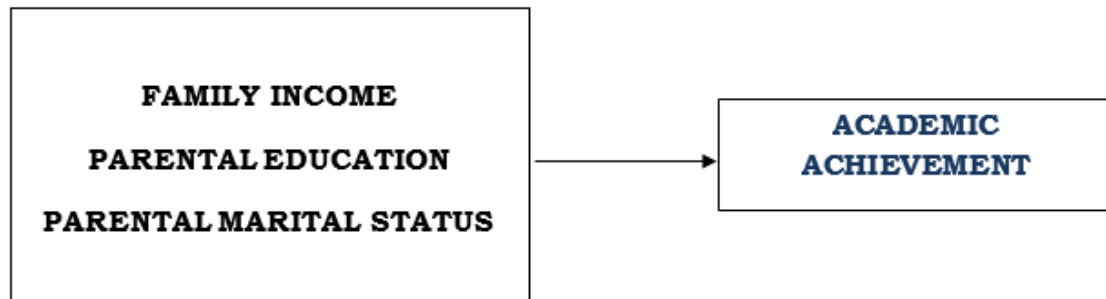
The simple hypotheses can be stated as follows;
H0-1: Students whose parents have higher incomes will achieve higher academic achievement.
H0-2: Students whose parents obtain higher education will earn the higher academic achievement.
H0-3: Students who have both parents will have higher academic achievement
then students from single-parent homes.

This research will be using questionnaire method as a research instrument, and the questionnaire will be adapted from a journal written by Md Rofikul Islam and Zebun Nisa Khan [24]. The respondents for this research will consist of a student from the three Polytechnics which are Politeknik Sultan Salahuddin Abdul Aziz Shah (4492 students), Politeknik Sultan Idris Shah (3350 students) and Politeknik Banting Selangor (1061 students). In total, 8902 students from the three polytechnics became the respondents for this research purpose. According to Krejcie and Morgan's table, the nearest figure for 8903 is 9000 and the sample size that researcher should select is 367 which that will pick randomly from all the three Polytechnics using Stratified Random Sampling Procedure and the configuration for this sample size is seen in Table 1.

Table 1 : Stratified Random Sampling Procedure

Polytechnics	Population	Sample size
PSA	4492	185
PSIS	3350	138
PBS	1061	44
Total	8903	367

The subsample rates for students from Politeknik Sultan Salahuddin Abdul Aziz Shah, Politeknik Sultan Idris Shah, and Politeknik Banting Selangor are 185, 138 and 44 respectively.

Data collected will be analyzed using the Statistical Package for the Social Sciences for Windows (SPSS). The distributional characteristics of independent and dependent variables will be described by using descriptive statistics, and the relationship between independent variables with the dependent variable will be analyzed using linear regression analysis.

4. CONCLUSION

In the past, not many new studies have been done on this topic. Therefore, our contribution to this study is to provide new insights, and researchers can explore the socioeconomic impact of academic achievement and identify whether there is a relationship between socioeconomic status and academic achievement. This study will focus on socioeconomic status, taking into account family characteristics of income, parental education, and parental marital status. This research will be helpful for the management to formulate a suitable program that can help students, particularly those in category B40 to improve their academic achievement.

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USING THE ADDIE MODEL TO DESIGN AND DEVELOP A MOBILE LEARNING APPLICATION FOR MICROECONOMICS MODULE

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ABSTRACT

This study presents the steps taken to produce a mobile learning application framework to learn Microeconomics for which is named "MobiEko Apps". Mobile learning application is utilized because the framework enables seamless access between all the involved actors. The design and development of an application prototype in this study are based on the ADDIE instructional design model. Objective: The objective of this study is to develop a mobile learning application based on ADDIE approach for users. Results: In this paper a systematic, research framework using ADDIE (Analyse, Design, Develop, Implement, and Evaluate) approach is proposed and findings shows that students were satisfied of the presentation design, interactivity, visual, navigation and accessibility of 'MobiEko' application. Conclusion: Overall, this paper discussed the design and development of mobile educational application to promote enhanced student learning through modular audio visual and text content (mobile apps) in the subject "Microeconomics" at the Malaysian Polytechnics.

Keywords: Mobile learning, ADDIE model, Design and development & Microeconomics

1. INTRODUCTION

The development of mobile technology has increased the instructional climate in recent decades from conventional learning in the classroom to a virtual, interactive setting. The use of mobile devices has experienced changes in the classroom's landscape, encouraging educators and learners to participate actively in a more appealing and interactive instructional system (Li, Lee, Wong, Yau, & Wong, 2018; Norazah Mohd Nordin & Embi, 2008). The fast growth of ICT also offered a chance for teachers to integrate the use of tools and apps in teaching and learning procedures. Therefore, the teaching and learning pedagogy should be revised to satisfy the requirements of education in the 21st century (Valk, Rashid, & Elder, 2010). Mobile learning products and services are usually used in a technologically setting with fresh learning material and applications, which are creating a lot of anticipation in the educational community these days. Mobile phones in this technological age have achieved an important status, because of their mobile capacity to satisfy and fulfill the requirements of society. (Leonid, 2014). Wireless and mobile characteristics made it possible to communicate borderless regardless of moment and geographical distance. The mobile device has been providing rapid access to information in recent decades, promoting education from traditional teaching and learning methods to teaching and learning environment based on technology. Students bring these technologies to their everyday affairs anywhere. This phenomenon should be viewed as a challenge by educators. The concept of mobile learning' anytime' and' anyplace' should be used to enhance pedagogical activities in lessons delivered (Bidin & Ziden, 2013).

Given the development of teaching and learning, which leads to the development of information technology, this research seeks to create the novel mobile app "MobiEko," used in the Malaysian Polytechnics microeconomics module. The MobiEko application is intended for combined learning to help teachers and learners, leveraging mobile devices' affordability and ownership, to promote the learning of Microeconomics lessons for mobile devices. In this paper, we shall report the results of the process of mobile education. The aims of this research are to describe the mobile learning application's design and development efforts.

1.1 Mobile Learning application for 21st Century Classrooms

Mobile device portability characteristics and Wi-Fi systems help learners learn everywhere and remove time and place restrictions that allow mobile devices to use their time more effectively (Cárdenas-Robledo & Peña-Ayala, 2018). These technologies offer a new way of learning and teaching that is easier to access and share information on electronic education. Access to learning content everywhere promotes cooperation (Gikas & Grant, 2013), flexibility(Afendi Hamat, Mohamed Amin Embi, & Haslinda Abu Hassan, 2012; Onyechere Ugochukwu & Ismail, 2015), personalized learning (Kim, Rueckert, Kim, & Seo, 2013), interactivity, learner-centered and self-paced learning, ubiquitous and learning in a run or mobility in learning(Mehdipour & Zerehkafi, 2013; Muslimin, Nordin, & Mansor, 2015).

1.2 ADDIE Framework

The ADDIE model is based on behaviorism, an idea developed by (Dick & Carey, 1996) to design the instruction and learning system. The term ADDIE is an acronym for Analysis, Design, Development, Implementation, and Evaluation (rating). Each element or level does not necessarily follow a sequential pattern but informs each other in a design system, where the output of a level will be input to that level next. The ADDIE model is a basic instructional design that can be integrated into any learning strategy. It provides a systematic approach to processes design instructions and acts as a well-organized framework to ensure that the educational products produced are effective and creative processes are very efficient. In this study, the researchers used the ADDIE model to guide the development of Mobile Learning for Microeconomics instruction. The model comprises five primary stages: analysis, design, growth, execution and assessment. The most fundamental, easy and relevant ADDIE model is a generic and systematic model for the instructional design (Reiser & Dempsey, 2012) and as a fundamental and simplified instructional systems design model. The ADDIE model provides a framework which lists generic processes used by training designers and developers as a guideline for building effective education and support programs in five phases: analysis, design, development, implementation and evaluation as shown below.:

Figure 1 : Process of the application by the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model
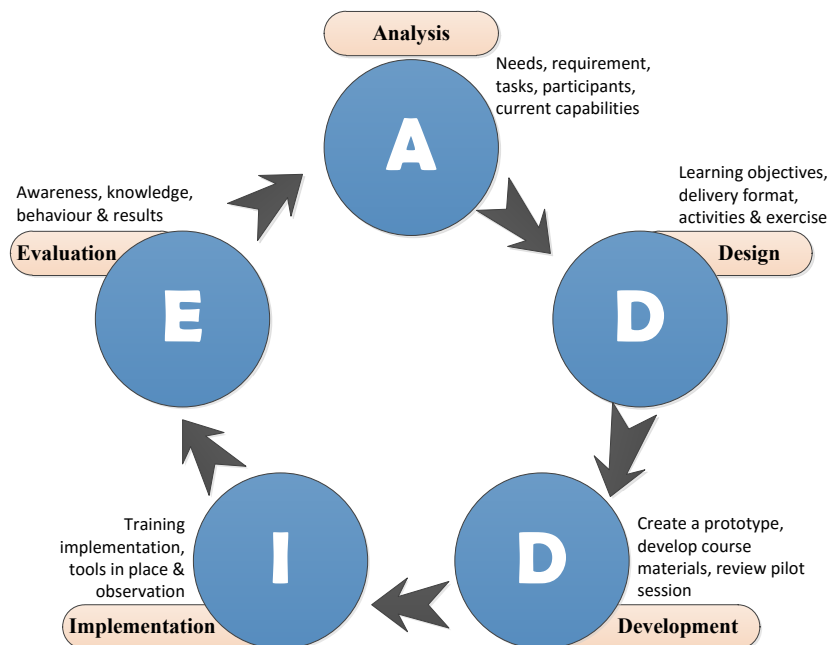
2. METHODOLOGY

The design and development of the implementation in this research is based on the ADDIE instructional design model. The ADDIE method (analysis, design, creation, implementation and evaluation) is a popular method used in the creation of training courses and programmes (Peterson, 2003). This strategy offers teachers usefully defined steps for efficient training. In this research, the apps that want to generate are Android mobile app for education that supports classroom teaching and learning.

Figure 2 : Development Framework Model of Mobile Learning Application Development
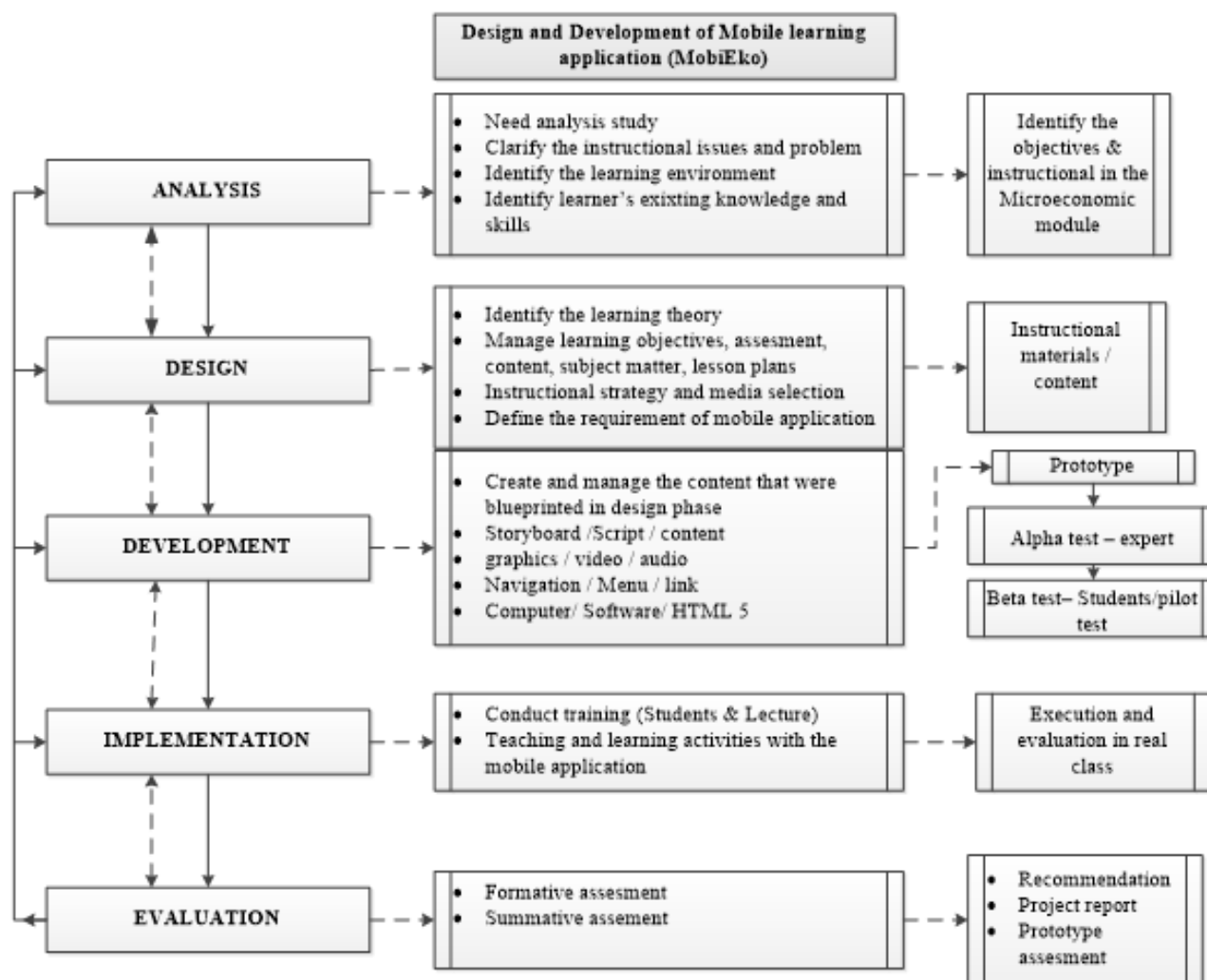
2.1 Analyze phase

Two major practical issues have been promoted in Microeconomics by the development of mobile applications (MobiEko). Firstly, the issues relate to mobile devices ' opportunity compared to other ICT tools (Oyelere, 2016). Secondly, the ability to create and enhance Microeconomics on the mobile device platform is the opportunity to learn through mixed learning instead of the traditional face-to-face classroom teaching. (Mayisela, 2013). In blended learning, learners can learn face-to-face via on-line media, allowing teachers to reach more students. This affordability for teaching is therefore essential to leverage. In order to identify the problem, the stakeholders met and consulted through the document review, face-to-face discussions, questionnaires and interviews in order to provide information on students ' willingness to adopt mobile learning, preferences for the use of specific mobile learning for Microeconomics courses and their ideas as to the suitability of mobile learning.

2.2 Design phase

The design phase sets the learning goals and identifies the student learning and evaluation approach based on analysis outcomes. Learning goals concentrate on the repetitive acquisition of information about the Microeconomics module using instructional mobile apps as a teaching assistance to improve understanding of the Microeconomics module. The learning objectives of the main 4 sections are shown in Fig.3. Based on the results from the analysis stage, a learning menu was produced which consists of key contents and subsections

Figure 3 : Main sections of MobiEko application
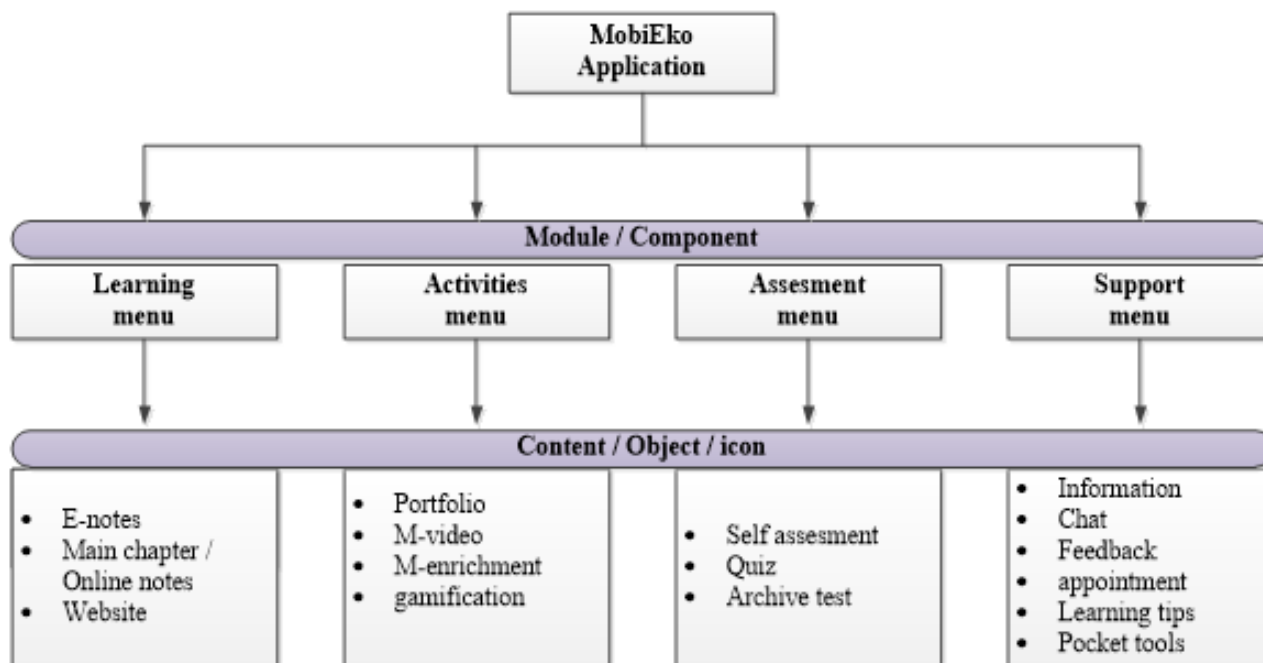
Mobile application design also incorporated the tutorial elements such as introduction, concepts, examples, exercises, and a summary to achieve deeper learning objectives. Activities design to be carried out to achieve the objectives of MobiEko should be able compelling students, provide relevant knowledge, help students to understand clearly with the objective of learning, organize content, explain the concept, present the concept in many ways, provide a meaningful exercise, provide sufficient exercise, make sure the example is relevant to the context, create a closure and able to promote discussion. All these elements have long been practiced in formal learning, and make it ' automatically ' through mobile device system will further enhance the ability to learn (Quinn, 2011). Furthermore, the application of m-learning functions like chats, e-mails, push notifications, discussion forums and interactive self-practice materials is also provided to support the involvement of students.

2.3 Development phase

In the analysis and design phasing, an education application was developed based on the learning objectives and structure established.. Development of mobile applications requiring hardware and selection of the right authoring tools. Authoring tool refers to key components required to develop software applications such as audio, video software, graphics, animation and mobile application development software such as Android Developer Tools (ADB) or online software. In this study, the researchers applied Appy pie software. Appy Pie is one of the top online software available on the Internet for developing mobile applications. The software can support the application process either through the Android platform, Mac OS, Windows Phone, Blackberry, and HTML 5. Also, there are several other software used in developing the application, such as computer operating system Microsoft Windows 8.1, an image editing software (Jing software), Cam Scanner, web browsers (Chrome & Mozilla Firefox) and the Adobe Photoshop as an image editing software and graphics.

2.4 Implementation phase

Prototyping may be used in the classroom or outside the classroom by exploring prototyping activity such as access to notes, quizzes, discussion material, and reflection. The entire system consists of clients, system administrator, a database and the server as described in design phase (android supported mobile device). After developing the application, the prototype tested severally on the emulator and actual devices to check the functionality of the different devices. Then, the prototype (MobiEko apps) installed on a real mobile device for debugging. The testing was done on 5.5inches Xiaomi Redmi Note 2 and 5 inches Huawei Honor 3 phone. The scheme was introduced according to the requirements of the stakeholders. To arrive at this prototype, rigorous precision and iterative characteristics of ADDIE were used. For Android customers, the first version of the application was introduced. Popular operating systems like iOS, Windows are introduced in subsequent releases.

2.5 Evaluation phase

This stage refers to the prototype testing and evaluation process of an application that has been developed to ensure that all criteria have been met. The prototype assessment involves aspects of the interface between content, graphics, audio, video and software. The evaluation process is ongoing and integrated that happens at every level of the stage. There are two types of an evaluation carried out to applications, namely formative and summative assessment. Formative assessment provides feedback and support for the course of education, enabling teachers and students to adapt their education and learning to improve the achievement of planned learning results (Black, Harrison, Hodgen, Marshall, & Serret, 2011). Meanwhile, summative assessment refers to the overall evaluation of instructional materials that have been developed. The evaluation was performed to ensure that the mobile application prototype meets the objective. In general, the summative evaluation undertaken is to ensure that all areas can be improved so that teaching and learning activities can improve student achievement and motivation through the use of mobile learning applications. The table below shows the summary of the app reviewer for MobiEko application.

Table 1 : Group of app reviewer

Evaluator	Description
Mobile Technology expert	a team of experts with experience in mobile application development in the education field.
Technical expert	has expertise in technical areas such as interface development, multi-media, and interactivity.
Content expert	has special expertise in Economics education
Course lecturer	lecturers involved in the teaching and learning process of Microeconomics modules.
Students (user)	a group of students using the MobiEko application in the teaching and learning process.

3. RESULTS AND DISCUSSIONS

3.1 Development of an Educational Smartphone App

Mobile applications are created by separating content into four primary section, namely the learning menu, learning activities, evaluation tasks and support activities. The learning menu includes offline notes, internet notes and a key chapter for every subject, whereas learning activities include problem-solving activities, tutorials, portfolios and videos. The MobiEko implementation incorporates quizzes, tests and past year tests for evaluation activities so that students can review and practice the tests. Finally, the support segment offers extra activities that enhance and strengthen student learning. Menu of Information, chatting, feedback & reflection, appointments, advice and pocketing tools are among the activities included in the support chapter. The home menu and the interface of the main menu are shown in figure 5 and figure 6.

Figure 4 : Main four sections and additional information icons of the application
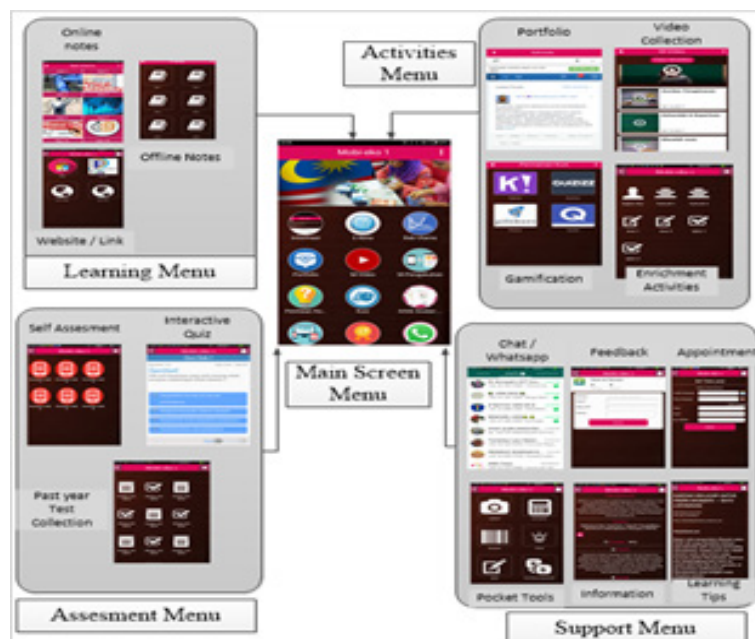
Figure 5 : MobiEko interfaces

The aim of creating an instructional app was to produce teaching materials, which could be accessed via mobile devices such as a smartphone as an instructional approach aimed at helping students to master contents of the MPC module. The 'MobiEko' smartphone app developed for this study stores a much larger amount of learning contents. The benefits of educational materials using smartphone apps are that they allow users to have instant access to educational data and to enjoy the freedom of mobility in places where there are no computers available at any time learners need them. Mobile phones also provide multimedia services and a broad range of exciting and attractive apps, including Personal Message, GPS, camera and games, have already been created. As an electronic privately owned textbook for microeconomic learners, "MobiEko" smartphone app, created to solve such problems, will therefore play an significant role. Research constantly demonstrates that when learners participate actively with materials, they learn more. (Li et al., 2018). The use of mobile wireless technology can overcome the restriction of flexibility in education through wired technology. Mobile wireless systems enhance teaching and learning utilization and efficiency by enjoying mobility. (Muslimin, Nordin, & Mansor, 2017).

4. CONCLUSIONS

The ADDIE model is the best instructional design model to be used to develop a kind of instructional material in its phases of analysis, design, development, implementation, and evaluation. The concept of mobile learning application seems to be an interesting and mobile educational application have the potential to provide a different and exciting learning experience for users. Therefore, the development of the application is expected to help the students mastering the Microeconomics course with the help of mobile technology and multimedia elements infused in a teaching approach based on tutorial strategy accordingly. The invention of this application is also expected to encourage students to perform independent learning (self-directed learning). Therefore, a mobile educational application should be allowed to offer their benefits in the learning process. To ensure the applicable mobile learning application performance and can attract students to learn, MobiEko application developed with an emphasis on noticeable presentation and integrated learning materials. The development of the learning materials prepared with carefully guided by ADDIE model so that the content more easily understood and lead to effective learning.

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MATHEMATICS SELF-EFFICACY AND ANXIETY AMONG TVET STUDENTS

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ABSTRACT

Technical and Vocational Education and Training (TVET) Institution mathematics achievement is often influenced by students' mathematics self-efficacy and anxiety. Therefore, the purpose of this study is to explore the level of mathematics self-efficacy and anxiety and to discover the possible interconnection between these parameters with student's gender and mathematics achievement. The scale measuring mathematics self-efficacy and anxiety consisted of 28 five-point. The respondent involve was students from Diploma Engineering in Aircraft Maintenance in Politeknik Banting Selangor (PBS). The result from the statistical analysis shows that the mathematics self-efficacy level of students was high and the mathematics anxiety level was low. The study will give advantageous to TVET lecturer for them to understand better about the TVET students' mathematics self-efficacy and anxiety so that their attainment in technical and vocational courses can become improve better in quality. The result also shows no significant difference was obtained between male and female mathematics self-efficacy and anxiety with mathematics achievement.

Keywords: mathematics self-efficacy, mathematics anxiety, achievement in mathematics

1. INTRODUCTION

The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasizes that Technical and Vocational Education and Training (TVET) is a process of education and training for students to gain knowledge, practical skills, in line with industry requirements (ISCED, 1997). TVET programmes in Malaysia are offered by various ministries that include the Ministry of Education (MOE). School-leavers who have completed Sijil Pelajaran Malaysia (SPM) can enroll at MOE's Community Collages, Polytechnics and Malaysia Technical University Network (MTUN) for technical and vocational education to pursue certificate, diploma and bachelor's degree qualifications (EPU, 2016). The Politeknik Banting Selangor (PBS) offers three TVET programs: Diploma in Mechanical Engineering, Diploma in Mechanical Engineering (Manufacturing) and Diploma in Aircraft Maintenance Engineering. TVET programmes aim to produce work-ready graduate required for the industry which equipped with the knowledge, technical skills and soft skills (Alavi & Awang, 2013). The application of mathematics is an essential skill set for students in TVET programmes, which is required to take courses that utilize mathematical concepts. Mathematic literacy and problem-solving ability is a key factor student performed in mathematics. However, mathematic has become inherent difficulties due to its abstract and cumulative nature which students need a firm foundation. This situation can affect the students' motivation as well as mathematical self-efficacy and Mathematics anxiety.

1.1 Mathematics Self-Efficacy

Mathematics Self-efficacy is defined as an individual's belief or perception of his or her ability to learn Mathematics as well as their level of enjoyment in mathematics (Joseph, 2019; May, 2009) suggest that students with high levels of self-efficacy will be more motivated to learn and able to perform more challenging tasks. (Schunk & Mullen, 2012) indicated the characteristic of self-efficacy it has a significant relationship between cognitive and non-cognitive skills, including academic achievement. Mathematics at the school level, finding self-efficacy is one of the important variables to explain differences in students' math performance for predicting student mathematics achievement (Pajares, 2006). Indeed, (Pajares, 1994) mentioned that mathematics self-efficacy is the main predictor of mathematics achievement compare with mathematics anxiety and the experience of mathematics.

1.2   Mathematic Anxiety

There are three domains involved in the development of mathematical anxiety: social, intellectual and psychological or emotional domains. The impact of mathematical anxiety on social or behavioral domains may cause students to avoid learning activities related to mathematical solutions (Beilock & Maloney, 2015; Fatin, Mohd Salleh, Mohammad Bilal, & Salmiza, 2014). Meanwhile, the effects of mathematics anxiety on the intellectual domain can cause the working memory of the individual to be restricted (Beilock & Maloney, 2015; Passolunghi, Caviola, De Agostini, Perin, & Mammarella, 2016). The mathematical effect of anxiety on the psychological domain will influence the student's self and cause a negative impression on the student (Mohd Nordin, N. A., Md Tahir, H., Kamis, N. H., & Khairul Azmi, N. N, 2013).

Mathematics anxiety involves feelings of tension, dislikes, frustration and fear with test anxiety and also expand to a more specific fear went dealings with numbers and the find a solution of mathematical problems in academic learning (Jameson & Fusco, 2014; Joseph, 2019).   Mathematics anxiety is closely related to the student's fear of assignments, assessments, and mathematics tests. This will result in the inability of the student to perform in Mathematics. Therefore, mathematics anxiety will be an obstacle for students to dominate the knowledge in the study of engineering or engineering technology field. It is important to address the mathematical anxiety phenomena to ensure that students can perform well in the mathematic course and other discipline courses (Joseph, 2019). This is because mathematics anxiety was a significant factor of student's mathematic performance as well as low self-esteem, confidence and efficacy (Mohd Rameli et al., 2014).

1.3 Mathematics Self-Efficacy and Mathematics Anxiety versus Gender and Mathematics Achievement.

According to a study (Recber, Isiksal, & Koc, 2017), gender has a significant impact scores on mathematics self-efficacy, attitudes, anxiety and mathematics achievement. Researchers indicated that there is a positive relationship between attitudes and mathematical achievement for females while males have no significant correlation (Mubeen, 2013). On the other hand, Soleymani & Rekabdar (2016) mentioned that male students have better scores in mathematics achievement compare with females.

The female students had lower mathematics anxiety level compared to male students (Yahya & Amir, 2018). In term of self-efficacy in mathematics examination, females hold lower self-efficacy compared to male students (Louis & Mistele, 2012). Researchers have also indicated that affective factors, such as mathematics self-efficacy and mathematics anxiety, play a crucial role in mathematics achievement. According to the study of May (2009), those students who passed their examination were found to have a higher self-efficacy and lower the anxiety that those students who failed. Thus, it was found that mathematics anxiety is correlated to self-efficacy. The higher math anxiety will be lower math learning, mastery, and motivation (Reyes, Joseph D, 2019). (Chang, 2015; Kalaycıoğlu, 2015; Liu & Koirala, 2009), study the relationship between mathematics self-efficacy and mathematics achievement of students and the results significantly indicated that mathematics self-efficacy and mathematics achievement were related.

2   METHODOLOGY

2.1   Research Design

Quantitative research method was adopted in this study. Quantitative research according to Sukamolson (2007), encompasses the use of scientific sampling method with a designed questionnaire to measure a given population's characteristics through the utilization of statistical methods. The numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect. This ultimate study outlines to explore the level of mathematics self-efficacy and anxiety of student's in Politeknik Banting Selangor. Besides, survey questionnaire is chosen to determine the relationship between mathematics self-efficacy and mathematics anxiety that affect mathematics achievements.

2.2   Instrument

For this study, self-administered questionnaires have been applied. Self-administered questionnaire defines the method in which the respondents answer the questionnaire by their own, either on the questionnaire papers. Basically, the questions in the questionnaire were adopted from previous researchers and modified based upon the necessity to fit into this study. The Mathematics Self-Efficacy and Anxiety Questionnaire (MSEAQ) (May, 2009), was used to measure students' mathematics self-efficacy and mathematics anxiety. The structure of the questionnaire is carried out in simple English for better understanding of question. This encourages higher degree of accuracy in the respondents' answers due to the prevention of confusion in answering the questions. Brief introduction and the purpose for study are stated in the cover page of the questionnaire.

Generally, the questionnaires are divided into two sections, which are Section A for the demographic information, and Section B for the Mathematics self-efficacy and anxiety Questionnaire. Section A: contained demographic information (gender, race, semester, department of study, programme of study and mathematic achievement during first semester). Section B consists of 28 items in which respondents are expected to state their level of feelings regarding each variable.

The questionnaires used the Likert scale from 1 for strongly disagree at all to 5 for strongly agree. The questionnaires were distributed using survey method random sampling approach. To increases the validity and reliability of the information gathered, the respondents are asked on their willingness to participate in the questionnaire prior to the questionnaire. The questionnaire was carried out smoothly, thus researchers able to collect it on time.

2.3   Process of Data Collection

Questionnaires were administered to a total of 62 respondents of student in 2 departments in Banting Polytechnic consists of Department of Mechanical Engineering and Department of Aircraft Maintenance (Maintenance, Repair and Overhaul (MRO)), out of which 62 respondents will take. This survey will conduct from students' semester 2.

2   METHODOLOGY

Quantitative data were analyzed using SPSS21 software and used descriptive statistics such as frequency, percent, mean and standard deviation to explain the objectives of the study.

3.1 Instrument reliability

Instrument reliability was determined using the Alpha Cronbach's internal consistency method. Table 1 shows the results of the Cronbach's Alpha reliability test for MSEAQ including 13 items self-efficacy scale (MSEAQ-SE) and the 15 items anxiety scale (MSEAQ-A). Note that the anxiety items on the MSEAQ are reversed scored.

Table 1: Summary of instrument reliability analysis

	Number of items	Alpha value
MSEAQ-SE	13	.953
MSEAQ-A	15	.889

According to Table 1, the Cronbach's Alpha value for MSEAQ-SE was 0.953, while the Cronbach's Alpha value for MSEAQ-A was 0.889. This indicates that the questionnaire has high reliability (Pallant, 2011).

3.2 Respondent Profile

Table 2 shows the respondent profile. From the 62 respondents who answered the survey, 69.4% (n = 43) were male and 30.6% (n = 19) were female. The results for mathematics students showed high distinction was 4.8% (n = 3), distinction of 22.6% (n-14), credit 45.2% (n = 28) and pass 27.4% (n = 17).

Table 2: Respondent profile

Profile	Frequency	Percentage
Gender		
Male	43	69.4
Female	19	30.6
Mathematics Result		
Very Excellent	3	4.8
Excellent	14	22.6
Credit	28	45.2
Pass	17	27.4

3.3 Research Objective 1: To know the students' mathematics self-efficacy and anxiety levels.

Table 3 shows the mathematics' self-efficacy level for 62 respondents. The level of mathematics self-efficacy of students is at a moderate level (mean = 3.42, SD = .777). In detail all dimensions of math self-efficacy construct also at a moderate level with a mean range of M=3.08, SD=.997 to M=3.74, SD=.848.

Table 3: Mathematic Self-Efficacy (MSEAQ-SE) Level

Item	Mean	SD
I feel confident enough to ask questions in my mathematics class.	3.45	1.183
I believe I can do well on a mathematics test.	3.35	1.057
I believe I can complete all of the assignments in a mathematics course.	3.50	1.036
I believe I am the kind of person who is good at mathematics.	3.08	.997
I believe I will be able to use mathematics in my future career when needed.	3.44	1.050
I believe I can understand the content in a mathematics course.	3.56	.802
I believe I can get an "A" when I am in a mathematics course.	3.47	1.067
I believe I can learn well in a mathematics course.	3.74	.848
I feel confident when taking a mathematics test.	3.24	.862
I believe I am the type of person who can do mathematics.	3.47	.804
I feel that I will be able to do well in future mathematics courses.	3.44	.880
I believe I can do the mathematics in a mathematics course.	3.48	.971
I feel confident when using mathematics outside of polytechnic.	3.26	.974
Average of Mathematics Self Efficacy Level	**3.42**	**.777**

Table 4: Mathematic Anxiety (MSEAQ-A) Level

Item	Mean	SD
Item	Mean	SD
I get tense when I prepare for a mathematics test.	3.06	1.038
I get nervous when I have to use mathematics outside of polytechnic.	2.85	1.069
I worry that I will not be able to use mathematics in my future career when needed.	3.03	1.130
. I worry that I will not be able to get a good grade in my mathematics course.	3.32	1.328
I worry that I will not be able to do well on mathematics tests.	3.35	1.147
I feel stressed when listening to mathematics instructors in class.	1.95	.838
I get nervous when asking questions in class.	2.82	1.138
Working on mathematics homework is stressful for me.	2.44	.760
I worry that I do not know enough mathematics to do well in future mathematics courses.	3.23	1.151
I worry that I will not be able to complete every assignment in a mathematics course.	2.94	.973
I worry I will not be able to understand the mathematics.	2.89	1.103
I worry that I will not be able to get an "A" in my mathematics course.	3.10	1.251
I worry that I will not be able to learn well in my mathematics course.	3.00	1.101
I get nervous when taking a mathematics test.	3.00	1.024
I am afraid to give an incorrect answer during my mathematics class.	3.06	1.038
Average of Mathematics Anxiety Level	2.95	.676

Table 4 shows the mathematics' anxiety level for 62 respondents. The level of mathematics self-efficacy of students is at a moderate level (mean = 3.42, SD = .777). In detail all dimensions of math self-efficacy construct also at a moderate level with a mean range of M=3.08, SD=.997 to M=3.74, SD=.848.

3.4 Research Objective 2: To determine the difference mathematics self-efficacy and anxiety levels between gender

Result from the Independent Sample t-Test (Table 5) shows that there is a significant different of Mathematics Self-Efficacy (M=3.42, SD=.777), t(60)=2.506, p=.02) between Male and Female. It shows that Male Student have greater self-efficacy level compared to Female Student. However, result shows that there is no significant different of Mathematics Anxiety (M=3.21, SD=.42), t(57.28)=.860, p=.29) between male and female students.

Table 5: SPSS Output for Independent Sample t-Test

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
MSEAQ-SE	Equal variances assumed	2.506	60	.015	.51483
	Equal variances not assumed	2.960	51.933	.005	.51483
MSEAQ-A	Equal variances assumed	.860	60	.393	.16042
	Equal variances not assumed	1.068	57.280	.290	.16042

3.5 Research Objective 3: To determine the relationship between the variables of the mathematics self-efficacy and mathematics anxiety with mathematics achievements and gender.

A Spearman's rank-order correlation was run to determine the relationship between Mathematic Self-Efficacy, Mathematic Anxiety and Mathematic Achievement. There was a weak inverse correlation between Mathematic Self-Efficacy and Mathematic Anxiety, which was statistically significant ($r62 = -.373$, $p=.003$). It shows that the higher student having self-efficacy in Mathematic, the less their anxiety. However, there is a weak inverse correlation between Mathematic Self-Efficacy and Mathematic Achievement between student also, which was statistically significant ($r62 = -.279$, $p=.028$). While there is a weak positive correlation between Mathematic Anxiety and Mathematic Achievement of student, which was statistically significant ($r62 = .335$, $p=.008$). It shows the less student having anxiety in Mathematic, their grade will be better.

Table 6: Correlation

			MSEAQ_SE	MSEAQ_A	Math Achievement
Spearman's rho	MSEAQ_SE	Correlation Coefficient	1.000	-.373**	-.279*
		Sig. (2-tailed)	.	.003	.028
		N	62	62	62
	MSEAQ_A	Correlation Coefficient	-.373**	1.000	.335**
		Sig. (2-tailed)	.003	.	.008
		N	62	62	62
	Math Achievement	Correlation Coefficient	-.279*	.335**	1.000
		Sig. (2-tailed)	.028	.008	.
			62	62	62

4 CONCLUSIONS

The findings from research in mathematics self-efficacy and mathematics anxiety to policymakers are the understanding that success in mathematics achievement requires not only knowledge of mathematical concepts but also involves the right attitude among students and educators. The subject of Engineering Mathematics is often considered as a challenging subject that many TVET students do not like. As a result, many TVET students simply accept their existing mathematical achievement in their ability to solve mathematics problems instead of striving to study smart to improve their own mathematic self-efficacy as well as to reduce their mathematic anxiety levels and as a result improve academic achievement in their technical or engineering related mathematic subjects. Therefore, awareness among TVET students about the importance of the ability to apply mathematical knowledge and skills in their daily lives and careers should be taken into account throughout their studies at educational institutions. Educators in mathematics courses need to consistently practice the right learning techniques and instructional strategies that can effectively help TVET students learn and improve their ability and achievement in mathematics.

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ANALYSIS OF THE EFFECT OF SELF EFFICACY, EMPLOYEE COMMITMENT, AND CAREER DEVELOPMENT ON EMPLOYEE PERFORMANCE OF PT. BANK DKI, JUANDA - JAKARTA PUSAT

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ABSTRACT

Analysis of the Effect of Self-Efficacy, Employee Commitment, and Career Development on the Performance of Employees PT. Bank DKI, Juanda - Central Jakarta. The purpose of this research is to determine the effect of self-efficacy, employee commitment, and career development partially or simultaneously on employee performance. This research was conducted using descriptive and quantitative analysis methods. The sampling technique used was proportional random sampling with a sample of 75 respondents. The results of the partial hypothesis test obtained the value of tcount for the variable Self-Efficacy of 22.77 and the Commitment of Employees of tcount of 5.71 and Career Development of tcount of 21.16; while the value of ttable = 1.67. The probability values for all independent variables were all less than 5% (p <5%). Simultaneous hypothesis test results obtained Fcount value of 207.56 and probability value <5%, while Ftable value = 3.12. Based on the calculation of the coefficient of determination partially, the results obtained the variable self-efficacy of 87.7%, variable employee commitment of 30.9% and career development variables of 86%, and the simultaneous calculation of the coefficient of determination was 89.8%. Based on the results, it can be concluded that partially the variables of self-efficacy, employee commitment and career development had a significant effect on employee performance. Self-efficacy variables had the most dominant influence (87.7%) on employee performance, while employee commitment had the weakest influence (30.9%) on employee performance. Simultaneously, the variables of self-efficacy, employee commitment and career development had a significant effect on employee performance by 89.8% and the regression equation of $Y = 7.969 + 2.733X_1 + 0.109X_2 + 1.726X_3$.

Keywords: Self Efficacy, Employee Commitment, Career Development, Employee Performance

1. INTRODUCTION

A. Background

The dynamic condition of banking competition requires a lot of improvement and excellent service in order to provide customer satisfaction, especially many state-owned banks, region-owned banks, and private banks that are competing to launch new programs that can provide convenience for their customers. Therefore, banking companies must continue to improve and develop the performance of their employees in order to be able to provide satisfying services for customers. There are several factors that can be developed to improve employee performance, namely the companies motivatethe employees to produce mature self-efficacy so that the employees can work confidently, the companies encourage the employees to increase their commitment, and the employers provide an attraction for employees to work wellby developing career development programs open to all employees.

Self-efficacy is considered important in encouraging employee performance because of its relationship with life in an organization in which the self-confidence and firm belief are needed from the employees. The higher the level of efficacy of the employees on the values of self-confidence, meaning that the employees will know what to do and what can be expected of themselves, so they always act quickly to overcome various existing problems.

Another factor that can affect employee performance is employee commitment. Commitment also drives the employees to be loyal and have a sense of ownership tothe organization.Thus, every time they work, theyare orientated to work well and then produce appropriate work, so as to provide high work performance and deliver the organization to achieve its goals. Furthermore, in an effort to improve employee performance, the career development factor has a significant influence.

Bank DKI (Daerah Khusus Ibukota/Capital Special Region) continues to improve the quality and competence of its human resources through various education and training programs, both regular and non-regular programs.The training programs are provided through in-house training, as well as training programs in collaboration with leading educational institutions (Annual Report 2013).

To accelerate the empowerment and creation of cadres of future leaders, Bank DKI has carried out various human resource development programs, namely the Staff Development Program, Manager Development Program, and Executive Program Development (Annual Report 2013).

Although the development system has been implemented in order to improve employee performance such as self-efficacy, employee commitment, and career development, changing times demand continuous improvements coupled with the increasingly complex patterns of thought and behavior of customers that demand more advantages. Thus, improvement efforts in order to meet the customer needs cannot be seen as a simple matter and the internal parts of the company must have awareness, because otherwise the customers will look away to other banks.

In order to implement a more objective performance assessment system, Bank DKI continues to harmonize the valid and objectively accountable system through key performance indicators (KPI). The KPI program is also intended to measure the mapping of the strength of human resources currently owned by Bank DKI, as well as a cascading map of company-level strategies that are broken down into work unit strategy maps and work targets.

The KPI, as a measure of the success of performance, will also be a reference for the application of reward and punishment which will later be related to the CASH (Cara Agar Semua Happy/Ways to Make Everyone Happy) program.

Based on the explanation above, it is interesting and challenging to conduct a research related to the theory and empiricism that have relevance to performance, self-efficacy, employee commitment, and career development. The title of this research that will be held is: "Analysis of the Effect of Self-Efficacy, Employee Commitment, and Career Development on Employee Performance of Bank DKI - Case Study of Bank DKI Jakarta Central Bank employees".

B. Formulation of Problem

1. Does self-efficacy significantly influence employee performance?
2. Does employee commitment significantlyinfluence employee performance?
3. Does career development significantlyinfluence employee performance?
4. Do self-efficacy, employee commitment, and career development simultaneously significantlyinfluence employee performance?

2. THEORIES

A. Self Efficacy

Self-efficacy as in "one's beliefs about the ability to produce levels of performance"has influence on events that affect one's life. In addition, self-efficacy is defined as "self-assessment of the ability to regulate and carry out actions desired to achieve the goal." In this sense, self-efficacy can determine how a person feels, motivates himself, and behaves so that it can influence behavior.

Based on the definitions, it can be concluded that self-efficacy is one's belief in one's ability to organize and display effective performance behaviors so that one can complete certain tasks well. Self-efficacy is also a personal factor that mediates between behavioral factors and environmental factors. Factors that influence self-confidence can originate from four principles of information sources, namely performance attainment, vicarious experience, verbal persuasion, and physiological state.

There are three dimensions of self-efficacy in individuals in determining taken actions, namely:
a. Dimension of magnitude (difficulty level)
b. Dimension of strength
c. Dimension of generality

B. Employee Commitment

Employee commitment is the desire of the employees to maintain their membership in the organization and to be willing to make efforts for the achievement of organizational goals. Employment commitment consists of work commitment, career/professional commitment, and organizational commitment.

Organizational Commitment, according to Luthans (2006) in Wijaya (2010: 5), is defined as the desire to maintain oneself to remain a member of the organization and to be willing to try hard as part of a work organization.

Career/Professional Commitment is a perception that is centered on a person's loyalty, determination, and expectations, guided by a system of values or norms that direct the person to act or work according to certain procedures in an effort to carry out their duties. Employees who work longer hours will have a higher professional commitment than those who are new to the same profession.

Work/Job Commitment refers to a commitmentgiven not to the organization or to one's career, but to the job itself. Someone who feels attached to the job has a strong sense of duty or obligation from the job, and puts intrinsic value on the job as a "central life interest".

Employees who are committed to their company will be responsible for their duties and have the possibility to leave the company are smaller than employees whose commitment levels are lower. In connection with high employee commitment, Steers in Wijaya (2010: 6) stated that employee commitment to the company will show four things, namely:

1. High level of participation in company activities.
2. Strong desire to keep working so they can continue to achieve the goals they believe in.
3. Full involvement in the work, because the work is a key mechanism and means for individuals to contribute to the achievement of company goals.
4. Willingness to put forth a lot of effort for the benefit of the organization.

Commitment, as the nature of an individual's relationship with the organization that allows a personto have high commitment, shows:
a. Strong desire to remain a member of the organization
b. Willingness to do their best in the interests of the organization
c. Strong trust and acceptance of the organization's values and goals

C. Career Development

According to Rivai(2010: 274), career development is the process of increasing individual work skills in order to achieve the desired career. Furthermore, career development based on Rivai'sstatement is an increase in work ability in the context of achieving a higher job position in an organization. Usually, this career development attracts employees to work, with a high position or a position guaranteeing financial adequacy and adequate work facilities plus a sense of pride in having a respected work position.

Based on the explanation, it can be concluded that career development is a certain position to be achieved by every employee who requires certain abilities and certain qualifications according to specified career criteria. In addition, the existence of career development is used as a tool to attract employees to work in totality, namely employees put out all their best abilities at work.

There are two dominant factors that can affect one's career in addition to other factors, namely:
1. Life Stages, which can be classifiedinto four stages:
a. The first stage is identity placement. Someone is at this stage at the age of 10 to 20 years old. Individuals investigate choices and begin careers to move into the adult world.
b. The second stage is growth and placement in a career.This stage begins at the age of 20 to 40 years old. In this stage, a person chooses a placement and a position on a career path.
c. The third stage is maintaining and adjusting. This stage generally ends at the age of 50 years and older. Career change and separation occurred during this phase because people seriously question their quality of life.
d. The fourth stage is the decline.The reduction in physical and mental abilities might accelerate to this stage. At this stage, a person has low aspirations and motivation even though extra careers are always possible and can be adjusted.

2. Career Anchor

Edgar Scheinidentifies five different motives that explain how to choose and prepare for a career which came to be called a career anchor, which includes:
   a.   Managerial competence. The career goal of managers is to develop interpersonal, analytical, and emotional competence qualities. People who use this anchor want to manage other people.
   b.   Technical or functional competence. The anchor for engineering people is to continue developing their technical talent.
   c.   Security anchor. For individuals who deliberately seek safety is to adjust their career circumstances to a particular organization and geographical location.
   d.   Creativity. Creative individuals have entrepreneurship. They want to create everything they have.
   e.   Autonomyand independence.The career anchor for people who are independent is a desire to be free from the organization. Their value of autonomy and their desire is to become leaders or work for themselves.

D. Performance

Performance is a universal concept which is the operational effectiveness of an organization, parts of the organization, and its employees based on predetermined standards and criteria. Organizations are basically run by humans, hence performance is actually human behavior in playing the role that they perform in an organization to meet the standards of behavior that have been set in order to produce the desired results and actions.

According to Dessler (2005: 316), there are at least six dimensions that can be used to build employee performance, namely Quality, Productivity, Job knowledge, Reliability, Availability, and Independence.

3. RESEARCH METHODOLOGY

This research was conducted with a descriptive data analysis method in which the descriptive data were grouped and tabulated, and then explained and analyzed quantitativelyin terms of causal relationships (influences) between the variables being studied using the Structural Equation Modeling (SEM) analysis tools.

The population in this research was 292 Bank DKI employees. With the sampling technique using the proportional stratified random sampling and the Slovin formula with an error value of 5%, the number of respondents was obtained, namely 169 people.They are distributed as follows:

Table 4.1: Number of Respondents

No	Employee	Number of Employee	Respondents
1	Corporate Secretary	24	14
2	Change Management Office	6	4
3	Human Resource Group	69	40
4	Treasury Group	30	17
5	Information Technology Group	49	28
6	Strategic Planning Group	19	11
7	General Affair Group	48	28
8	Financial Budgeting Group	47	27
Total	**292**	**169**	

4. RESULTS AND DISCUSSION

A. Results of Descriptive Analysis

Table 4.2: Self-Efficiency Questionnaire Data

Dimension	Indicator		Statement					
			SA	A	QA	D	SD	Total
Magnitude (Ability in doing difficult work)	Able to complete a work in progress	F	50	108	9	2	0	169
		%	29.33	64.00	5.33	1.33	0.00	100
	Work challenge	F	63	104	2	0	0	169
		%	37.33	61.33	1.33	0.00	0.00	100
	Pride for the work	F	52	115	2	0	0	169
		%	30.67	68.00	1.33	0.00	0.00	100
	Initiative	F	45	110	14	0	0	169
		%	26.67	65.33	8.00	0.00	0.00	100
	Ability in executing work program	F	45	120	2	2	0	169
		%	26.67	70.67	1.33	1.33	0.00	100
	Sum	∑ F	255	557	29	4	0	845
		%	30.13	65.87	3.47	0.53	0.00	100
Strength	Considering suggestions	F	45	95	29	0	0	169
		(Stable belief)	26.67	56.00	17.33	0.00	0.00	100
	Subordinate motivation	F	83	50	36	0	0	169
		%	49.33	29.33	21.33	0.00	0.00	100
	Firm action	F	50	108	9	2	0	169
		%	29.33	64.00	5.33	1.33	0.00	100
	Belief in abilities	F	63	104	2	0	0	169
		%	37.33	61.33	1.33	0.00	0.00	100
	Evaluation	F	61	95	13	0	0	169
		%	36.00	56.00	8.00	0.00	0.00	100
	Sum	∑ F	302	452	89	2	0	845
		%	35.73	53.33	10.67	0.27	0.00	100
Generalization (Mature Preparation)	Readiness for risks	F	59	74	36	0	0	169
		%	34.67	44.00	21.33	0.00	0.00	100
	Additional tasks	F	59	81	29	0	0	169
		%	34.67	48.00	17.33	0.00	0.00	100
	Overtime	F	61	72	36	0	0	169
		%	36.00	42.67	21.33	0.00	0.00	100
	Work productivity	F	59	79	31	0	0	169
		%	34.67	46.67	18.67	0.00	0.00	100
	Risk abilities	F	59	81	29	0	0	169
		%	34.67	48.00	17.33	0.00	0.00	100
	Sum	∑ F	297	387	161	0	0	845
			34.93	45.87	19.20	0.00	0.00	100
TOTAL SUM		∑ F	854	1396	279	6	0	2535
		%	33.6	55.02	11.11	0.27	0	100

Source: Processed primary data

Table 4.3 : Response Criteria

Dimension	N	Mean	Standard Deviation	Minimum	Maximum	Response Criteria
Magnitude	169	4.26	0.54	3.72	4.80	High to Very High
Strength	169	4.25	0.64	3.60	4.89	High to Very High
Generalization	169	4.16	0.72	3.44	4.88	High to Very High

Source: Processed primary data

From the responses (Table 4.2), of the 3 dimensions and 15 indicators given,the Magnitude dimension has the most dominant value in which 65.87% of the respondents stated "agree".On the Strength dimension, 53.33% of respondents stated "agree".The Generalization dimension hadthe lowest valuewith the answer "agree" amounting 45.87%. Furthermore, in Table 4.3, it can be seen that the dimension of Magnitude movedfrom 3.72 to 4.80, meaning that the criteria of responses about the Magnitude dimension movedin the range of "High to Very High". Strength dimension hada value moving from 3.60 to 4.89, which means the criteria of the responses about the Strength moved in the range of "High to Very High". The Generalization dimension moved from 3.44 to 4.88, which means that the criteria of responses about the Generalization dimension movedin the range of "High to Very High".

From the responses in Tables 4.4 and 4.5, it can be concluded that for all statements about the Self-Efficacy variable, the majority of respondents answered "agree" (55.02%) and "strongly agree" (33.6%). This illustrates that Bank DKI already had a strong Self-Efficacy that was embedded in each of its employees, making it easier to achieve goals and objectives.

Table 4.4 : Employee Commitment Questionnaire Data

Dimension	Indicator		Statement					
			SA	A	QA	D	SD	Total
Affective Commitment	Responsibility	F	68	95	4	2	0	169
		%	40.00	56.00	2.67	1.33	0.00	100
	Comfort	F	79	79	11	0	0	169
		%	46.67	46.67	6.67	0.00	0.00	100
	Sum	∑ F	65	77	7	1	0	150
		%	43.33	51.33	4.67	0.67	0.00	100
Continuance Commitment	Totality in working	F	77	88	2	2	0	169
		%	45.33	52.00	1.33	1.33	0.00	100
	Maintain working	F	79	79	11	0	0	169
		%	46.67	46.67	6.67	0.00	0.00	100
	Sum	∑ F	69	74	6	1	0	150
		%	46.00	49.33	4.00	0.67	0.00	100
Normative Commitment	Working with best performance	F	70	77	20	2	0	169
		%	41.33	45.33	12.00	1.33	0.00	100
	Oriented in optimum results	F	59	79	31	0	0	169
		%	34.67	46.67	18.67	0.00	0.00	100
	Sum	∑ F	57	69	23	1	0	150
			38.00	46.00	15.33	0.67	0.00	100
TOTAL SUM		∑ F	191	220	36	3	0	450
		%	42.44	48.89	8	0.67	0	100

Source: Processed primary data

Table 4.5 : Response Criteria

Dimension	N	Mean	Standard Deviation	Minimum	Maximum	Response Criteria
Affective	169	4.37	0.61	3.77	4.98	High to Very High
Continuance	169	4.41	0.60	3.80	5.01	High to Very High
Normative	169	4.21	0.72	3.49	4.93	High to Very High

Source: Processed primary data

From the responses (Table 4.4), of the 3 dimensions and 6 indicators given,the Affective Commitment dimension wasthe most dominant in which 51.33% of respondents stated "agree".In the Continuance Commitment dimension, 49.33% of respondents stated "agree".The Normative Commitment dimension hadthe lowest value with the "agree" answer amounting to 46.00%.

From Table 4.5, it can be seen that the dimensions of Affective Commitment movedfrom 3.77 to 4.98. This means the criteria of the responses about the Affective dimension movedin the range of "High to Very High". The Continuance dimension moved from 3.80 to 5.01 which means that the responses werein the range of "High to Very High". Further more, the Normative Dimension moved from 3.49 to 4.93, meaning that the criteria moved in the "High to Very High" range.

From the responses in Tables 4.4 and 4.5, it can be concluded that in all statements about the Employee Commitment variable, the majority of respondents answered "good" (48.89%) and "very good" (42.44%). This illustrates that Bank DKI had a strong commitment in upholding the regulations in carrying out the work.

Table 4.2: Self-Efficiency Questionnaire Data

Dimension	Indicator		Statement					
			SA	A	QA	D	SD	Total
Training	Material	F	50	108	9	2	0	169
		%	29.33	64.00	5.33	1.33	0.00	100
	Career development	F	63	104	2	0	0	169
		%	37.33	61.33	1.33	0.00	0.00	100
	Training and education	F	52	115	2	0	0	169
		%	30.67	68.00	1.33	0.00	0.00	100
	Individual training	F	45.0723	110.4077	13.52	0	0	169
		%	26.67	65.33	8.00	0.00	0.00	100
	Needs analysis	F	45	120	2	2	0	169
		%	26.67	70.67	1.33	1.33	0.00	100
	Sum	F	113	247	13	2	0	375
		%	30.13	65.87	3.47	0.53	0.00	100
Work Assessment	Opportunity	F	45	95	29	0	0	169
		%	26.67	56.00	17.33	0.00	0.00	100
	Development program	F	83	50	36	0	0	169
		%	49.33	29.33	21.33	0.00	0.00	100
	Target achievement	F	50	108	9	2	0	169
		%	29.33	64.00	5.33	1.33	0.00	100
	Reward	F	63	104	2	0	0	169
		%	37.33	61.33	1.33	0.00	0.00	100
	Assessment	F	61	95	13	0	0	169
		%	36.00	56.00	8.00	0.00	0.00	100
	Sum	F	134	200	40	1	0	375
		%	35.73	53.33	10.67	0.27	0.00	100

Dimension	Indicator		Statement					
			SA	A	QA	D	SD	Total
Work Experience	Skill	F	59	74	36	0	0	169
		%	34.67	44.00	21.33	0.00	0.00	100
	Potential	F	56	79	32	2	0	169
		%	33.33	46.67	18.67	1.33	0.00	100
	Opportunity	F	61	72	36	0	0	169
		%	36.00	42.67	21.33	0.00	0.00	100
	Sum	F	78	100	46	1	0	225
		%	34.67	44.44	20.44	0.44	0.00	100
Work Relationship	Support Career development	F	59	79	31	0	0	169
		%	34.67	46.67	18.67	0.00	0.00	100
	Self-potentials	F	58.5923	81.12	29.2877	0	0	169
		%	34.67	48.00	17.33	0.00	0.00	100
	Self-adaptation	F	63.0877	103.6477	2.2477	0	0	169
		%	37.33	61.33	1.33	0.00	0.00	100
	Environmental adaptation	F	60.84	94.64	13.52	0	0	169
		%	36.00	56.00	8.00	0.00	0.00	100
	Awareness	F	58.5923	74.36	36.0477	0	0	169
		%	34.67	44.00	21.33	0.00	0.00	100
	Sum	F	133	192	50	0	0	375
		%	35.47	51.20	13.33	0.00	0.00	100
TOTAL SUM		∑ F	458	739	149	4	0	1350
		%	33.92593	54.74074	11.03704	0.296296	0	100

Source: Processed primary data

Table 4.7 : Response Criteria

Dimension	N	Mean	Standard Deviation	Minimum	Maximum	Response Criteria
Training	169	4.26	0.54	3.72	4.80	High to Very High
Work Assessment	169	4.25	0.64	3.60	4.89	High to Very High
Work Experience	169	4.13	0.74	3.39	4.13	Medium to High
Work Relationship	169	4.22	0.66	3.56	4.22	High to Very High

Source: Processed primary data

From the respondent's answer (Table 4.6), of the 4 dimensions and 18 indicators provided,the Training dimension hadthe most dominant in which 65.87% of respondents stated "agree". Inthe dimension of Work Assessment, 53.33% of respondents stated "agree". The dimension of Work Relationship had a value of 51.20%. The dimension of Work Experience had the lowest value with the answer "agree" amounting to 44.44%.

Furthermore, Table 4.7 shows that the Training dimension hada value of 3.72 to 4.80, meaning that the criteria of responses moved in the range of "High to Very High". The dimension of Work Assessment movedfrom 3.60 to 4.89, meaning that the criteria of responses movedin the range of "High to Very High".The dimension of Work Experience movedfrom 3.39 to 4.13, meaning that the criteria of responses movedin the "Medium to High" range. Whereas, the dimension of Work Relationship movedfrom 3.56 to 4.22, meaning that the criteria of responses movedin the range of "High to Very High". From the responses in Tables 4.6 and 4.7, it can be concluded that in all statements regarding the Career Development variable, the majority of respondents answered "good" (54.74%) and "very good" (33.93%). This illustrates that the employees of Bank DKI were given the opportunity to work in different positions within a certain time, in preparing career development programs and preparing for a higher level.

Table 4.8 : Performance Questionnaire Data

Dimension	Indicator		Statement					
			SA	A	QA	D	SD	Total
Performance	Target	F	54	113	2	0	0	169
		%	32.00	66.67	1.33	0.00	0.00	100
	Mistake	F	47	106	16	0	0	169
		%	28.00	62.67	9.33	0.00	0.00	100
	Working well	F	43	119	5	2	0	169
		%	25.33	70.67	2.67	1.33	0.00	100
	Readiness	F	45	95	29	0	0	169
		%	26.67	56.00	17.33	0.00	0.00	100
	Achievement	F	81	50	38	0	0	169
		%	48.00	29.33	22.67	0.00	0.00	100
	Punctuality	F	54	113	2	0	0	169
		%	32.00	66.67	1.33	0.00	0.00	100
	Attendance	F	45	108	16	0	0	169
		%	26.67	64.00	9.33	0.00	0.00	100
	Co-worker	F	45	120	2	2	0	169
		%	26.67	70.67	1.33	1.33	0.00	100
	Leader adaptation	F	54	90	23	2	0	169
		%	32.00	53.33	13.33	1.33	0.00	100
	TOTAL	F	208	405	59	3	0	675
		%	30.81	60.00	8.74	0.44	0.00	100

Source: Processed primary data

Table4.9: Response Criteria

Dimension	N	Mean	Standard Deviation	Minimum	Maximum	Response Criteria
Performance	169	4.21	0.61	3.60	4.82	High to Very High

Source: Processed primary data

From the responses (Table 4.8) of the 9 indicators given, the Working Well and Having Good Relations withCo-workers werethe most dominant dimensions with the same value in which70.67% of the respondents stated "agree".The dimensions of Target Achievement and Punctualityalso hadthe same value in which 66.67% of respondents stated "agree".

Furthermore, Table 4.9 shows that the Performance dimension movedfrom a 3.60 to 4.82. It means that the criteria of responses about the dimension of Performance movedin the range of "High to Very High"

From the answers of respondents presented in Tables 4.8 and 4.9, it can be concluded that in all statements about the Performance variable, the majority of respondents answered "good" (60.00%) and "very good" (30.81%). This illustrates that the employees of Bank DKI were able to work well and to adapt and build good relations with co-workers in order to achieve the company's goals and objectives.

B. Verificative Testing

1   Analysis of Variable Constructions

To find out the questionnaire data testing, it was necessary to test the construct of each variable. Confirmatory Factor Analysis (CFA) testing was performed to determine the construct model that forms the overall measurement model using the LISREL statistical application. There are three independent variables in this research, namely Self-Efficacy, Employee Commitment, and Career Development.

The results of data processing for the exogenous construct using the SEM method with the LISREL 8.70 statistical application obtained the model as in Figure 4.1 and explained in the Table 4.10.

Figure 4.1: Overall Relationship Structure of Exogenous Variables
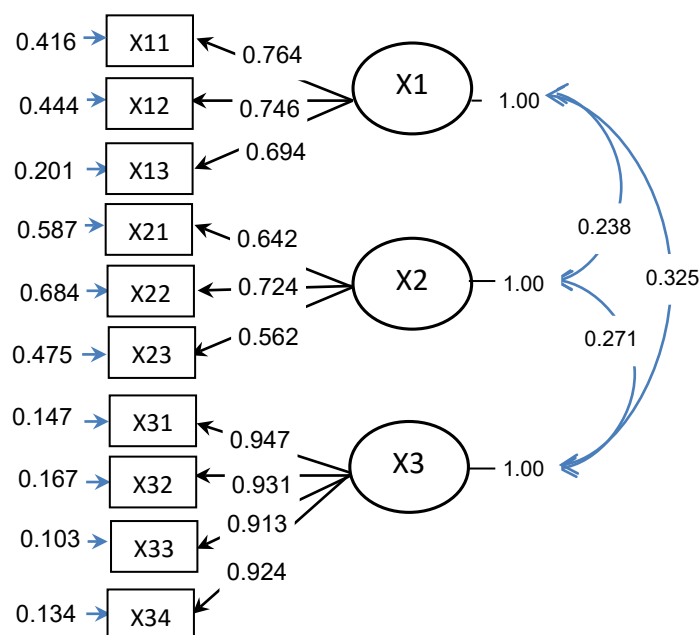
Based on the results of processing using the LISREL 8.70 application, the measurement model (CFA) for each variable and indicator relationships shown by the loading factor of each indicator is presented in Table 4.10 as follows.

Table 4.10 : Analysis Results of the Exogenous Variable Measurement Model

Dimension	Standardized Solution (Loading Factor)			T-value	R2	Error
	Self -Efficacy	Employee Commitment	Career Development			
X11, Magnitude	0.764			14.308	0.799	0.416
X12,Strangth	0.746			11.282	0.584	0.444
X13,Generalization	0.694			10.895	0.556	0.201
X21,Affective Commitment		0.642		8.081	0.413	0.587
X22,Continuance Commitment		0.724		9.313	0.525	0.684
X23,Normative Commitment		0.562		6.918	0.285	0.475
X31,Training			0.947	16.312	0.897	0.147
X32,Work Assessment			0.931	15.811	0.853	0.167
X33,Work Experience			0.913	15.281	0.826	0.103
X34,Work Relationship			0.924	15.599	0.833	0.134

Source: LISREL data processing results

a.Self-efficacy (X1)

Table 4.10 illustrates that Self-Efficacy (X1) with the Magnitude dimension (X1.1) with a loading factor of 0.764 with an R2 of 79.9% hadthe highest degree of importance compared to other dimensions, while the Generalization dimension (X1.3) with loading factor of 0.694 and R2 value of 55.6% hadthe lowest degree of importance. Such a situation illustratedthat Bank DKI had the ability and stable confidence in completing difficult work. This means that employees of Bank DKI already had a strong Self-Efficacy that was embedded in each of its employees, so that it was easier for Bank DKI to achieve goals and objectives.

b. Employee Commitment (X2)

Table 4.10 illustrates that Employee Commitment with the dimension of ContinuanceCommitment (X2.2) with a loading factor of 0.724 and an R2 of 52.5% hadthe highest degree of importance on the variable of Employee Commitment compared to other dimensions. While the Normative Commitment dimension (X2.3) with a loading factor of 0.562 and an R2 of 28.5% hadthe lowest degree of importance. This illustratedthat Bank DKI had a strong commitment in completing work and upholding regulations in carrying out work.

c. Career Development (X3)

Table 4.10 illustrates that Career Development with Training dimension (X3.1) with a loading factor of 0.947 and an R2 of 89.7% hadthe highest degree of importance onCareer Development variables compared to other dimensions. While the dimension of Work Experience (X3.3) with a loading factor of 0.913 and an R2 of 82.6% hadthe lowest degree of importance. This illustratedthat the employees of Bank DKI were given the opportunity to work in different positions within a certain time, in preparing career development programs and preparing for a higher level.

2. Structural Model Analysis

Analysis of the formulated structural models of the research was carried out by taking into account the values or the relationship coefficients calculated from each model. In this analysis, the values of the Fit Indicesare discussed as the LISREL 8.70 output.

The next analysis was the Full Model SEM analysis which was intended to test the models and hypotheses developed in this research. Testing the model in the SEM was conducted with two tests, namely the model fit test and the causality significance test through the regression coefficient test. The test results are presented in Figure 4.2 below.

Figure 4.2: Full Structural Equation Model (SEM)
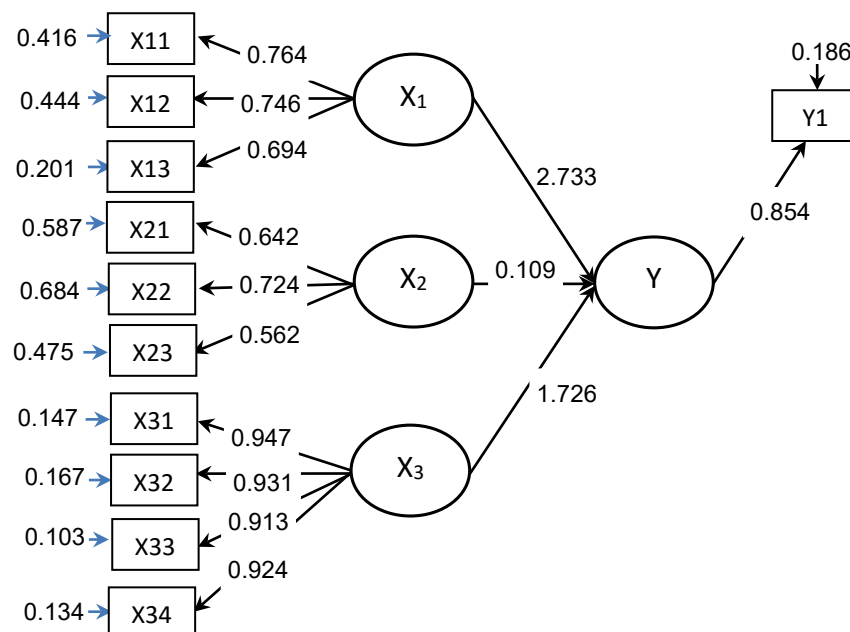
The research model, as stated in the figure, was then tested for fit by using various goodness-of-fit criteria to obtain an adequate level of conformity.The fit tests on the full SEM model are summarized in Table 4.11 as follows.

Table 4.11: Goodness of Fit Test Results for Structural Equation Modeling Analysis

No	GOF Measure	Model Criteria	Estimate	Description
1	χ^2(Chi-Square) df=169	P-Value >0.05	144.546 with P-Value=0.000	Sample size≥100
2	GFI	0.8≤GFI≤0.9	0.847	Good
3	AGFI	0.8≤AGFI≤0.9	0.809	Good
4	NNFI	≥ 0.95	0.968	Good
5	CFI	≥ 0.95	0.972	Good
6	RMSEA	≤ 0.08	0.0615	Good

Source: Processed data

Table 4.11 shows the results of the goodness of fit calculations of the full model and the results wereclassified as good, with a GFI value of 0.847; AGFI = 0.809; NNFI = 0.968; CFI = 0.972; and the RMSEA value = 0.0615, while the P-count value wassmaller than 0.05. This value indicatedthat the overall measurement model in this research hadmarginal fit with the data. This means that the GFI, AGFI, NNFI, CFI, and RMSEA measurement indices werewithin the expected value range.

a.Effect of Self-Efficacy, Employee Commitment and Personal Development, on Performance

The results of processing using the Lisrel application are:

Y = 7.969 + 2.733*X1 + 0.109*X2 + 1.726*X3, Errorvar. =0.491, R²=0.898

b.   Hypothesis testing

Based on the conceptual framework of the research, the hypothesis of this researchis X1 (Self-Efficacy), X2 (Employee Commitment) and X3 (Career Development) on Y (Performance) either partially or simultaneously. To test the hypothesis, statistical testswere performed by calculating the SEM Analysis as a quantitative analysis.

1) Simultaneous Test (Overall)

H0: ρYX1 = ρYX2 =ρYX3 = 0;   Meaning: Self-Efficacy, Employee Commitment and Career Development have no influence on Employee Performance

H1: ρYX1 ≠ ρYX2 ≠ρYX3 ≠ 0;   Meaning: Self-Efficacy, Employee Commitment and Career Development have influence on Employee Performance

To test whether there is a strong simultaneous/overall influence between X1 (Self-Efficacy), X2 (Employee Commitment) and X3 (Career Development) on Y (Employee Performance), it can be seen from the results of the F test as follows:

$$F = \frac{(n - k - 1)R^2_{yxk}}{k(1 - R^2_{yxk})}$$

$$F = \frac{(169 - 3 - 1)0.898}{3(1 - 0.898)} = 484.22$$

Based on the calculation, the Fcount value is 484.22, Ftable with degrees of freedom v1 = 3, v2 = (169-3-1) = 165 and α = 5%, the value of F table = 2.66, it can be concluded that there wasa simultaneous influence between X1 (Self-Efficacy), X2 (Employee Commitment) and X3 (Career Development) on Y (Employee Performance)

2). Partial Test (Separate)

Partial test using t test was conducted to find out which independent variable significantly influenced the dependent variable.

The rejection criteria H0 is if tcount is greater than ttable or t0>ttable, with the number of samples = 169.

a) Partial Test of Self-Efficacy on Performance
   H0:ρYX1 = 0;Meaning: Self-efficacy (X1) has no influence on Performance (Y)
   H1:ρYX1 ≠ 0;Meaning: Self-efficacy (X1) has influence on Performance (Y)

For the path coefficient X1 = 2.733, tcount of 22.773 was obtained with a significance level α of 5%, the value of ttable or t0.05.169 = 1.974, thus tcount = 22.773 wasgreater than ttable = 1.974.This means that Self-Efficacy (X1) hadsignificant influence on Performance (Y).

Table 4.12 : Partial Test of Self-Efficacy (X1) on Performance (Y)

Structural	Path Coef.	t_{count}	t_{table}	P_{value}	Conclusion
ρYX1	2.733	22.73	1.97	0.000	H_0 was rejected X_1hadsignificant influence on Y

Source: Processed data

b) Partial Test of Employee Commitment on Performance
   H0:ρYX2 = 0;Meaning: Employee Commitment (X2) has no influence on Performance (Y)
   H1:ρYX2 ≠ 0;Meaning: Employee Commitment (X2) has influence on Performance (Y)

For the path coefficient X2 = 0.109, the tcount value of 4.225 was obtained by significance level of α of 5%, the value of ttable or t0.05.169 = 1.97, and since tcount = 3.225 wasgreater than ttable = 1.97, then H0wasrejected, or in other words Employee Commitment (X2) had significant influence on Performance (Y).

Table 4.14: Partial Test of Work Motivation (X3) on Job Satisfaction (Y)

Structural	Path Coef.	t_{count}	t_{table}	P_{value}	Conclusion
ρYX3	1.726	21.161	1.97	0.000	H_0 was rejected X_1hadsignificant influence on Y

Source: Processed data

C. Discussion

Based on the results of descriptive tests for Self-Efficacy variable, it is known that on statements about self-efficacy variables, the majority of respondents answered "agree" (55.02%) and "strongly agree" (33.6%). This illustratedthat Bank DKI already had strong Self-Efficacy that was embedded in each of its employees, so that they were able to implement all prepared programs so that the company's goals and objectives can be achieved. Based on the results of hypothesis testing, it is known that Self-Efficacy had a significant influence on performance by 27.33%. The results of this analysis are in accordance with Bandura stating that self-efficacy as self-assessment of the ability to regulate and carry out the desired actions to achieve goals. With strong self-efficacy, one is able to assess one's ability to organize and carry out directed steps to achieve a goal. Self-confidence is one of the personal factors that mediates the interaction between behavioral factors and environmental factors. High perceived self-confidence will motivate the individual to act more cognitively directed, especially if the goal to be achieved is clear.

Based on descriptive test of employee commitment, it is known that on statements about Employee Commitment variable, the majority of respondents answered "good" (48.89%) and "very good" (42.44%). This illustratedthat Bank DKI had a strong commitment in upholding the regulations in carrying out work because someone feels bound to work if he has a strong sense of duty or obligation from his work, and places the intrinsic value of his work as a "central life interest". Furthermore, based on the results of the hypothesis test, it wasknown that employee commitment affectedperformance by 10.9% which is in line with Lincoln's opinion in Wijaya (2010: 5) that employee commitment is the desire of employees to continue to maintain membership

in the organization and are willing to make efforts for achievement organization goals. Employees who are committed to the company will be responsible for their duties and have the possibility to leave the company are smaller than employees whose commitment levels are lower.

Based on descriptive tests, it is known that on the statements about the Career Development variable, the majority of respondents answered "good" (54.74%) and "very good" (33.93%). This illustratedthat the employees of Bank DKI weregiven the opportunity to work in different positions within a certain time, in preparing career development programs and preparing for a higher level. This is in line with Rivai's theory (2010: 274) stating that career development is a process of increasing individual work skills achieved in order to achieve the desired career. Then based on the results of the hypothesis test, it wasdiscovered that career development hada significant influence on performance with a value of 17.26%. This result is reinforced by Werther and Davis that career development is an important tool for organizations in increasing productivity, increasing employee positive attitudes at work, and developing better employee quality, whose main purpose is to help employees analyze their abilities and talents in meeting their individual needs in line with the development interests and needs of the organization.

Then based on the results of the simultaneous test, it wasfound that Self-Efficacy, Employee Commitment, and Career Development hadsignificant influence on performance with an effect value of 89.8%. This means that the management of Bank DKI paid attention to these three variables, namely Self-Efficacy, Employee Commitment, and Career Development. Employees'involvement in making policiesincreased self-confidence in every decision making in the form of company policies, solid employee commitment, and open career development, and encouragedthe employees to develop and produce the best employee performance.

5. CONCLUSIONS

Based on the results of the analysis and discussion, the following conclusions can be drawn:
1. Self-Efficacy had influence on the Performance of employees of Bank DKI, Central Jakarta at 27.33%, the rest could be explained by other variables and other factors.
2. Employee Commitment had influence on the Performance of Bank DKI, Central Jakarta by 10.9%, the rest could be explained by other variables and other factors.
3. Career Development had influence on the Performance of Bank DKI. The remaining 17.26% could be explained by other variables and other factors.
4. Self-Efficacy, Employee Commitment, and Career Development had simultaneousinfluence on the Performance of the employees of Bank DKI, Central Jakarta at 89.8%, the rest could be explained by other variables in this research and of the factor that had the most influence on Performance was Self-Efficacy.

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FIRM VALUE: TAX AVOIDANCE AND SUSTAINABILITY REPORT DISCLOSURE

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ABSTRACT

Empirical research provides evidence that tax avoidance and sustainability report disclosure affect firm value. We use 40 samples of financial report data on state-owned companies listed on the Indonesia Stock Exchange using the 2013-2017 time series data. The results of our research show that Tax avoidance affect firm value, and sustainability report disclosure affect firm value.

Keywords: Firm Value, Tax Avoidance, Sustainability Report Disclosure, State-Owned Company.

1.0 INTRODUCTION

Firm value is something that is very important because with high corporate value will be followed by high shareholder prosperity (Brigham Gapensi, 1996). Firm value is the firm's performance reflected by the stock price formed by capital market demand and supply which reflects the community's assessment of firm performance (Harmono, 2009).

Firm value is important in describing the performance of a firm that can influence the perceptions of prospective investors. Financial managers are required to be able to carry out their duties in managing finances correctly and efficiently as possible to increase firm value through achieving better performance.

The rise and fall of stock prices is an interesting phenomenon to be discussed, PT Telekomunikasi Indonesia (Persero) Tbk states, the biggest challenge is to maintain positive momentum in stock trading. The Telecommunication State Owned-Company market capitalization value at the close of trade broke the Rp. 300 trillion figure (Okezone, 2015). In the weakening trading of PT Telkom shares can be purchased at a price of Rp. 2,950 - Rp. 2,900 per share, and with a selling price of Rp. 3,050 - Rp. 3,150 per share. PT. Telkom is experiencing an uptrend phase in which rising stock prices accompanied by volume. Looking at the closing of the share price, Telkom's market capitalization has reached Rp. 300.4 trillion. This figure shot up from the October 2014 media opposition where the market capitalization of the telecom issuer was around Rp. 280 trillion. Market capitalization shows the value of one firm as indicated by the stock price multiplied by the number of shares outstanding on the stock. Even though PT Telkom experienced an uptrend phase, the firm had the largest market cap for telecommunications issuers. Its competitors, Indosat only has a market cap of Rp. 21.2 trillion and XL Rp. 44.4 trillion. These conditions affect firm value, because firm value is reflected in the stock price.

In addition, to get a good assessment from the community, many companies are currently required to be able to help with long-term development. This long-term development includes 3P, namely people, profit and the planet. Based on this 3P, companies going public are encouraged to pay attention to economic, social and environmental aspects. These three aspects can be fulfilled by disclosing sustainability report. Sustainability report is a practice of measuring, disclosing, and accountability efforts of organizational performance in achieving sustainable development goals for both internal and external stakeholders (GRI, 2006).

Sustainability report contains information on firm performance in the economic, social and environmental fields. In addition, sustainability report is a moral agent for companies by carrying out activities and interactions with the community, so that they have responsibility for their environment. Moral responsibility requires companies to consider the interests of other parties related to firm activities (stakeholders).

According to Weber et.al. , 2008 also states that companies that carry out sustainability report disclosures want to show the firm's commitment to social and environmental issues to stakeholders and show transparency and get feedback on firm performance in responding to the demands of information from stakeholders. With the sustainability report, it will increase public trust in the firm so that it can increase firm value.

The trend regarding sustainability reports in Indonesia has experienced positive developments. From 2012, companies that issued Sustainability Reports were only 2 companies, until the end of 2016, many companies had issued sustainability reports. According to the National Center for Sustainability Reporting (NCSR), until the end of 2016 there were a total of 120 companies that published sustainability reports in Indonesia, both companies that went public and private companies. However, this number is still far below the number of listed companies listed on the stock exchange especially when compared to the number of all companies in Indonesia. This gives an understanding that the firm already has a concern that is more related to sustainability in the economic, social and environmental fields (Simbolon & Sueb, 2016).

Another effort to increase firm value is to do tax planning, how to do it with tax avoidance. The activity is carried out by reducing the firm's tax burden but does not violate the applicable tax regulations, so that later it will be able to raise the firm's profits and will affect firm value. Tax avoidance activity is an effective step to increase firm value according to financial management.

Tax avoidance is a tax avoidance activity that is done by not violating the laws that apply in a country in other words it is a legal and safe activity for taxpayers because this activity is carried out by utilizing the weaknesses contained in the law and tax regulations, this activity is carried out to reduce the amount of corporate tax so that later it will increase firm profits and will have an impact on firm value as seen from the stock market price. But on the one hand it can be seen, this tax avoidance activity can cause losses to the state if this activity leads to overly aggressive tax avoidance, this can reduce income for the country.

Based on a report made jointly by Ernesto Crivelly, IMF investigator in 2016, based on a survey, then analyzed again by the United Nations University using a database of the International Center for Taxation and Development (ICTD) published data tax avoidance companies 30 countries. Indonesia ranks the 11th largest with an estimated value of 6.48 billion US dollars, corporate tax is not paid by companies in Indonesia to the Indonesian Tax Service. Meanwhile, according to the Secretary General of the Indonesian Forum for Budget Transparency, Yenny Sucipto said that according to him, tax evasion was a serious problem in Indonesia. It is estimated that every year there is Rp110 trillion which is a tax rate. Most are business entities, around 80 percent, the rest are individual taxpayers.

From the results of this research, contributing to adding insight into tax avoidance, sustainability report and firm value for sustainability in the economic field in Indonesia will be better.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Tax avoidance and firm value

Michelle Hanlon and Joel Slemrod, 2008 in their research stated that tax avoidance has an effect on firm value, marked by shareholders wanting to minimize corporate tax payments by increasing personal costs in order to maximize firm value, but on the other hand they aggressively avoid tax evasion.

Based on the explanation above, the writer concludes the hypothesis as follows:

H1: Tax Avoidance has a positive effect on firm value.

2.2 Sustainability report disclosure and firm value

Ilham Nuryana Fatchan and Rina Trisnawati, 2016 state that silk reporting affects firm value. The quality of the annual report, especially sustainability report, has a positive influence on the firm's market performance. If market participants see that the issuance of sustainability reports as a driver to increase firm capital, it will improve market performance. Each of the companies and investors believes that using sustainability issues as a strategy can create long-term value such as increasing stock prices (Sarkins, 2002).

Based on the explanation above, the writer concludes the hypothesis as follows:

H2: Sustainability report disclosure has a positive effect on firm value.

3. RESEARCH DESIGN

3.1 Sample and data collection procedure

The data used in this research are secondary data with a sample of State-Owned Company companies listed on the Indonesia Stock Exchange during the 2013-2017 period totaling 34 financial statement data which can finally be processed by the author.

3.2 Measurement

The main measure in this research is firm value, tax avoidance and sustainability report as follows:
Firm Value is the value that is transferred to management and firm organizations as a firm that continues to grow (Brigham, 2006), firm value can be formulated as follows:

$$PER = \frac{\text{Market Price per Share sheet}}{\text{Earnings per share}}$$

Tax Avoidance is a tax paid by the firm in cash in year t divided by pre-tax profit in year t. (Dyreng et al, 2008), Tax Avoidance can be formulated as follows:

$$CETR = \frac{\text{Payment of taxes}}{\text{Profit before tax}}$$

The sustainability report is depicted with Value 1 if the item is disclosed and vice versa gives a score of 0 when it is not and then summed in its entirety. After scoring on each index, the score is then entered into the SRDI formula:

$$SRDI = \frac{\text{number of disclosure items}}{\text{expected number of items}}$$

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
FV	40	,96174	29,28898	11,69120	7,66836
CETR	40	,17699	,46368	,27994	,07802
SRDI	40	,09091	,83517	,36191	,20685
Valid N (listwise)	40				

Shows the descriptive statistics for the variables being studied, it can be seen that out of a total of 8 companies which were the samples of the research during the 5 years of observation from 2013-2017 the minimum value of the firm variable was 0.96174 and the maximum value was 29.28898. These results indicate that the firm value that became the sample of this research ranged from 0.96174 to 29.28898. The minimum value of the Tax Avoidance variable is 0.17699 and the maximum value is 0.46368. These results indicate that the large Tax Avoidance that was the sample of this research ranged from 0.17699 to 0.46368. The minimum sustainability reporting variable is 0.09091 and the maximum value is 0.83517. These results indicated that the sustainability reporting size that is the sample of this research ranges from 0.09091 to 0.83517.

4.2 Hypothesis Testing and Data analysis
Analysis of Multiple Linear Regression

The research model used in this research is as follows:

$Y = a + b_1X_1 + b_2X_2 + e$
$Y = -1,490 + 73,647X_1 + -16,027X_2 + 5,254$
Where :
Y   : Firn Value
X_1 : Tax avoidance
X_2 : Sustainability report

Table 2. Analysis of Multiple Linear Regression
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig. 2-tiled	Sig. 1-tiled
		B	Std. Error	Beta			
1	(Constant)	4,914	,818	,000	6,006	,000	,000
	CETR	2,194	,655	,002	3,351	,002	,001
	SRDI	-,976	,274	,001	-3,564	,001	,0005

Tax avoidance measured by CETR has a significance value of 0.001 <0.05 and a t value of 3.351, so that it can be said that CETR has a positive effect on firm value. This shows that companies do a lot of tax avoidance to get maximum profits and get a good view in the eyes of investors. (Michelle Hanlon And Joel Slemrod, 2008), with the results of his research that shareholders want to minimize payment of corporate taxes by increasing personal costs in order to maximize the firm value, but on the other hand it turns out they do tax evasion aggressively.

Sustainability report as measured by SRDI has a significance value of 0,0005 <0,05 and a t value of 3,564 with a negative direction, so that it can be said that SRDI has a negative effect on firm value. This proves that the information in the Sustainability reporting firm disclosures is still not interesting information for investors. This is because many investors focus more on companies with high profits and do not care whether the firm reports its social responsibility.

5. CONCLUSION

This research used secondary data, with a sample of financial report data on State-Owned Company listed on the Indonesia Stock Exchange for the period 2013-2017 with observations of 40 financial statement data. The results showed that tax avoidance had an effect on firm value. This showed that companies do a lot of tax avoidance to get maximum profits and get a good view in the eyes of investors. (Michelle Hanlon And Joel Slemrod, 2008), with the results of their research that shareholders want to minimize payment of corporate taxes by increasing personal costs in order to maximize firm value, but on the other hand it turns out they do tax evasion aggressively.

Sustainability reporting as measured by SRDI has a negative effect on firm value. This proves that the information in the firm's Sustainability report disclosures is still not interesting information for investors. This is because many investors focus more on companies with high profits and do not care whether the firm reports its social responsibility.

Even though this research has achieved its objectives but there are still limitations, for further research it can replicate research with other industries in order to achieve better generalization of results, both can add other related variables.

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21ST CENTURY SKILLS DEVELOPMENT THROUGH BUSINESS SIMULATION GAMES

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ABSTRACT

This study aims to determine the impacts of business simulation games as a tool of experiential learning toward development of 21st century skills among Ungku Omar Polytechnic (PUO) students. The questionnaire was distributed to 50 participants of the MonsoonSIM training. The result show that student's skill regarding integrated learning, decision-making and problem solving has increase significantly after being exposed to use business simulation game (MonsoonSIM). It also shows that when students use business simulation game, students are exposed to experiential learning that encourages student development of 21st century skills.

Keywords: Business simulation games, 21st century skills.

1.0 INTRODUCTION

The rapid changes of knowledge have developed the new model of education for future. The emergence of the concept of Industrial Revolution (IR 4.0) has changed the landscape of educational. Due to the IR 4.0, 5.1 million jobs will be lost before 2020 because of dependency of artificial intelligence, robotics, nanotechnology and socioeconomic that replace the need of human workers (Forum, 2016). In order to succeed in IR 4.0 evolution, students will need digital age proficiencies. It is crucially important for the educational system to make parallel changes in order to fulfill its mission in society. Therefore, the educational system must understand and embrace the following 21st century skills within the context of rigorous academic standards (Osman, Tuan, & Nurazidawati, 2010).

This study aims to determine the impacts of business simulation games as a tool of experiential learning toward development of 21st century skills among Ungku Omar Polytechnic (PUO) students. Therefore, in this study, MonsoonSIM was chosen because this type of enterprise resource planning (ERP) simulation was recently introduced to the market (Shafudin, 2018). MonsoonSIM is a unique, experiential learning pedagogical platform for business studies. The concepts that covered by MonsoonSIM including business and economy fundamentals, business operational management, ERP and logistics and supply chain management (SCM) (Ltd, n.d.).

1.1 Business simulation games

Nowadays, business simulation games are becoming popular tool in education and business. There are many beneficial skills that can be learned by the participants such as teamwork, analytical thinking, communication, as well as active individual engagement. According to Robin Bell and Mark Loon (Robin Bell & Mark Loon, 2015), business simulation can provide a valuable tool of teaching and it also provide the opportunity to develop higher order thinking through the development of critical and strategic thinking skills. Business simulation games also a method of teaching or learning based on an actual situation (Blazic & Novak, 2015). Shalini Rahul Tiwari, Lubna Nafees and Omkumar Krishnan (Shalini Rahul Tiwari, Lubna Nafees, & Omkumar Krishnan, 2014) stated that business simulations bridge the gap between the classroom and the real-life business decision making through experiential learning experiences.

Business simulation games are considered as one of the contemporary methods of education because through business simulation games, educator can convey the knowledge in a practical way and it increasingly imitate to the real-world situation when the business simulation games becoming more complex (Waver, Milosz, Muryjas, & Rzemieniak, 2010). Business simulations also provide an interactive learning experience that requires participants to apply what they have learned and it was risk-free environment. Through business simulation, students build relevant skills, improve conceptual knowledge and gain a better business strategy to build skills and improve performance (Solution, 2019).

The main educational aim of business games is to develop decision-making skills and a confidence with business strategies (Knotts & Keys, 1997). Business games and simulations are direct form of experiential learning. Experimental learning is a dialectical process where all concepts are subject to revision and changes through lived experiences are possible (Ceschi, Sartoni, Tacconi, & Hysenbelli, 2014). Kolb (1984) (Kolb, 1984) states that the main aspect of the learning process is based on the concrete experience. Therefore, business simulation games are one of the effective ways to improve the experience in the management of business processes in modern enterprise (Faria & Nulsen, 1996).

1.2 21st Century Skills

Malaysia today has changed extremely in terms of technological development. Most of work need to operate globally in order to survive the competition. This transformation has given an impact on the nature of work where the usage of high-level technology is a need to compete in the global stage. Consequently, a more flexible employees with advanced technical skills with well-developed generic skills such as creative thinking, problem solving and analytical skills are required by the employer in the industry in order to meet the challenges faced by businesses (Osman, Tuan, & Nurazidawati, 2010). 21st century skills represent characteristic of student to overcome adversity and achieve success in the workplace (Ball, Joyce, & Anderson-Butcher, 2016). 21st century learning focuses on four skills (4Cs) that should dominant by student, namely critical thinking, collaboration, communication and creativity (Norazlin Mohd Rusdin, 2018). These skills are considered appropriate to produce effective learners, workers and citizens that can participate in the knowledge economy in future society (Hilt, Riese, & Soriede, 2019). According to Alismail H.A. and McGuire P. (2015) (Alismail & McGuire, 2015), students are needed to engage in the learning environment effectively to develop 21st century skills. In that way, students will be prepared with the necessary knowledge and life skills which will help them to be successful in their careers. Samual et al. (Samuel Kai Wah Chu, Rebecca B. Reynolds, Nicole J. Tavares, Michele Natari, & Celina Wing Yi Lee, 2016) state that twenty-first century skills comprise of three domains knowledge; (1) innovation thinking, information; (2) media and ICT skills and life and (3) career skills. Binkley (Binkley, et al., 2011) was defined 21st century skills as a way of thinking, working and living in connected.

Stavroulia, Contantinou, Samantzis, Chrysanthou and Zacharatos (Stavroulia, Constantinou, Samantzis, Chrysanthou, & Zacharatos, 2015) stated that simulation games encourage the development of the 21st century skills that are considered to be important for a successful future if new generations. It was supported by Qian and Clark (Qian & Clark, 2016) where there is reason to be optimistic about the potential of using a game-based learning approach to promote 21st century skill development in the future. 21st century students must have self-direction and an ability to collaborate with individuals, groups and machines (McCoog, 2008). 21st century skills consist of twelve abilities that students need to succeed in their carrier during the Information Age which are critical thinking, creativity, collaboration, communication, information literacy, media literacy, flexibility, leadership, initiative, productivity and social skills.

1.3 Experiential learning

The changes in education area has given the impact on business practice. The industries are requiring students to learn from experiential learning (Summers, 2004). Experiential learning refers to the learning from the experience or learning by doing. According to Lewis and William, 1994, student would "learn by doing" applying knowledge to experience in order to develop skills (Lewis & Williams, 1994). Therefore, students who are exposed with experiential learning will develop decision-making skills, promoting teamwork, motivating students and active learning (Williams, 2011).

1.4 Teamwork

Teamwork, collaboration and intercultural competence among others are essential of 21st century skills (Anand & Liu, 2019). According to Yu-Yin Wang et al. (2019) (Wang, Wang, & Jian, 2019), business simulation games will assist students to improve a key competencies which are important in business environment including decision-making skills, ability to adapt to new situations, teamwork skills, communication skills, problem-solving skills and informational analysis skills. The business simulation games also stimulated interest and participant among students and was effective in encouraging teamwork skills (Rogmans & Abaza, 2019).

1.5 Decision making

Simulation are known to enhance students' decision-making skills (Shalini Rahul Tiwari, Lubna Nafees, & Omkumar Krishnan, 2014). In attempt to improve student's decision making and analytic abilities, some business educators have used computer-based simulations (Huo, 2015). It was proved by Mohd Hizam Hanafiah et al. (Mohd Nizam, Mohd Suhaimi, & Nor Liza, 2016), that business simulation is an effective way in developing decision-making skills among students.

1.6 Problem solving

Business simulation games help students obtain workforce skill by enabling students to practice thinking critically, making decision and solving business problems (Caruso, 2019). According to Pray and Rabinowitz (Pray & Rabinowitz, 1989) states that business simulation provide solution for the training and development problems resolution by strengthening analytical and interpersonal skills in a single training session.

This study aims (1) to identify the level of teamwork skill, decision-making skill and problem-solving skill as independent variables and experiential learning using business simulation game as dependent variable; (2) to determine the relationship between independent variables and dependent variable.

Figure 1: Research framework of the impact of using business simulation game toward development of 21st century skills
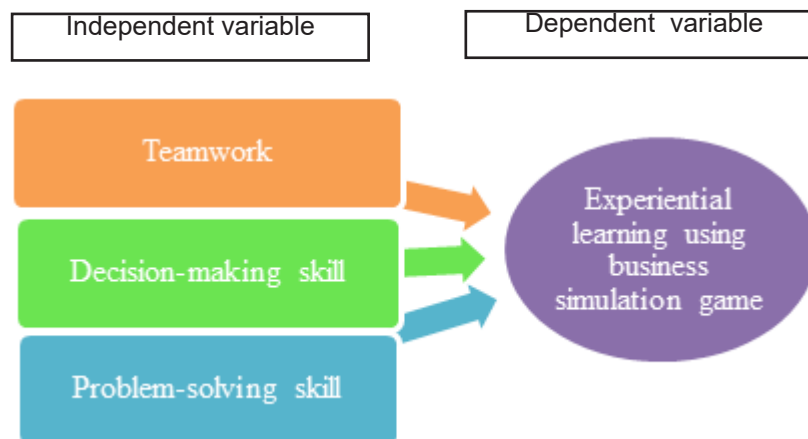
2. METHODOLOGY

2.1 Research Design

A descriptive research design was employed in this study by using quantitative approach. A cross-sectional survey was carried out on experiential learning using business simulation games, teamwork skill, decision-making skill and problem-solving skill. A sample was selected by using purposive sampling. The sample consists of 50 students who attended the MonsoonSIM training at PUO. The questionnaire survey was completed through online upon the student completed the final MonsoonSIM Campus competition. The questionnaire consists of 19 questions which are adapted from existing instruments from previous researchers that measure the related variables.

The measurement items for experiential learning were adapted from the study of Mohd Guzairy et al. (2017); teamwork items from Lohmann G. et al. (Lohmann, et al., 2019); decision-making were adapted from Shalini et al. (2014); and problem solving were adapted from Mohd Guzairy et al. (2017) and Gurvinder Kaur Gurcharan Singh et al. (2008). Students were asked to respond to a number of statements with an answer on a four-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'.

This study was using SPSS version 23 to report the correlation analysis to determine the strength and direction between independent variables and dependent variable.

3. RESULTS AND DISCUSSIONS

3.1 Mean

Table 1: Result of the factors

Dependent variables	Overall mean score	Interpretation
Experiential learning	3.50	High
Independent variables	Overall mean score	Interpretation
Teamwork skill	3.26	High
Decision-making skill	3.25	High
Problem-solving skill	3.27	High

From this study, the first question is to determine the level of skill using business simulation game. The interpretation given is according to Moidunny (2009) (Moidunny, 2009). Based on descriptive analysis on the Table 1, all variables mean score is high. Problem-solving skills is the higher mean with 3.27 rather than teamwork skill with 3.26 and decision-making skill with 3.25. This result is consistent with the previous finding from William which stated that students who are exposed towards experiential learning will develop the decision-making skills, teamwork and active learning. This result also supported by finding from Pray et al. states that business simulation develops problems resolution in a single training session.

3.2 Correlation

The second question for this study is to examine the relationship between three independent variables towards experiential learning using business simulation game.

Figure 2: Correlation analysis on independent variables and dependent variable

Correlations

		Mean Experiential Process	Mean Teamwork	Mean Decision making	Mean Problem solving
Mean Experiential Process	Pearson Correlation	1	.645**	.691**	.627**
	Sig. (2-tailed)		.000	.000	.000
	N	50	50	50	50
Mean Teamwork	Pearson Correlation	.645**	1	.865**	.896**
	Sig. (2-tailed)	.000		.000	.000
	N	50	50	50	50
Mean Decision making	Pearson Correlation	.691**	.865**	1	.784**
	Sig. (2-tailed)	.000	.000		.000
	N	50	50	50	50
Mean Problem solving	Pearson Correlation	.627**	.896**	.784**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 2 shows that all independent variables are significant correlate with dependent variable. It can be concluded that the more students involve in business simulation game will increase the 21st century skills especially in problem-solving, decision-making and teamwork. This result is consistent with the study of Lewis et al. and William stated that experiential learning from business simulation game could develop a valuable skill. Mohd Guzairy et al. also proved that knowledge and skill that gain from business simulation game make student improved problem-solving and decision-making.

4. CONCLUSIONS

The result obtained in this study indicate the usage of business simulation games as an experiential learning tool in education will bring the impact towards development of 21st century skills among students. Problem-solving skill, decision-making skills and cooperative skills among students are the valuable skill that needed to fulfil the demand of the industry nowadays. The more student active in business simulation games the more students will sharpen their skills.

There are two limitations in this this study. First, this study only had a small respondent because this business simulation games (MonsoonSIM) was the first time conduct in PUO. Therefore, the students' involvement in this training is relatively low. Lastly, the scope of this study was limited to PUO. Even though several polytechnics in Malaysia have used MonsoonSIM, the researcher could obtain all the information from other polytechnic due to time constraints. Thus, the results were less accurate because it was based on PUO only.

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EMPLOYERS' PERCEPTION ON MALAYSIAN POLYTECHNIC GRADUATES EMPLOYABILITY SKILLS

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ABSTRACT

The increasing rate of unemployed graduates is one of the major concerns of our government. As a result, the quality of education system in Malaysia was questioned. A part of the education system in Malaysia is Polytechnic that produces highly skilled graduates. However, lack of employability skills is a barrier for employment. Therefore, this study would like to determine the employers' perception on Malaysian polytechnic graduates' employability skills. The respondents of this study are Polytechnic Ungku Omar (PUO) graduates who graduated from 2014 and 2015 session. Data was collected using questionnaires that were distributed to 331 employers that employed Polytechnic Ungku Omar (PUO) graduates. Variables used in this study are technical skills, knowledge skills and generic skills. The result showed that the employers have favorable perception on PUO graduates

Keywords: Employers' perception; Malaysian Polytechnic; Employability skills.

1. INTRODUCTION

Investment in human capital is very critical to making developed country in Malaysia in order to advance Malaysia to the forefront of the knowledge aspect and human capital investment (Ramlee, 2013a) [17]. In addition, Malaysia needs to increase social and human capital capacity. Changes in the new geopolitical landscape in Malaysia demanded graduates to face global competition. The rhetorical nature is simply useless. In terms of globalization, Malaysia has taken steps to make Malaysia a developed nation. Agenda Wawasan 2020 is a national mission towards making Malaysia a developed nation by 2020 (Halimahton, 2011) [5]. Wawasan 2020 gives a clear picture that the success of a country lies not only in the wisdom of the leader but also in transforming the paradigm of the people and driving the industry as an engine of economic growth to realize Wawasan 2020 (Jabatan Perdana Menteri, 2010) [8]. However, in order to advance Malaysia to the forefront of the knowledge aspect, human capital investment is critical. Knowledge-based economy (k-economy) requires many creative and innovative workers (Ramlee, 2013a) [17].

Maran et al. (2009) [14] emphasized that firms providing training, knowledge, skills and education to human resources will cause the company's performance to improve. Technical and Vocational Education (TVE) needs to integrate the elements of workability skills in the curriculum so that graduates relevant to employers and industry demands. The use of new technology will impact human capital that can generate sustainable economic growth in order to achieve the goal of the New Economic Model. This New Economic Model has eight initiatives and one of the initiatives is human capital development that can develop a quality workforce. This quality workforce can reduce dependency on foreign workers. Quality workforce is also capable of bringing all forms of change in workplace atmosphere at work. This workforce is a knowledgeable worker (k-workers). Skilled education and workforce systems are the key weapons for a country to face global competition (Ramlee, 2013b) [18]. However, the ability to gain employment among graduates as well as lack of skills and skills is a barrier to human capital development in Malaysia (Ramlee, 2013a) [17].

For this reason, Malaysian Polytechnic should play a role in producing highly-skilled graduates to address the changes in the country's ecosystem of higher education. Therefore, in order to be an institution of choice in technical and vocational education and training (TVET), polytechnic should strive to make a premier institution and subsequently the graduates who are fulfilling the needs of employers as well as the work market today. Graduates currently employed by the employer are those who possess technical skills and work skills. Therefore, this study aims to evaluate the skills of Malaysian Polytechnic students in the workplace according to the employers' perception.

1.1 Problem Statement

Various parties began to question the quality of education in the country as large numbers of polytechnic graduates were still unemployed and worked outside the field of studied. Some people blame their own graduates and some blame the polytechnics who do not think they are providing the curriculum that suits the employer's preference. Hence, this study is conducted to look at these problems either from graduates or otherwise. The industrial sector is also urged to give full support to the implementation of the Industrial Training Policy for Higher Education Institutions which encourages the parties to inject input into polytechnic curriculum and collaborate for student placement in local and multinational companies. Graduates Survey findings show unemployment due to lack of skills required to ensure job marketability (Esa et al., 2014) [2]. Esa et al. (2014) [2] also found that most engineering students have good technical skills, but their soft skills are not at the same level. This is because they have a lack of communication, self-confidence, and self-adaptation in the workplace. This should be considered as employers need graduates who demonstrate in soft skills that include communication skills, thinking skills, problem solving skills, and positive attitude towards work (Hanapi & Kamis, 2017; Leo, 2016; Machart, 2017) [6] [10] [13]. The incompatibility of knowledge and skills among graduates is a gap between the criteria required by the industry and the education graduates (Bilal & Ummah, 2016) [1].

2 LITERATURE REVIEW

Based on literature reviews, employers are looking for workers with various job skills, including knowledge and soft skills. The graduates' achievement is also a gauge for the success of polytechnics and programs that the students are following. This study is expected to provide information and improve the elements of workability that should be emphasized in implementing the program of study in polytechnics as well as the elements of workability from the aspect of the knowledge, skills and soft skills required by the employers and the industry in line with the idea of the Industrial Revolution 4.0.

2.1 Workability of Graduates

Workability is a non-technical skill that is often associated with an attitude and personality that is important for a graduate to get a job. The application of the elements of workability such as skills, knowledge and soft skills is necessary by instructors in the process of teaching and learning to produce quality skilled and required by the employer. The elements of workability are often associated with personal depictions, attitudes, habits, behaviours, communication styles, problem solving and decision-making skills as well as organizational abilities. Goodwin & Vicki (2012) [3] defines workability as a set of achievements, understandings and personal qualities that make individuals easier to get a job and succeed in the jobs they choose. Workability is defined as a person who is capable of acquiring knowledge and skills to perform various tasks at a time, not only can they perform the tasks quickly and quickly but they can perform tasks without further training (Little & Brenda, 2011) [11].

Whereas Lowden et al., (2011) [12] noted that this workability refers to the individual personalities' individuals earned and used in their career profession. The elements of workability are very important to be mastered by the students for the supply to the workplace. Elements of workability can manage self-care for every individual to be able to change quickly according to current needs, focus on self-quality, creative and always responsive to his or her duties. Individuals who are skilled in managing their career are more confident in a new working environment. This is because the current job world has become complex, especially the impact of technological and economic change. Current work requires diverse capabilities, skills and knowledge.

2.2 Technical Skills

Technical skills refer to understanding and efficiency in a particular activity, particularly those involving methods, processes, procedures and techniques. Technical skills are also a specialized knowledge and analytical ability in the use of tools and techniques in certain disciplines such as in civil engineering, electrical engineering, electronics or information systems (Ramlee, 2013b) [18]. To ensure that technical skills are relevant to current developments, the approach in education should be 'hands-on'. Therefore, the appropriate curriculum should be designed to increase employee productivity in the future. One of the most desirable ways is to expose the students with the technology and skills associated with them. There are employers who consider academic competence alone to be inadequate and begin to request higher education institutions to produce graduates equipped with various elements of workability.

2.3 Knowledge Skills

Knowledge is defined as a combination of experience, value, learning, information skills and individual understanding. Newly created knowledge can be spoken, formulated, written, drawn and collected by individuals (Nonaka & Toyoma, 2007) [15]. This knowledge can be stored in various formats such as documents, pictures and videos. Knowledge is divided into two that is implicit and explicit knowledge. Implicit knowledge is personal knowledge based on individual experience and involves factors such as instinct, personal values and beliefs (Rosenberg et al., 2012) [19]. For example, in Institutions of Higher Learning, the implied knowledge created by academics and embedded in their minds is an intellectual warehouse. Based on the opinion of Ofsted (2010) [16] stating that there are two important criteria in ensuring that economic development in Australia is constantly increasing by increasing the knowledge and level of skills in current or future employment. Knowledge-based economies will add growth sources through activities that increase added value and thus contribute to the Overall Productivity Factor. To achieve this stage, workers need to be equipped with the skills and knowledge which in turn will enhance creativity and innovation to bring about economic growth in the era of globalization and liberalization (Gunn, V. Bell, S and Kafmann, 2010) [4]. In recruiting new employees, the job market always emphasizes on working experience in addition to certificate qualifications. Hence, the need for industrial training or working experience becomes the basis of an institution of higher learning Tickle & Louise (2013) [20].

2.4 Generic Skills

Soft Skills are generic skills. Soft skills lead to the mastery of a person in a skill focused on the development of personal skills, personality and humanity. Soft skills that can display high personality values such as leadership, teamwork ability, critical thinking, problem solving skills, ethics and professional morals. The soft skills are a combination of knowledge, skills and personal characteristics that are needed in the app by employees in their daily lives (Tickle & Louise, 2013) [20]. Aspects of soft skills need to be applied to complement technical skills. Soft skills lead to the mastery of a person in a skill focused on the development of personal skills, personality and humanity. Most of the soft skills can display high personality values such as leadership, teamwork ability, critical thinking, problem-solving skills, ethics and professional morals (Lowden et al., 2011) [12]. Soft skills focus on self-development of students who can encourage and embrace interest, motivation and spirit in the organization. Soft skills should be applied to complement technical skills (Vathsala Wickramasinghe & Lasantha Perera, 2010) [21].

2.5 Satisfaction of Employers

Employer satisfaction can be achieved when employees meet their expectations (Inaliah, et.al., 2016) [7]. Usually, employers expect graduates to have other related skills. The graduates also must understand and have the ability to accomplish their responsibilities perfectly in order to contribute to organisational success. In general, satisfaction with the skills of the graduates that are successfully recruited appears to be high. However, virtually it is only reflecting the large organization rather than small organization. Dissatisfaction of the employers towards the graduates are because of a lack of communication skills, teamwork skills, computer skills and other important skills. This study is conducted to determine the employer perceptions towards PUO graduates which also shows the employer satisfaction.

2. METHODOLOGY

The population in this study is 331 employers listed in the directory of Malaysian Polytechnic graduates. The study has been conducted quantitatively and qualitatively by reviewing the sample of employers of polytechnic graduates. The researcher used random sampling technique in the sample selection. The selection of this method is made to ensure the sample of the study can represent the employer population for Malaysian Polytechnic. Total employer size is based on the sample size determination table by Krejcie and Morgan (1970) [9].

The instrument used in this study was a questionnaire containing three constructs with 17 items. Part A of the questionnaire included background information of the company or respondent containing four items. Part B is about general information about graduates and has seven items. Section C deals with skills, knowledge and soft skills and has a total number of items of 17. In the last section of the questionnaire, there are fourteen items of employers' perceptions of the generic skills of polytechnic graduates. The questionnaire items were measured using a Likert Scale. The Likert Scale was chosen because of its high reliability and validity (Chua et al., 2013). Likert scales used were (1) Very Low, (2) Low, (3) Medium, (4) High, and (5) Very High.

3 RESULTS AND DISCUSSIONS

The data obtained were analysed using descriptive statistics. Descriptive analysis can be done whether the study uses quantitative and qualitative methods. The quantitative analysis in this study involved 151 respondents from 331 samples (45.62%) based on stratified population of 2,400 graduates for 2014 and 2015). The data obtained were analysed using descriptive statistics using SPSS. The data in the form of mean interpreted shown in Table 1 below.

Table 1 : Interpretation of Mean Score

Mean Score	Interpretation of Levels
1.00 – 1.50	Very Low
1.51 – 2.50	Low
2.51 – 3.50	Moderate
3.51 – 4.50	High
4.51 – 5.00	Very High

A total of 331 questionnaires were sent and emailed to employers throughout Malaysia.
Out of these, 151 respondents had responded and the response rate was 45.62% (Table 2)

Table 2 : Feedback Received

Questionnaire	Total	Respond
Sent	331	
Feedback Received	151	45.62%

Demographic analysis of this study looks at the number of respondents (employers), the type of organization and the number of respondents according to the field and the initial salary offered by the respondents to Polytechnic graduates (Table 3).

Table 3 : Demographic Analysis

Item		Frequency	Percentage
Organization Category	Private sector	144	95.4
	Government	7	4.6
Number of respondents according to the field	Civil Engineering	31	20.5
	Electrical Engineering	7	4.6
	Mechanical Engineering	16	10.6
	Marine Engineering	2	1.3
	Commerce	49	32.5
	Information Technology	11	7.3
	Others	35	23.2
Initial salaries	RM1,001 – RM1,500	134	88.7
	RM1,501 – RM2,000	17	11.3

Table 4 shows the employers' perception on the level of technical skills, knowledge, skills and generic skills of PUO graduates. Overall, the items surveyed showed high results for employers' perceptions towards these skills of PUO' graduates (Mean = 4.13). The highest mean score is for the employer satisfaction level for technical skills and generic skills (Mean = 4.14). The lowest mean score is for employer satisfaction on the knowledge skills of graduates of PUO. (Mean = 4.11).

Table 4 : Mean Scores

Variables	Mean	Std. Dev.	Level
Technical Skills	4.14	0.513	High
Knowledge Skills	4.11	0.520	High
Generic Skills	4.14	0.480	High
Overall Mean Average	**4.13**	**0.5043**	**High**

Qualitative data analysis was obtained from interview findings from respondents. There were five (5) interview questions and six (6) respondents were selected based on the criteria set. Result is presented in table 5.

Table 5 : Interview findings from respondents

Item	Result
Polytechnic Graduates	Overall, all respondents stated that polytechnic graduates meet the needs of the organization in the required fields of industry. The three respondents stated that polytechnic graduates should be given training from time to time to achieve the quality of service continuing.
Skills	All respondents agreed that the skills learned from the system in polytechnics can meet the needs of the organization. There are two respondents feel that the skills of polytechnic graduates need to be upgraded from time to time according to the industry needs.
Knowledge	Overall, the respondents stated that polytechnic graduates need to improve their existing knowledge in order to compete in the industry. The respondents' classification states that polytechnic graduates only have basic knowledge when they enter the job environment.
Soft skills	Overall, all respondents agreed that polytechnic graduates had positive attitudes and were open in terms of soft skills.
Relevance of TVET	Overall, all respondents agreed that the TVET-based polytechnic program is still relevant in their respective organizations but needs to be sensitive to the latest needs in the industry. A respondent believes that polytechnic graduates are potentially a valuable human asset to the organizers in the future.

4   CONCLUSION

Further studies from the perspective of employers of polytechnic graduates should be implemented in the future as feedback from employers is crucial as a basis for drafting policies and strategies for the pursuit of Polytechnic Transformation. Through this strategy, it can indirectly help each polytechnic to develop an action plan and initiative that can improve graduates' workability, improve research & development (R&D), needs analysis and curriculum. In order to ensure that research findings on a more robust employer's perspective, this study should be undertaken by every polytechnic to produce skilled manpower to achieve the country's aspirations by 2020. The findings of this study are expected to help the Ministry of Education, the Polytechnic Education Department and the Community College, Ungku

Omar Polytechnic especially in program planning. The findings can be used as benchmarks for the formulation of curriculum in polytechnics, especially the elements of workability skills. The industry can also use the findings to know about the skills of workability skills amongst employees employed to increase productivity and improve productivity of the company. More organized human resource management can be processed more efficiently so that skilled workers can be used more optimally. This study serves as a guideline for industry in designing economic needs in the globalization era.

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THE EFFECT OF EMPLOYEE BEHAVIOR AND SELF-EFFICACY ON EMPLOYEE PERFORMANCE AT PT RESWARA MINERGI HARTAMA, SOUTH JAKARTA

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ABSTRACT

The purpose of this study was to determine the effect partially or simultaneously between Employee Behavior and Self-Efficacy on Employee Performance at PT Reswara Minergi Hartama, South Jakarta. The method of this research is associative research, the number of samples used is 130 respondents and uses census sampling techniques. Data analysis techniques use simple and multiple linear regression analysts with the help of SPSS 24 Software. The results of the first hypothesis study show that the value of tcount 8,869 > t table 1,979 or the value of Sig 0.000 < 0.05, Ho1 is rejected and Ha1 is accepted meaning that there is a partial effect between employee behavior on employee performance at PT Reswara Minergi Hartama Jakarta. The results of the second hypothesis study show that the value of tcount 7,118 > t table 1.979 or the value of Sig 0.000 < 0.05, Ho2 is rejected and Ha2 is accepted meaning that there is a partial effect between self-efficacy on employee performance at PT Reswara Minergi Hartama Jakarta. The results of simultaneous hypothesis research show Fcount 67,561 > F table 3,068 or Sig value 0,000 < 0,05, Ho3 is rejected and Ha3 is accepted, meaning in this study there is an influence of employee self-efficacy behavior on employee performance at PT Reswara Minergi Hartama Jakarta. The multiple linear regression equation found is Y = 0,124 + 0,471 + 0,343(X)this equation can be concluded that there is a direction of a positive relationship between Employee Behavior (X1) and Self Efficacy (X2) Against Performance (Y). The results of the rx12y correlation are 0.718 and are in the interval between 0.60 - 0.799 with a strong level of relationship, meaning Employee Behavior (X1) and Self-Efficacy (X2) have a strong level of relationship to performance (Y). On the results of the coefficient of determination (R2) between Employee Behavior (X1) and Self Efficacy (X2) Against Performance (Y) of 0.515 this indicates that the contribution or contribution of the Self Efficacy variable (X2) is 51.5% on Performance (Y) and the remaining 49.5% is influenced by other factors not examined such as work discipline variables, work environment and others.

Keywords: Employee Behavior, Self-Efficacy and Performance

1.0 INTRODUCTION

Human resource is part of companies' strength and may be different between companies. It is also known as a central figure, therefore human resources become an asset for a company. In order for the management activities to run well, a company must have employees who have internal capabilities, which are supported by the ability to master the skills, intellectual, self-management and the ability to build good relationships with others. Global developments will directly and indirectly give some impact on the organization and people within it.

The price of coal has been decreased from year 2014 until 2016. Therefore, the company has decided to reduce sales target due to the decline in coal price at that time, along with the strengthening of coal prices in the second half of 2016. The opportunities arising from significant increases in coal prices were utilized by increasing production and expanding markets both local and abroad. The company raised it sales target to spur deficiencies in the previous year and spurred the performance of employees who were also affected by these conditions. Utilization of coal resources has become a major drive of national economic growth and the company has tried to maximize employee performance through the sale of commodity targets.

In this study, researchers conducted observations by giving questionnaires / statements to 20 employees in order to assess employee behavior, self-efficacy and company employee performance.

Taking public transportation such as public buses can be a little burdensome to certain people such as office workers and students since it is hard to estimate the arrival of the bus at bus stops. They have to wait for a long time as they do not know when the bus will be arriving. As a result, these people often find themselves spending their pocket money on a more expensive transportation such as Grab and taxi. Besides, people still have to physically move to the nearest bus station to get the complete information of the buses such as bus numbers, ticket fare, routes and stops which is very inconvenient in this golden era of technology.

2.0 RESEARCH PURPOSES

The objectives to be achieved from this study are to obtain a deep investigation of the influence of Employees' Behavior and Self-Efficacy on the Performance of The Employees of PT Reswara Minergi Hartama.

3.0 RESEARCH METHODS

This research uses a quantitative approach with a survey to collect data that will be presented in the form of numbers. This research method which is based on positivism philosophy is aim to examine a particular population, sampling techniques that were generally carried out randomly, data collection using research instruments and quantitative or statistical data analysis aims to test a predetermined hypothesis.

This type of research is explanatory, since it uses a survey method by taking samples from a population and uses a questionnaire as the main data collection tool. Explanatory (explanation) is a type of conclusive research whose main purpose is to obtain evidence regarding causal or causal relations, Naresh Malhotra (2009: 100).

4.0 RESEARCH DESIGN
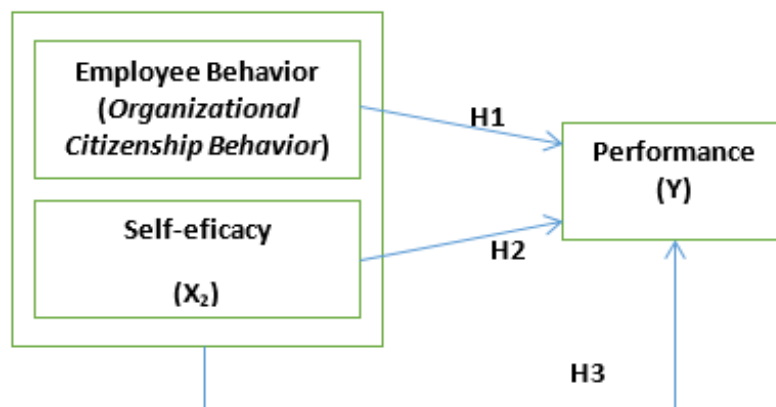
Figure 1
Research Design

5.0 POPULATION AND SAMPLE

Using preliminary observations in the study, the initial sampling in this study uses probability sampling techniques which are random from150 sample populations which are chosen randomly without regard to the strata in that population (Sugiyono, 2011: 63-64). From the proportional random sample return, a sample of 20 respondents were used for the observation samples, while the remaining 130 were used for the research samples.

6.0   RESEARCH RESULT

1.   Respondents Characteristics

The characteristics of respondents were categorized in 3 (three) categories; the age of the respondent, the sex of the respondent, and the education of the respondent.

a.   Age Frequency of Respondents; The SPSS output of the respondent's age frequency is as follows:

Table 1 : Output of Age RespondentsFrequency

Respondents' Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	≤ 30 Age	7	5,4	5,4	5,4
	31 s/d 40 Age	78	60,0	60,0	65,4
	≥ 41 Age	45	34,6	34,6	100,0
	Total	130	100,0	100,0	

b.   The SPSS Output of The Respondents' Gender is as follows:

Table 2 : Output of Respondents Gender Frequency

Respondents Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	21	16,2	16,2	16,2
	Male	109	83,8	83,8	100,0
	Total	130	100,0	100,0	

c.   The SPSS output of the respondent's education frequency is as follows:

Table 3 : Frequency Output of Respondents Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SMA	43	33,1	33,1	33,1
	Diploma	12	9,2	9,2	42,3
	Bachelor	75	57,7	57,7	100,0
	Total	130	100,0	100,0	

1.   Data Quality Test

The data quality test in this study uses the instrument validity testing with the product moment formula and the instrument reliability test with the Cronbach alpha formula.

a. Validity test

All statement items used in the study obtained r count value greater than the r value table and positive r value for the variables X_1, X_2, and Y, then all items are considered to be valid.

Employee Behavior Variable

No Inst	r count	r table	Information
1	0.440	0.3	Valid
2	0.591	0.3	Valid
3	0.470	0.3	Valid
4	0.472	0.3	Valid
5	0.440	0.3	Valid
6	0.468	0.3	Valid
7	0.544	0.3	Valid
8	0.661	0.3	Valid
9	0.623	0.3	Valid
10	0.554	0.3	Valid

Self Eficacy Variable

No Inst	r count	r table	Information
1	0.701	0.3	Valid
2	0.586	0.3	Valid
3	0.593	0.3	Valid
4	0.420	0.3	Valid
5	0.495	0.3	Valid
6	0.497	0.3	Valid
7	0.642	0.3	Valid
8	0.623	0.3	Valid
9	0.528	0.3	Valid
10	0.571	0.3	Valid

Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	2,82636327
Most Extreme Differences	Absolute	,063
	Positive	,063
	Negative	-,043
Test Statistic		,063
Asymp. Sig. (2-tailed)		,200c,d

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

No Inst	r_{count}	r_{table}	Information
1	0.523	0.3	Valid
2	0.615	0.3	Valid
3	0.530	0.3	Valid
4	0.552	0.3	Valid
5	0.597	0.3	Valid
6	0.568	0.3	Valid
7	0.642	0.3	Valid
8	0.459	0.3	Valid
9	0.606	0.3	Valid
10	0.454	0.3	Valid

Performance Variable

a. Realibility Test

Alpha cronbach value in this test is greater than the value of r table (0.6) and the value of r is positive. Therefore, the item statement is considered to be reliable.

Variable	Cronbach Alpha Value	Information
Employee Behavior	0.706	Reliable
Self Efficacy	0.747	Reliable
Performance	0.744	Reliable

2. Classical Assumption Test

a. Normality Test

The results of normality test output with the help of SPSS 24 Software with the Kolmogorov Smirnov method are;

Table 4 :   Output of Kolmogorov Smirnov Normality Test Method (One sample)

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Employee Behavior (X1)	,913	1,095
	Self-efficacy (X2)	,913	1,095

Looking at the Kolmogorov-Smirnov Test One-Sample table above, it can be explained that the Symp value. Sig. (2-tailed) 0,200> 0.05, it can be concluded that the data are normally distributed.

a.   Multicollinearity Test

Criteria for multicollinearity test is if the Tolerance value> 0.10 or equal to VIF value <10.

Looking at table Coefficientsa above shows the value of employee behavior tolerance (X1) and Self-efficacy (X2) 0.913> 0.10 and VIF value 1.095 <10, it can be concluded that, in this model there is no very high correlation or multicollinea rity between variables free in this study.

Table 5 : Output of Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Employee Behavior (X1)	,913	1,095
	Self-efficacy (X2)	,913	1,095

c. Heterokasdicity Test

Heteroscedasticity test results are as follows:

Scatterplot
Dependent Variable: Kinerja (Y)
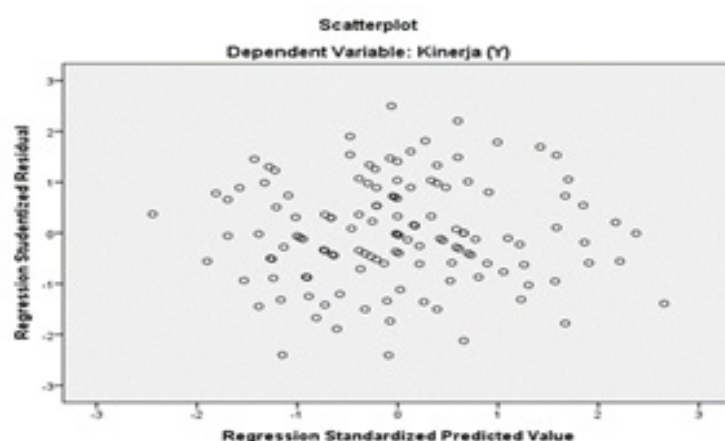
From the scatter plot picture above shows the points there are no clear patterns, and the points spread above and below the number 0 on the Y axis, it can be concluded that there was no heteroscedasticity in this study.

Model		Unstandardized Coefficients			T
		BBB	Std. Error	Beta	
1	(Constant)	19,971	2,564		7,790
	Self efficacy (X2)	,475	,067	,533	7,118

3. Linear Regression Test
a. Simple Linear Regression Test

The simple linear regression equation is Y = a b (x). Simple linear regression analysis between 1 (one) independent variable of the dependent variable is as follows:

1) Simple Linear Regression Between Employee Behavior (X1) Against Performance (Y)

The SPSS output results on simple linear regression test between Employee Behavior (X1) towards Performance (Y).

Coefficientsa

Table 6 : Simple Linear Regression Between Employee Behavior (X1) towards Performance (Y)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	16,187	2,486		6,511	,000
	Employee Behavior (X1)	,576	,065	,617	8,869	,000

Dependent Variable: performance (Y)

Looking at output Coefficientsa table above it can be explained that, the simple linear regression equation found is Y = 16,187 + 0.576 (X). This equation can be concluded that there is a positive relationship between Employee Behavior (X1) towards Performance (Y). .

2)   Simple Linear Regression Between Self-Efficacy (X2) towards Performance (Y)

Table 7   : Simple Linear Regression Between Self Efficacy (X2) towards Performance (Y)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	19,971	2,564		7,790	,000
	Self-efficacy(X2)	,475	,067	,533	7,118	,000

Dependent Variable: performance (Y)

Looking at Coefficientsa   table above it can be explained that, the simple linear regression equation found is Y = 19,971 while X= 0,475. This equation can be concluded that there is a direction of a positive relationship between Self Efficacy (X2) and Performance (Y).

3). F Simultaneous test

Table below shows SPSS output on simultaneous hypothesis test between employee behavior (X1), self-efficacy (X2) and performance (Y)

Table 7   : Simultaneous Hypothesis Test between Employee Behavior (X1),
Self-efficacy (X2) and Performance (Y)

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1096,398	2	548,199	67,561	,000b
	Residual	1030,494	127	8,114		
	Total	2126,892	129			

a. Dependent Variable: performance (Y)
b. Predictors: (Constant), self efficacy (X2), employee behavior (X1)

Coefficientsa table above shows value Fcount 67,561 > F table 3,068 or value Sig 0,000 < 0,05. This table shows that Ho3 been rejected while Ha3 is accepted. This result shows the relationship between employee behavior and self efficacy towards employee performance at PT Reswara Minergi Hartama Jakarta.

7.0 CONCLUSION

1. The relationship between employee's behavior (x1) towards performance (Y) in hypothesis test shows value tcount 8,869 > t table 1,979 or value Sig 0,000 < 0,05. So Ho1 rejected and Ha1 accepted. This research shows the relationship between employee's behavior and employee performances at PT Reswara Minergi Hartama Jakarta.

2. From the research, the relationship between self efficacy (X2) towards performance (Y) in partial hypothesis test shows value tcount 7,118 > t table 1,979 or value Sig 0,000 < 0,05. Ho2 been rejected and Ha2 been accepted. This result proves the relationship between self efficacy towards employee performances at PT Reswara Minergi Hartama Jakarta.

3. The relationship between employee behavior (X1) and self efficacy (X2) towards employee performance (Y). From the simulataneous hypothesis test, it shows value

F_{count} 67,561 > F_{table} 3,068 or value Sig 0,000 < 0,05. Ho3 been rejected and Ha3 been accepted. This reseach has proven the relationship between employee self efficacy towards employee performance at PT Reswara Minergi Hartama Jakarta.

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THE EFFECT OF WORK MOTIVATION AND DISCIPLINE ON EMPLOYEE PRODUCTIVITY
(IN PT. INSURANCE BINTANG TBK IN JAKARTA)

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ABSTRACT

The aim is to determine the effect of motivation and work discipline on employee work productivity at PT. Asuransi Bintang Tbk in Jakarta. The method used is descriptive method with an associative approach. The sampling technique used was proportional random sampling using the census or saturated sampling method with a sample of 60 respondents. The analysis tool uses the instrument test, classical assumption test, regression analysis, correlation coefficient analysis and determination and hypothesis testing. The results of this study are that motivation has a positive and significant effect on employee work productivity by 43.1%. Hypothesis testing is obtained t count> t table or (6.628> 2.002), so that H0 is rejected and H1 is accepted meaning that there is a positive and significant influence between motivation on employee work productivity at PT. Asuransi Bintang Tbk in Jakarta. Work discipline has a positive and significant effect on employee work productivity by 40.7%. Hypothesis testing is obtained t count> t table or (6.311> 2.02) so that H0 is rejected and H2 is accepted meaning that there is a positive and significant influence between work discipline on employee work productivity at PT. Asuransi Bintang Tbk in Jakarta. Simultaneous test results of motivation and work discipline have a positive and significant effect on employee work productivity with an influence contribution of 48.4%, while the remaining 53% are influenced by other factors. Hypothesis testing obtained the value of F count> F table or (32.194> 2.770), thus Ho is rejected and H3 is accepted. This means that there is a positive and significant effect simultaneously between motivation and work discipline on employee productivity at PT. Asuransi Bintang Tbk in Jakarta.

Keywords: Motivation, Work Discipline, Employee Productivity.

1.0 INTRODUCTION

An organization can run effectively if management functions such as planning (planning), organizing (organizing), directing (actuating) and controlling (controlling) run well, which is driven by the main elements of human organization.

Important motivation is given to employees because it will arouse enthusiasm for work and produce high employee productivity. Motivation can be interpreted as a strength both originating from within and from outside oneself which encourages work behavior in accordance with the provisions, intensity and a certain period of time related to intrinsic and extrinsic motivation in carrying out work.

The role of motivation is to intensify one's desires and desires, therefore it can be concluded that efforts to increase one's morale will always be related to motivating efforts by knowing their needs. According to David McCleland in Miftah Toha (2012: 235) stated "Motivation is a set of strengths both from within and from outside oneself which pushes to start working behavior according to the format, direction, intensity and a certain period of time".

The work discipline factor is very important in the implementation of employee work. Because according to Hasibuan (2013: 193) is awareness and willingness to obey all company regulations and applicable social norms. Meanwhile, in the opinion of other experts, Rivai (2013: 444) said that work discipline is a tool used by managers to communicate with employees so that they are willing to change a behavior, as well as an effort to increase awareness and willingness to obey all company rules and norms social norms that apply. In the end, employees who have high work discipline will have good performance because working time is used as well as possible to carry out the work in accordance with the targets set.

PT. Asuransi Bintang Tbk is one of the oldest general insurance in Indonesia which was established on March 17, 1995. PT. Asuransi Bintang Tbk in overcoming increasingly fierce competition in the garment industry, PT. Asuransi Bintang Tbk realizes the importance of having quality and committed human resources as well as maintaining consistent quality to be able to drive the performance of organizations that require strong carrying capacity in an effort to achieve its mission and mission. Nonetheless, pre-research observations show the percentage of achievement of the dimensions of work productivity, the need for affiliation and the need for power in employees, only reaching an average of 70.3%. This shows the level of motivation of employees of PT. Asuransi Bintang Tbk is still not optimal, overall it shows a trend that tends to decline.

The results of employee work discipline measurements at PT. Asuransi Bintang Tbk for a period of 5 (five) years from 2013 to 2017, shows that the percentage of absenteeism for work discipline ranges from 28% to 38%, there are still many employees who are late coming to work due to lack of discipline in employees. While the realization of product sales of PT. Asuransi Bintang Tbk has only reached 86.5% of the target set.

Based on the background of the problems above, the authors are interested in conducting research with the title: "The Effect of Work Motivation and Discipline on Employee Work Productivity at PT. Asuransi Bintang Tbk in Jakarta"

MATERIALS AND METHODS

Study area and duration

The study was held at PT. Asuransi Bintang Tbk di Jakarta and was conducted for 3 months from September to November 2018. The study started from research proposal, seminar proposal, setting of research instruments, collected primary data, analysis data and research report.

Data collections and data analysis

This study used observation, quesionare, and study of literature in order to garhered data. Data collection was conducted for three months. Scale of Likert was used to measures answer from each of respondents.

Table 1 : Scale of Likert

Answer	Score
Strogly Agree (SA)	5
Agree (A)	4
Less Agree (LA)	3
Not Agree (NA)	2
Strongly Not Agree (SNA)	1

To determine the scale range of each variable measured, an interval can be specified to provide interpretation, namely:

Table 2. Scale Range Criteria

Score	Range Criteria	Jawaban
1	1.00 – 1.79	Very not good
2	1.80 – 2.59	Not good
3	2.60 – 3.39	Moderate
4	3.40 – 4.19	Good
5	4.20 – 5.00	Very good

Instruments Testing
Test Research Instrument.

a. Validity Test.
To test the validity of each instrument, the formula used is the product moment correlation coefficient as follows:

$$rxy = \frac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{\sqrt{\left\{n\cdot\sum x^2 - \left(\sum x\right)^2\right\}\left\{n\cdot\sum y^2 - \left(\sum y\right)^2\right\}}}$$

b. Reability Test.
The formula used in this study to look for reliability uses the alpha or cronbach's alpha (α) formula because the questionnaire questions used are a range of values in this case using a rating scale of 1 to 5.

$$r_{11} = \left[\frac{k}{k-1}\right]\left[1 - \frac{\sum \sigma_b^2}{\sigma_1^2}\right]$$

Notes:
r11   = Reliability coefficient
k   = Number of questions

$\sum \sigma_b^2$ = Number of question item variances

σ_1^2 = total variance

Analysis of Varificative
a. Simple linear regression analysis

Simple linear regression analysis is used to predict how the value of the dependent variable changes if the value of the independent variable changes. Testing is done partially. This relationship model is arranged in a simple linear regression function or equation as follows:

$$Y = a + bX + \acute{\varepsilon}$$

Notes:
a   = Number of constanta
Y   = Depandant Variable
b   = Coeficient Regression for each variable
X   = Independent Variable
έ   = *Disturbance's error*

b. Double linear regression analysis
Regression analysis is used to predict how the value of the dependent variable changes if the value of the independent variable is increased / derived. This relationship model is arranged in a multiple regression function or equation as follows:

$$Y = a + b_1X_1 + b_2X_2 + \acute{\varepsilon}$$

c. Correlation Coefficient Analysis (R)

Correlation coefficient analysis is intended to determine the level of relationship between independent variables with the dependent variable both partially and simultaneously. Pearson correlation is stated in the following formula:

$$r = \frac{n \sum XY - \sum X \sum Y}{\sqrt{\left(n \sum X^2 - (\sum X)^2\right)\left(n \sum Y^2 - (\sum Y)^2\right)}}$$

Notes :

r : Correlation between independent variables and dependent variables
n : Number of samples
X : Value of independent variables (free)
Y : Value of dependent variable (bound)

RESULT AND DISCUSSION

A. Analisis Kuantitatif Variabel Motivasi dan Disiplin Kerja

1. Test of Validity

Tabel 4Hasil Uji Reliabilitas Variabel Independen dan Dependen

No.	Variabel	Coeficient Alpha	Standar Chronbach Alpha	Keputusan
1	Motivationi (X1)	0.638	0.60	Reliabel
2	Work Dicipline (X2)	0.645	0.60	Relibel
3	Employee Work Productivity (Y)	0.612	0.60	Reliabel

Based on the test results in the table above, it shows that the motivational variables (X1), work discipline (X2) and employee work productivity (Y) are stated to be reliable, it is evidenced by each variable having a coefficient value of Alpha> chronbath alpha 0.60.

B. Descriptive and Verification Analysis
1. Descriptive Analysis of Respondents' Assessment of Variables (Qualitative)

a. Evaluation of Respondents Based on Motivational Variables (X1)

Respondents to the statement on the motivational variable (X1), obtained an average score of 3.90 including the scale range of 3.40-4.19 with good criteria, but given the number of respondents who answered 'disagree' and 'disagree' reached 35, 14% then the company should pay more attention to employees in terms of full appreciation of the work, a safe and comfortable atmosphere at work, good wages, attractive work and wise discipline from every manager.

b. Evaluation of Respondents Based on Work Discipline Variables (X2)

Respondents' responses to the variable work discipline (X2) obtained an average score of 3.86 including the scale range of 3.40-4.19 with good criteria, but given the number of respondents who answered less agree and disagree reached 35.14% then for better again the company must encourage employees to have responsibilities in carrying out the work.

c. Evaluation of Respondents Based on Employee Productivity Variables (Y)

Respondents' responses to variable employee productivity vary, with an average score of 3.92 including in the scale range of 3.40-4.19 with good criteria, but given the number of respondents who answered 'disagree' and 'disagree' reached 35.14% then it should be companies must further encourage their employees to have innovation and smart thinking in every technological development that supports the process of achieving organizational goals.

2.   Verification Analysis

Verification analysis is intended to determine the magnitude of the influence and analyze the significance of these influences. In this analysis carried out on the influence of two independent variables on the dependent variable. partially or simultaneously.

a.   Simple Linear Regression Analysis.

Table 5. Hasil Pengolahan Regresi Linier Sederhana Variabel Motivasi (X1) Terhadap Produktivitas Kerja Karyawan (Y)

Coefficients[a]					t	Sig.
	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta			
1 (Constant)	15.791	3.550			4.448	.000
Motivation (X1)	.601	.091	.656		6.628	.000

a. Dependent Variable: Produktivitas Kerja Karyawan (Y)

Based on the results of the regression calculations in the above table, the regression equation Y = 15.791 + 0.601X1 can be obtained. From the above equation it can be concluded as follows:

1.   A constant value of 15.791 means that if the motivational variable (X1) does not exist then there is an employee productivity value (Y) of 15.791 points.
2.   The value of 0.601 is interpreted if the constant is constant and there is no change in the work discipline variable (X2), then every 1 unit change in the motivational variable (X1) will result in a change in employee work productivity (Y) of 0.601 points.

Table 6. Partial Correlation Coefficient Analysis Results Between Motivational Variables (X1) Against Employee Productivity (Y)

Correlations[b]		Motivasi (X1)	Produktivitas Kerja Karyawan (Y)
Motivation (X1)	Pearson Correlation	1	.656**
	Sig. (2-tailed)		.000
Employee Productivity (Y)	Pearson Correlation	.656**	1
	Sig. (2-tailed)	.000	

Based on the test results in the above table, the R value (correlation coefficient) of 0.656 means that the two variables have a strong relationship.

Table 7. Partial Correlation Coefficient Analysis Results Between Work Discipline Variables (X2) Against Employee Productivity (Y)

Correlations[b]		Work dicipline (X2)	Employee productivity (Y)
Work dicipline (X2)	Pearson Correlation	1	.638**
	Sig. (2-tailed)		.000
Employee productivity (Y)	Pearson Correlation	.638**	1
	Sig. (2-tailed)	.000	

Based on the test results in the table above, the R value (correlation coefficient) of 0.638 obtained means that the two variables have a strong relationship.

a.   Effect of Motivation (X1) on Employee Productivity (Y).

Based on statistical results, the regression equation Y = 15.791 + 0.601X1 and the correlation coefficient value of 0.636 means that both variables have a strong influence level. The contribution of motivation (X1) to employee work productivity (Y) is 0.431 or 43.1% while the remaining 56.9% is influenced by other factors. This shows that increased motivation will increase employee productivity. Hypothesis testing obtained t count> t table or (6.628> 2.002), this is reinforced by a probability signification of 0,000 <0.05, thus H0 is rejected and H1 is accepted, meaning there is a positive and partially significant effect between motivation on employee productivity. The results of this study are consistent with Agustina's research, Journal of Business Administration, 2014, ISSN: 2355-5408 Vol.2 No.3, Effect of Motivation on Employee Productivity at PT. Dwimitra Palma Lestari Samarinda, where in the research it was obtained the regression equation Y = 2,376 + 0.469X, the coefficient of determination between motivation variables and work productivity was 36.9%. T test results obtained t count 2.334> t table 2.004 thus there is a significant influence of motivation on work productivity. This is in accordance with the opinion of Maslow in Sutrisno (2014: 55) that motivation is providing the driving force that creates the excitement of one's work, so they want to work together, work effectively and be integrated with all their efforts to achieve satisfaction in work.

b.   Effect of Work Discipline (X2) on Employee Productivity (Y)

Based on statistical results, the regression equation Y = 16.335 + 0.593X and the correlation coefficient of 0.638 means that both variables have a strong influence level. The contribution of the influence of work discipline (X2) on employee work productivity (Y) is 0.407 or 40.7% while the remaining 59.3% is influenced by other factors. This shows that high work discipline will increase employee work productivity. Hypothesis testing is obtained t count> t table or (6.311> 2.002), this is reinforced with a probability signification of 0,000 <0.05, thus H0 is rejected and H2 is accepted meaning that there is a positive and partially significant effect between work discipline on employee work productivity . The results of this study are consistent with research by Ismail Usman, Journal of Business Administration, ISSN: 2355-5408. Vol. 4, No.3, 2016: 911-922. Effect of Work Discipline on Employee Productivity at PT Allo Jaya in Bontang, and this is in accordance with the opinion of Hasibuan (2016: 193) that work discipline is the awareness and willingness of a person to obey all applicable rules and regulations.

c.   Effect of Motivation (X1) and Work Discipline (X2) Simultaneously Against Employee Productivity (Y).

Based on the results of the study, showed that motivation (X1) and work discipline (X2) had a positive effect on employee work productivity by obtaining a regression equation Y = 9,939 + 0,395X1 + 0,360X2. The results of this regression analysis show the coefficient of each variable is positive, meaning that the higher the training and work discipline, the higher the employee's work productivity, conversely the lower the motivation and work discipline, the lower the employee's work productivity will be. While the level of relationship or influence between the independent variables with the dependent variable obtained by 0.728 means that it has a strong relationship or influence. The contribution of the influence of motivation and work discipline by 53.0% while the remaining 37% is influenced by other factors.

From the hypothesis testing obtained F count> F table or (32.194> 2.770), this is also strengthened with a probability significance of 0,000 <0.05. Thus H0 is rejected and H3 is accepted. This means that there is a positive and significant effect simultaneously between motivation and work discipline on employee work productivity. The results of this study are consistent with the research of I Ketut Sirna, Journal of Management and Business, ISSN: 1978-6069, Vol.12, No.2. August 2017, The effect of work discipline and motivation on employee productivity at the Patra Jasa Bali resort & Villas hotel, and this is in line with Sedarmayanti's opinion (2013: 79) which states that work productivity shows that the individual is a comparison of the effectiveness of output (achievement for maximum work) with the efficiency of one of the inputs (labor) that includes quantity, quality, within a certain time ".

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STUDENTS' AWARENESS TOWARDS EDUCATIONAL LOAN REPAYMENT AT UNGKU OMAR POLYTECHNIC

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ABSTRACT

Recently, educational loan defaulting issue is increasing on a worldwide scale. This scenario has brought severe problems to the government, PTPTN Corporation and the students who are willing to further their studies at tertiary level. With the hope of raising the students' awareness to repay the educational loan, investigated the students' knowledge, attitude and the parental influence towards loan repayment. Four main objectives are set to guide the research process. The objectives include determining whether the students aware their responsibilities to repay the loan after graduation; identifying if students have good knowledge about educational loan repayment; identifying the students' attitudes to repay the educational loans; and identifying parental influence towards students' awareness to repay the educational loan.
 A total of 361 students from Semester 4 and 5 of Ungku Omar Polytechnic participated in the study and data were collected using the previous study questionnaire. The descriptive analysis method is applied to analyse the demographic part and overall mean score.

Keywords:

1.0 INTRODUCTION

In Malaysia, public universities and private universities, polytechnics or colleges were established to create more chances for students to further their studies at the tertiary level. Many students would prefer to continue their studies at local universities due to limited financial resources. To address this problem, the Malaysian government has established an educational loan offered under the National Higher Education Fund (1997), which is also known as Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) that supports in decreasing the students' financial problems.

1.1 Problem Statement

According to the Deputy Higher Education Minister Datuk Dr. Mary Yap Kain Ching, 1,574,700 debtors who failed to repay their National Higher Education Fund Corporation (PTPTN) loans, totaling RM32.07 billion, have been listed in the Central Credit Reference Information System (CCRIS). (The Star Online News, 19 September 2016). She also mentioned that PTPTN had issued loans to 2.6 million debtors until the end of their studies, involving an allocation of RM59.67 billion as of last month. However, PTPTN has only collected RM10.07 billion from 1.2 million debtors compared to RM18.84 billion which was supposed to be collected from 1.9 million debtors during the corresponding period. (The Star Online News, 19 September 2016).

If the loan repayment is not recoverable, the government will lack the source to provide loans to the upcoming batch of students who wish to further their studies in Malaysia. To counter the funding constraints resulted from unpaid loans, PTPTN Chairman Datuk Shamsul Anuar Nasrah stated that PTPTN had no option but to either reduce the number of students receiving the loans by 50,000 or decrease the loan amount. According to the Chairman's statement, latter was chosen so that the number of student loan recipients would remain the same. (iMoney.com by Iris Lee, 7 November 2014)

2. METHODOLOGY

2.1 Introduction

This section discusses and elaborates in detail on the research design, research population and research sample, research instrument, method of data collection and method of data analysis. It intends to provide a clearer view to the readers on how the research is carried out.

2.2 Research Design

The research design of this study is using the survey method to collect quantitative data through questionnaires. The responses in the questionnaires will be analysed by using SPSS Version 22.0. It is used to report the descriptive statistical profile of the respondents and the overall mean score.

2.3 Population and Sample

The population of the study comprises all of the 6198 students in Ungku Omar Polytechnic (UOP). The sample has only involved the students in semester 4 and semester 5 from five departments in UOP, which include Commerce Department(JP), Mechanical Engineering Department (JKM), Electrical Engineering Department(JKE), Information and Communication Department (JTMK) and Civil Engineering Department (JKA).

First of all, we choose the entire UOP students as our survey population because most of the students in UOP apply for the educational loan (PTPTN). Then, we eliminate students from semester 1 to 3 because students will only get PTPTN after they entered semester 2, also they just received the loan and lacked of the thought on how to repay the loan or anything about loan repayment. They might still not possess the knowledge about PTPTN and the awareness to make loan repayment. (Bakar, E.A.,2006)

The numbers of respondents in the sample for this study is determined by using Krejcie and Morgan (1970). The total number of 361 respondents will be involved in this study (see table 3.1). According to Roscoe (1975), sample size from 30 to 500 is the most suitable measurement for a study. Therefore, a sufficient number of respondents for fieldwork enable researchers to perform statistical procedures of the study.

Table 3.1 Sample size according to class

Class	No of Sample
Commerce Department (JP)	73
Mechanical Engineering Department (JKM)	72
Electrical Engineering Department (JKE)	72
Information and Communication Department (JTMK)	72
Civil Engineering (JKA)	72
TOTAL	361

2.4 Method of Data Analysis

Firstly, researchers manually check questionnaires to detect any incomplete questionnaires filled. Then, data will be entering into the computer according to the codes set by the researchers. Data were analysed using the program Statistical Package for Social Science (SPSS) version 22.0. The analysis will be using descriptive analysis such as frequency, percentage and mean.

Likert's scale is an attempt to let the respondent to indicate their answers based on the scale from one extreme to another extreme. In this questionnaire, we used only four level of Likert's scale, which are strongly disagree, disagree, agree and strongly agree. To identify the reliability of the statistic, the rule of thumb of Cronbach's Alpha is used.

Table 3.2: Likert Scale

Choice	Likert Scale
Strongly disagree	1
Disagree (D)	2
Agree (A)	3
Strongly Agree (SA)	4

Table 3.3: Rule of thumb of Cronbach's Alpha

< 0.6	Poor
0.6 < 0.7	Moderate
0.7 < 0.9	Good
0.8 < 0.9	Very Good
< 0.9	Excellent

3. RESULTS AND DISCUSSIONS

3.1 RELIABILITY ANALYSIS

A survey instrument is considered reliable if it supplied consistent results even if repeated. Reliability is concerned with estimating the degree to which a measurement is free of random or unstable error. (Refer to table 3.1 Cronbach's Alpha in Methodology)

Table 3.1: Overall Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	Number of Items
0.876	20

Based on table 3.2, the overall reliability statistic for 20 items, which comprised of DV and IV questions, had achieved a 'Very Good' level with a value of Cronbach's alpha 0.876.

3.2 DESCRIPTIVE ANALYSIS

The information collected from the questionnaire were described and summarised in this section by using descriptive statistics.

A total of 361 students participated in this study and they are comprised of 183 (50.7%) males and 178 (49.3%) females. Across all respondents, 281 (77.8%) were Malay, 37 (10.2%) were Chinese, 35 (9.7%) were Indian, and only 8 (2.2%) were of the other group such as Siamese and Iban.

3.2.1 MEAN

To answer the four research objectives, descriptive statistics were conducted to calculate the frequencies, percentages and mean scores for the responses to the survey items. There were four categories of Likert Scale were used in this research: Strongly Disagree, Disagree, Agree, Strongly Agree. Mean scores were interpreted in the Table 3.2 below.

Table 3.2: Mean Score Scale

Mean Score	Interpretation
1.00-1.49	Strongly Disagree (SD)
1.50-2.49	Disagree (D)
2.50-3.49	Agree (A)
3.50-4.00	Strongly Agree (SA)

Mean score of 1.49 and below were interpreted as strongly disagree; 2.49 and below were interpreted as disagree; 3.49 and below interpreted as agree; 3.50 to 4.00 were interpreted as strongly agree. (Duru, 2006)

3.2.2 Awareness About The Loan Repayment Issues

Table 3.3: Analysis on Student's Awareness towards Educational Loan Repayment

No	Items	Frequency (%)				Mean	Overall Mean
		SD	D	A	SA		
1	I will make repayment because it is my priority.	8 (2.2%)	26 (7.2%)	190 (52.6%)	137 (38.9%)	3.26	3.2576
2	I will find any job after I graduate to pay back student loan.	10 (2.8%)	26 (7.2%)	186 (51.5%)	139 (38.5%)	3.26	
3	I will save part of the loan during study, so that I can make repayments immediately after I graduate.	10 (2.8%)	59 (16.3%)	182 (50.4%)	110 (30.5%)	3.09	
4	I will make regular payments through salary deduction.	8 (2.2%)	28 (7.8%)	193 (53.5%)	132 (36.6%)	3.24	
5	I will make regular payments to avoid problems in the future.	7 (1.9%)	16 (4.4%)	184 (51.0%)	154 (42.7%)	3.34	

Based on table 3.3, the overall mean score was 3.2576. According to the mean score scale, the overall mean score was between 2.50 and 3.49, thus, it indicated that the respondents were overall agreed with the items stated in Table 3.3.

The highest mean among the five items stated was 3.3. Out of 361 respondents 338 (93.7%) of them agreed with the statement of 'I will make regular payments to avoid problem in the future'. Meanwhile, only 23 (6.3%) of them disagree with the statement.

The analysis show that the third item (I will save part of the loan during study, so that I can make repayments immediately after I graduate.) had the lowest mean, which was 3.09, as 292 (80.9%) out of 361 respondents agreed with the statement. However, 69 (19.1%) of them disagree with the statement.

3.2.3 Knowledge About Loan Repayment

Table 3.4: Analysis on Student's Knowledge towards Educational Loan Repayment

No	Items	Frequency (%)				Mean	Overall Mean
		SD	D	A	SA		
1	The repayment period is 10 years.	13 (36%)	61 (16.9%)	212 (58.7%)	75 (20.8%)	2.97	2.9861
2	The loan is given throughout the year of study in UOP.	13 (3.6%)	41 (11.4%)	219 (60.7%)	88 (24.4%)	3.06	
3	Science program gets higher amount in UOP.	34 (9.4%)	76 (21.1%)	184 (51.0%)	67 (18.6%)	2.79	
4	Repayment after 6 months.	19 (5.3%)	67 (18.6%)	197 (54.6%)	78 (21.6%)	2.93	
5	Have insurance protection.	12 (3.3%)	46 (12.7%)	194 (53.7%)	109 (30.2%)	3.11	

Based on Table 3.4, the overall mean score was 2.9861. According on the mean score scale, the overall mean score was between 2.50 and 3.49, thus, it indicated that the respondents were overall agreed with the items stated in Table 3.4.

The state of 'Have insurance protection.' Had the highest mean (3.11) among the five item stated in table 3.4. 303 (83.9%) out of 361 respondents agreed; 58 (16%) of them disagree with the statement.

Meanwhile, the statement of 'Science program gets higher amount in UOP.' Had the lowest mean (2.79) compared to the other items. 251 (69.6%) out of 361 respondents agreed; 110(30.5%) of them disagreed with the statement.

3.2.4 Attitude Towards Loan Repayment

Table 3.5: Analysis on Student's Attitude towards Educational Loan Repayment

No	Items	Frequency (%)				Mean	Overall Mean
		SD	D	A	SA		
1	Not easy to repay the loan.	13 (3.6%)	40 (11.1%)	178 (49.3%)	130 (36.0%)	3.18	3.1690
2	Repayment can help other students.	8 (2.2%)	54 (15.0%)	188 (52.1%)	111 (30.7%)	3.11	
3	Repayment is my obligation.	5 (1.4%)	31 (8.6%)	213 (59.0%)	112 (31.0%)	3.20	
4	There are legal penalties for non-repayment.	9 (2.5%)	40 (11.1%)	196 (53.7%)	136 (32.7%)	3.17	
5	I have to put an effort to make repayment	3 (0.8%)	26 (7.2%)	196 (54.3%)	136 (37.7%)	3.29	

Based on table 3.5, the overall mean score (3.1690) was between 2.50 and 3.49, which means that the respondents were overall agreed with the items state in Table 4.8.

The statement of 'I have to put an effort to make repayment.' Had the highest mean (3.29) among the five items stated in table 3.5. 332 (92%) out of 361 respondents agreed; 29 (8%) disagree with the statement.

On the contrary, the statement of 'Repayment can help other students.' Had the lowest mean (3.11) compared to the other items. 299 (82.8%) out of 361 respondents agreed; 62 (17.2%) of them disagreed with the statement.

3.2.5 Parental Influence

Table 3.6: Analysis on Student's Attitude towards Educational Loan Repayment

No	Items	Frequency (%)				Mean	Overall Mean
		SD	D	A	SA		
1	My parents advise me after I graduate to find any job to pay the loan first.	10 (2.8%)	43 (11.9%)	178 (49.3%)	130 (36.0%)	3.19	3.1690
2	My parents advise me to save from the PTPTN loan while a student, so that I can make payments immediately after I graduate.	8 (2.2%)	53 (14.7%)	199 (55.1%)	101 (28.0%)	3.09	
3	My parents' experiences with any loan influence me to make repayment after I graduate.	7 (1.9%)	44 (12.2%)	205 (56.8%)	105 (29.1%)	3.13	
4	My parents reminded me of the importance of making loan repayment after I graduate.	7 (1.9%)	34 (9.4%)	207 (57.3%)	113 (31.3%)	3.18	
5	My parents as guarantors for this loan remind me to pay back the loan after graduate to avoid burden to them in the future.	12 (3.3%)	29 (8.0%)	188 (52.1%)	132 (36.6%)	3.22	

Based on table 3.6, the overall mean score (3.1690) was between 2.50 and 3.49, which means that the respondents were overall agreed with the items state in Table 3.6.

The fifth item 'My parents as guarantors for this loan remind me to pay back the loan after graduate to avoid burden to them in the future.' Had the highest mean (3.22) among the others. 320 (88.7%) out of 361 respondents agreed; 41 (11.3%) of them disagree with the statement.

In contrast, the second statement (My parents advise me to save from the PTPTN loan while a student, so that I can make payments immediately after I graduate.) had the lowest mean (3.09) compared to the other items. 300 (83.1%) of the respondents agreed; 61 (16.9%) of them disagreed with the statement.

3.3 SUMMARY

This chapter presented the quantitative results and findings, which obtained from the analysed questionnaire by using SPSS Version 22.0, in the form table. The data were presented by percentage, mean and frequency. Based on the mean scores of the dependent variable (DV) and the independent variable (IV), the majority of the respondents agreed with the items stated in the questionnaire.

4. CONCLUSIONS

In conclusion, this research has proposed the aspects that may affect the students' awareness towards educational loan repayment and the findings were also supported by several previous study findings. It is very much hoped that the findings and recommendations put forward in this study will help the Malaysian government and PTPTN Corporation to understand the key reasons behind loan default, which involves students' awareness and its factors and to thereby take corrective actions. However, certain limitations exist in this study; thus, future research on this issue should be carried out in an attempt to further complement this study.

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THEME 4 :

CURRICULUM AND INSTRUCTION

AN INTEGRATED CURRICULUM APPROACH TO DEVELOP INDUSTRY-READY CIVIL ENGINEERING TECHNOLOGY GRADUATES OF THE 21ST CENTURY

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ABSTRACT

This paper presents the experiences in designing an integrated curriculum for the Bachelor in Civil Engineering Technology (BCT) programme offered in Politeknik Ungku Omar by adapting the innovative engineering education framework of Conceive-Design-Implement-Operate (CDIO) real-world systems and products to produce a new generation of engineering technologists. In particular, the curriculum was designed using CDIO Standard 3 – Integrated Curriculum and CDIO Standard 7 - Integrated Learning Experiences and the focus was on providing integrated learning experiences for students to take an active role in their learning. This paper also presents the experiences in developing a 40-week structured on-the-job or Work-based Learning (WBL) programme with partnership from the nation's key-industry players in civil engineering and construction sector which aims to provide a real-life work environment and facilitate structured and experiential learning for Year 4 students before they graduate and join the work force. The paper concludes with an evaluation of the efficacy of the integrated curriculum measured through the feedback received from the industry partners on students' performance in the WBL programme and the graduate employment rate. Graduate employment has improved significantly and the industries recognise that BCT graduates are more industry-ready and confident in facing the challenging construction industry. However, through interaction with recent graduates and industry partners, there are still gaps in BCT graduates' skill sets and measures to address the gaps are discussed.

Keywords: CDIO, Civil Engineering Technology, integrated curriculum, work-based learning, experiential learning, integrated learning experiences

1. INTRODUCTION

The Construction Industry Transformation Programme (CITP) 2016-2020 is Malaysia's national agenda to transform the construction industry to be highly productive, environmentally sustainable, with globally competitive players while focused on safety and quality standards [1]. One of the strategic thrust in CITP is 'Productivity'. Productivity is the primary engine of growth towards Malaysia's high-income target in the 11th Malaysia Plan. As a vital sector to the nation's advancement, the construction industry will lead with high productivity levels through efficient adoption of new technologies and modern practices coupled with high-skilled, highly paid workforce. Among the initiatives included in CITP were to accelerate adoption of Industrialised Building Systems (IBS), mechanization and modern practices and to roll out technology advantage across project life-cycle by facilitating Building Information Modelling (BIM) adoption in construction industry via regulations [2].

The civil engineering sub-sector is expected to remain as the driver of the construction sector in Malaysia to spearhead the 11th Malaysia Plan, supported by expansions in high impact infrastructure projects in rail links and transit lines, airports, roads and highways as well as the new planned supply in the affordable homes and industrial segments. The demand for industry-ready workforce is set to grow in the construction sector [3].

In response to this demand, the Bachelor in Civil Engineering Technology (BCT) programme at Politeknik Ungku Omar (PUO) offered a revised curriculum in 2015 focusing on new technologies and modern practices namely Information Technology (IT) Construction via Building Information Modelling (BIM), risk assessments and quality management in construction sector integrated with personal skills, interpersonal skills of teamwork and communication, and product, process, and system building skills to prepare graduates for the 21st century challenges.

The revised curriculum was developed by adapting the innovative engineering education framework of Conceive-Design-Implement-Operate (CDIO) principles and guidelines [4]. In particular, the curriculum was designed using CDIO Standard 3 – Integrated Curriculum to better reflect the multidisciplinary nature of Civil Engineering Technology and CDIO Standard 7 - Integrated Learning Experiences where the focus was on providing an integrated learning experience for students to take an active role in their learning and discover for themselves the relevance of training to their future career needs.

2. METHODOLOGY

Integrated Curriculum Design

An environmental scan was performed in the current construction industry landscape and workforce needs in Malaysia. This was done by conducting surveys with BCT alumni, and interviews with the countries' leading construction association, Master Builders Association Malaysia (MBAM) and the government agency that regulates the construction industry, Construction Industrial Development Board (CIDB). The outcomes of the environmental scan were summarized as follows:

- Industry via MBAM feedback had indicated that the current BCT curriculum remained relevant to the construction industry for skillsets in the areas of infrastructure planning, designing and constructing. However, skillsets to support latest technology in IT Construction, risk assessments and quality management as well as personal and interpersonal skills could be further enhanced into the curriculum.
- Information gathered from interviews with CIDB also pointed to the emerging workforce needs on skillsets to support the government push towards higher productivity using IT Construction and environmental sustainability in the construction industry.
- Feedback received from the BCT alumni showed that the current curriculum had equipped them with strong foundation knowledge and skills in infrastructure planning, designing and constructing. However, more employment opportunities were found in the construction sector which required different skillsets in the latest construction technology, operation and maintenance, and quality compliance.

These feedbacks served as the basis for the review and enhancement to the existing BCT curriculum.

Integrated Curriculum

The key strategy in designing the revised curriculum was based on the CDIO Standard 3 – Integrated Curriculum. The curriculum should be designed with mutually supporting disciplinary courses, and with an explicit plan to integrate personal, interpersonal, and product, process, and system building skills [5]. There was also a global trend where employers placed higher emphasis on 21st century skills than technical skills as necessary attributes from their workforce [6]. Therefore, the curricula of higher learning must incorporate effective platforms, such as collaborative project-based learning, for students to develop and demonstrate these attributes [7].

Following the design process recommended by Malmqvist et al. [8], the objective of the revised curriculum is to train a cohort of Civil Engineering Technology graduates to be technically competent, professionally proficient and socially responsible in planning, designing and constructing infrastructures as well as an advantage in acquiring competencies of new technologies and modern practices namely IT Construction via BIM, risk assessment and quality management in the construction sector. This was followed by an iterative process of developing the learning outcomes, aligning the learning outcomes, designing the learning activities and applying the assessment methods of the courses offered in this curriculum in an integrated manner to meet the construction sector's needs.

Figure 1 : The Revised Integrated Curriculum Learning Track of the Bachelor in Civil Engineering Technology Programme (BCT)
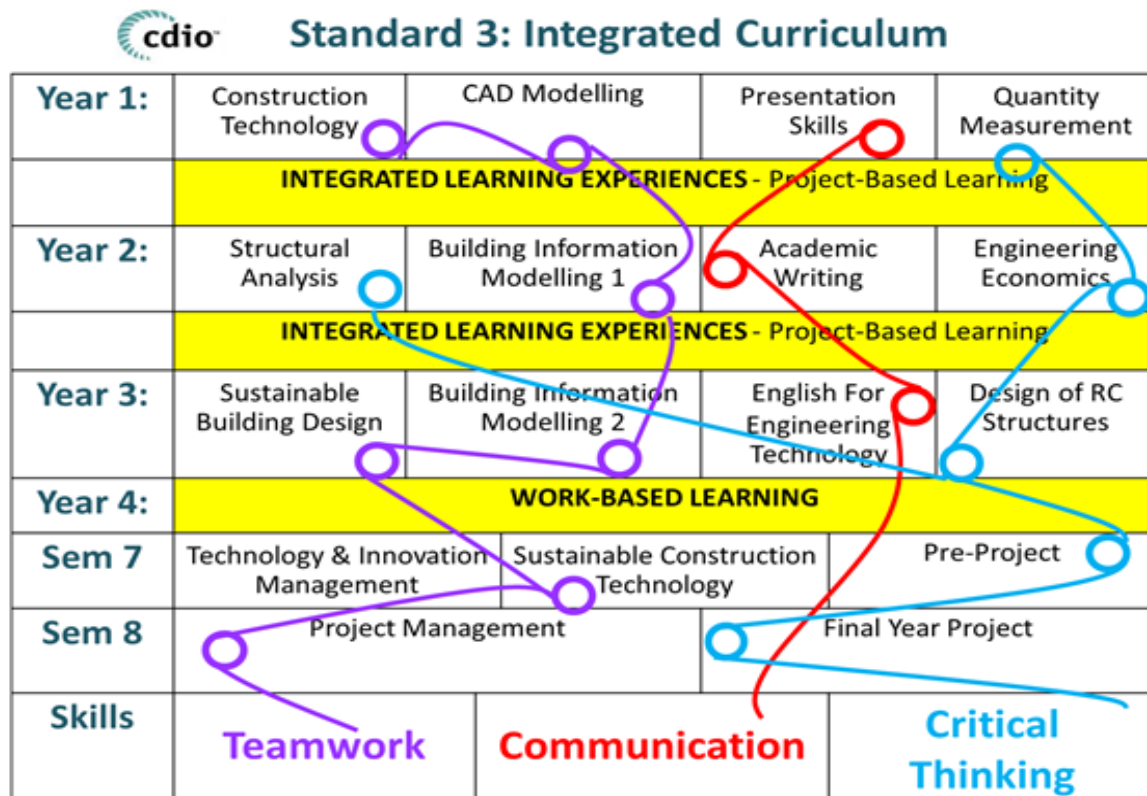
Integrated Learning Experiences

BCT curriculum incorporated the Intra-Programme Integrated Learning Experience (IP-ILE) in its learning track. IP-ILE is a collaborative project-based learning (PBL) integrated into 2 or more technical courses (core-discipline) and a communication course (common core) within the same semester. Students will be assessed on the process and the project outcome by the respective courses, both as teams and as individuals. The aims of IP-ILE were as follows:

i.   To engage, enable and empower students, through the medium of multidisciplinary projects, to undertake their own applied learning journeys.
ii. To deepen and diversify student skills, not only in technical domains and project execution but also the 21st century skills, such as collaboration, communication, critical and creative thinking, and problem solving.
iii. To build students' resilience to persist and perform in challenging situations.
iv. To enhance the students' presentation and public speaking skills.
v.   To inspire and promote a culture of innovation whilst providing a risk-free environment.
vi. To give the students' opportunity to optimize their student learning time (SLT) effectively and be more focused to produce a better outcome for their project.

Work-based Learning

Work-based Learning (WBL) is a learning approach in which polytechnics and industries work together to conduct teaching and learning process that are innovatively designed and implemented in the workplace provided by the industry [9]. WBL for BCT is designed as a structured internship programme with core discipline courses incorporated in the learning track for BCT as shown in Figure 1. This well-structured on-the-job (OJT) programme which was developed together with BCT's industry partners to meet the training needs of an industry sector aims to provide a real-life work environment and facilitate structured and integrated learning experiences for Year 4 BCT students before they graduate and join the workforce. Through the experiential learning nature of WBL, students further deepen their competencies for occupational skills, transferable workplace skills and personal effectiveness skills. With WBL put in place, BCT students were able to carry out internships in several related project management practices within the construction projects and gained valuable experience on risk assessment and quality management in the construction industry.

The BCT programme offered by PUO had collaborated with Master Builders Association Malaysia (MBAM) together with its participating companies and Universiti Malaysia Pahang Holdings (UMPH) with its subsidiaries companies to implement WBL since 2015. Most industries in Malaysia were still unable to distinguish between WBL approach and industrial training. PUO has taken initiatives to raise awareness and promote WBL approach by giving explanation during the industrial meeting with participating companies' representatives. The WBL framework for BCT programme that differentiates it from industrial training is that students will go through the learning process with a number of courses which are required to be taken while working at the industry during their WBL stint. The implementation of the courses will be monitored and assessed by the polytechnic lecturers. In addition, students will also perform work assigned by the industry under the guidance of industry mentors. Training supervision and coordination at the workplace are primarily undertaken by the industry, with the polytechnic's role as supervisors on the students' academic assessment.

The WBL approach for BCT is implemented in the final year of the programme which is during the 7th and 8th semester, covering 20 weeks per semester respectively. Therefore, students will be in the industry for 40 weeks with an equivalent of 1600 hours of OJT. In semester 7, three core discipline courses were offered; BCT7264 - Research Method and Pre-Project, BCT7275 - Technology and Innovation Management and BCT7288 - Sustainable Construction Technology with a total of 17 credit hours. Meanwhile, in semester 8, two core discipline courses offered were BCT8297 - Project Management and BCT83010 - Final Year Project which summed up to 17 credit hours.

Appointed WBL lecturers will conduct WBL observation at industry as scheduled by the BCT WBL coordinator. During the observation, visiting WBL lecturers will collect the appraisal feedback from the industry mentors and the continuous assessments of the WBL courses from the students. After WBL observation, all evaluation marks will be transferred into iPUO students' evaluation system. Another industrial meeting with the industry coordinator and its participating companies will be held at the end of the semester to present the performance of the WBL students as well as getting feedback from the industries on matters pertaining to WBL implementation. The WBL implementation flow chart is as shown in Figure 2.

Figure 2 : BCT WBL Implementation Flow Chart
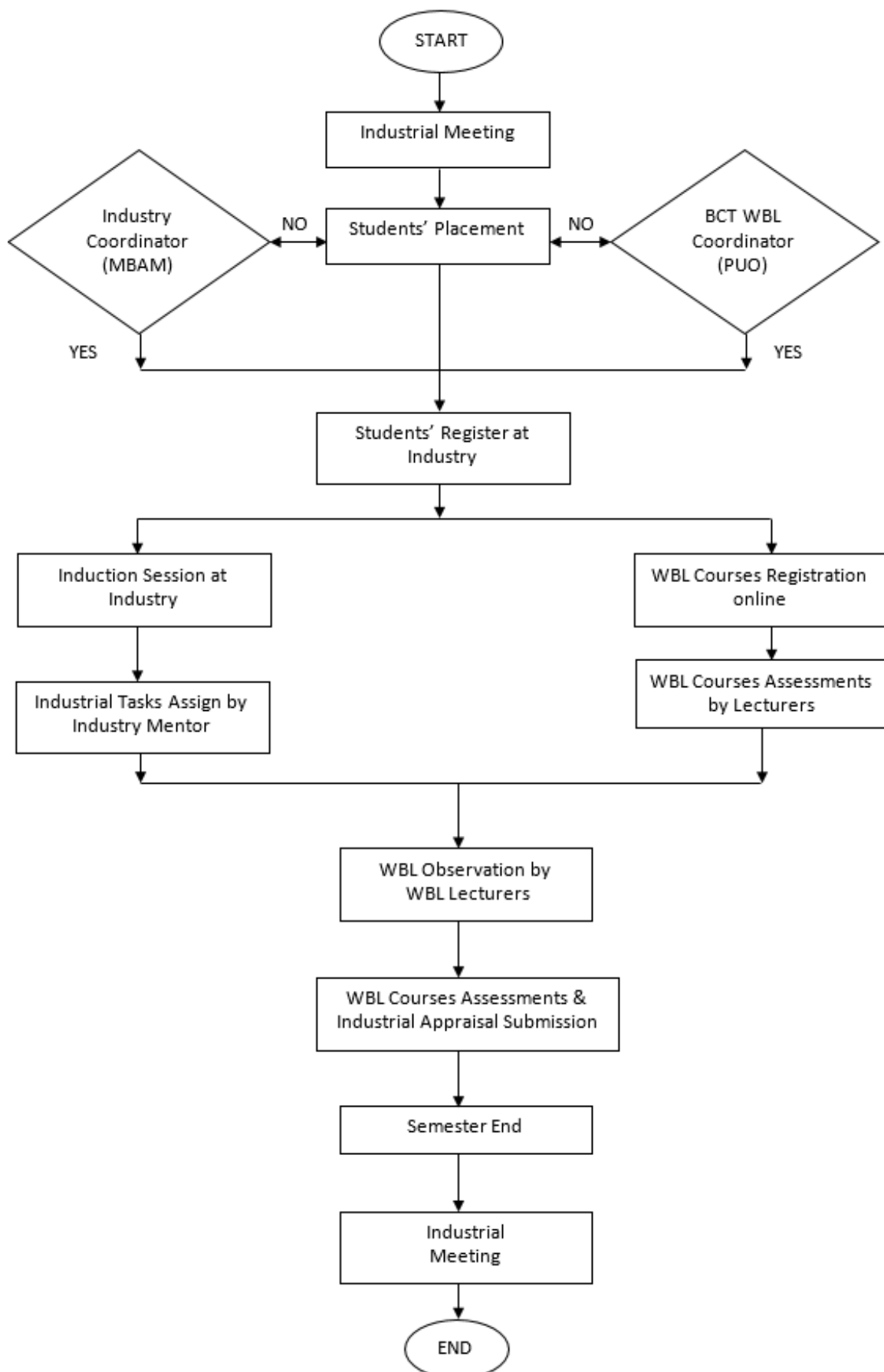
Constructive Alignment

Figure 3 illustrates the constructive alignment which was adapted from Biggs (2003) for the course BCT7264 – Research Method and Pre-Project as an example for the constructive alignment implemented for BCT programme. Students construct meaning through relevant and authentic learning activities at the workplace. Lecturers and industry mentors facilitate the learning of the student by creating learning activities and assessments that are aligned with the learning outcomes to determine what student learn and the educator does [10]. The alignment component refers to what the educators do to create a learning environment that includes learning activities and assessments that the learning outcomes desire.

To assist industry mentors in conducting teaching and learning (T&L) sessions, a team-teaching approach was implemented by two or more lecturers teaching the same course together with the industry mentors [11]. In WBL approach, team-teaching is conducted with the industry mentors handling the practical aspects of the courses whilst the theoretical aspects are led by the polytechnic lecturers. Implementing a team-teaching method involved sharing ideas to convey knowledge. This can shape the value of teamwork among lecturers and industry mentors in delivering T&L. In addition, the T&L could be blended learning method by e-Learning approach. E-Learning refers to the use of information and communication technology to facilitate the process of T&L [12]. The implementation of blended learning method refers to the course having a mix of online mode learning approaches with face-to-face learning mode where 30% - 80% of course content is delivered online whether it supports or replaces teaching face to face [13] [14].

Figure 3 : BCT 7264 Research Method and Pre-Project Constructive Alignment

Learning Activity

Experiential Learning and Reporting

Commence of effective learning time (ELT) of 212 hours for BCT 7264 - Research Method and Pre-Project during WBL where students will experience working with the industry at project site. During WBL students need to update their learning journey in the Logbook.

Timeline	Topic	Points of Reflection
ELT 212 hours	The students will be trained in various aspect of research and analysis, writing thesis and journals	• Students trained in problem solving methodology decision making and data collection process. • The project should be industry based project. • All work progress submitted online through CIDOS to the respective lecturers (supervisors) according to the course outline • Students present to defend the proposal

LO 4

On successful completion of this course student should be able to produce project proposal based on knowledge and analysis in broadly-defined civil engineering problems

Assessment

During Work-based Learning, students must write and update the logbook every day and should send to industry mentor every week for approval. Students should send online every two weeks on their pre-project progress report to the lecturers and approved by Industry Mentor. Students' discussion on the report should reflect the project proposal as part of the work portfolios. Students will be observed by lecturers at project site twice a semester and the Industry Mentor will give the Appraisal marks. Students need to do the presentation to defend their project proposal and submit the Project Proposal to the lecturer.

3. RESULTS AND DISCUSSIONS

The collaboration between PUO and the leading construction industry has had a positive impact on the marketability of BCT graduates. This is because the duration of the WBL period of 40 weeks allowed students to be trained and exposed to the real work environment. Students become more competent and enhanced their personal and inter-personal skills in communication, teamwork, leadership, critical thinking and problem solving. As a result, students are hired by the companies as soon as they completed their WBL. Table 1 shows the list of companies collaborating with Politeknik Ungku Omar in the implementation of WBL.

Table 1 : List of companies collaborating with PUO

No.	Company	Collaboration Since
1	Master Builders Association Malaysia	2015
2	Sunway Construction Sdn Bhd	2015
3	Bina Puri Sdn Bhd	2015
4	TRC Synergy Berhad	2015
5	Putra Perdana Construction Sdn Bhd	2015
6	MITC Engineering Sdn Bhd	2015
7	Premier Construction Sdn Bhd	2015
8	Mudajaya Corporation Berhad	2015
9	Rimbun Prima Sdn Bhd	2015
10	UMP-Ecopest Sdn Bhd	2015
11	UMP Services Sdn Bhd	2015
12	UMP Green Technology Sdn Bhd	2015
13	UMP Innovest Sdn Bhd	2015
14	Syarikat Pembenaan Yeoh Tiong Lay Sdn Bhd	2017
15	Fajarbaru Builder Sdn Bhd	2017
16	Ocned Water Technology Sdn Bhd	2017
17	Pembinaan Mitrajaya Sdn Bhd	2017
18	Trans Elite Group Sdn Bhd	2018
19	Bauer (Malaysia) Sdn Bhd	2018
20	Rosha Dynamic Sdn Bhd	2019

To date, the BCT programme had issued 4 cohorts of graduates where the latest cohort just completed their studies in August 2019 and will not be included in the survey conducted for graduate employability. From the graduate employment survey 'Sistem Kajian Pengesanan Graduan-TVET' (SKPG TVET) that was conducted annually by the Department of Polytechnic and Community College Education (DPCCE) during convocation; the outcomes were summarized as follows:

The first cohort of 28 BCT students graduated in February 2017. A total of 11 graduates were offered jobs by the concessionaire company upon completion of the WBL. While 5 became entrepreneurs, 10 others got jobs in the field within 2 months of graduation and 2 others chose to work outside the field.

The second cohort of 28 BCT students graduated in February 2018. A total of 11 graduates were offered jobs by the concessionaire upon completion of the WBL but 3 declined their offer of employment and worked with other companies where 1 of them worked abroad. Meanwhile 15 others have been employed in the field within 2 months of graduation, 1 went for further studies and 1 was self-employed.

The third cohort of 25 BCT students graduated in August 2018. A total of 13 graduates had been offered jobs by the concessionaire immediately after WBL's completion but 2 had rejected the offer because they chose to work with another company. While 9 others got jobs in the field within 2 months of graduation, 1 chose to work outside of the field, 1 became an entrepreneur, and 1 pursued further studies. Table 2 shows the graduates employability of the 1st Cohort until 3rd Cohort of BCT graduates.

Table 2 : Graduate employability for BCT graduates

Year / Cohort	February 2017 1st Cohort	February 2018 2nd Cohort	August 2018 3rd Cohort
Number of graduates	(27/28)	(27/28)	(25/25)
Graduate Employability	96 %	96 %	100 %

Meanwhile, the company profile that participated with PUO's BCT WBL programme make it possible for the graduates to get hired as they are the nation's key-industry players in civil engineering and construction. The experiential learning integrated within WBL programme enabled BCT graduates to improve significantly and the industries recognised that BCT graduates are more industry-ready and confident in facing the challenging construction industry.

Since the launch of the revised curriculum for the Bachelor in Civil Engineering Technology programme in 2015, a total of 111 BCT students completed this track and the WBL in various job functions in the construction companies. The effectiveness of the integrated curriculum in this track was measured through the feedback received from the industry partners on students' performance in the WBL programme and the graduate employment rate.

Positive comments were received from the industry partners on the students' performance. The industry mentors highlighted that BCT students demonstrated an excellent attitude in approaching the tasks assigned to them and had always given their best efforts to all tasks assigned. The students showed commendable initiatives in contributing new ideas and producing innovative solutions to problems encountered at the work place via their Final Year Project. It was also highlighted that BCT students were competent in performing good project management practice which reflected their experience in conducting risk assessment and quality management in the construction industry.

From the graduate employment survey 'Sistem Kajian Pengesanan Graduan-TVET' (SKPG TVET) that was conducted annually by the Department of Polytechnic and Community College Education (DPCCE) during convocation, the employment rate for students who graduated from the BCT programme has improved to 100 % in 2018 when compared with the employment rate of 96% obtained in 2017.

4. CONCLUSIONS

The revised integrated curriculum was created to meet the needs of the construction industry has effectively met the curriculum review objectives as well as the intended learning outcomes for civil engineering technology students. Graduate employment survey has improved significantly and the industries recognize that BCT graduates are more industry-ready and confident in facing the complex and challenging construction industry.

However, through interaction with recent graduates and industry partners made during the feedback meeting with industries after the WBL programme ended for the latest 4th Cohort, there are still gaps in BCT graduates' skill sets. They expressed that the students should be more resilient as working in the 3D environment of the construction sector – 'Dangerous, Dirty and Difficult' need them to be able to withstand and recover quickly from difficult conditions at the construction project site. To address these gaps, PUO-BCT has planned an outward bound camp for the upcoming cohorts who are going for their WBL to build the students' resilience to persist and perform in challenging situations as well as to realize their full potential by performing the tasks and challenges in the camp's expedition.

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THE MOST INFLUENTIAL FACTOR THAT AFFECT THE PERFORMANCE OF BLENDED LEARNING USAGE AMONGST PASTRY STUDENTS AT KOLEJ KOMUNITI SELAYANG (KKSY)

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ABSTRACT

The growth of the hospitality industry is consequential to the development of formal institutions. Accordingly, the Ministry's overriding aspiration is to create a higher education system that ranks among the world's leading education systems and that enables Malaysia to compete in the global economy. The MEB (HE) builds on the system's achievements to date and proposes major changes in the way the Ministry and system will operate in order to realise the goal. One of the goal is to focus on outcomes over inputs and to actively pursue technologies and innovations that address students' needs and enable greater personalisation of the learning experience. Online learning is a method of delivering educational information via the internet instead of in a physical classroom. There are many different applications for online learning, ranging in scope from simple downloadable content to structured programmes that include assessment and award. Therefore, combination methods of learning are recommended by introducing online video learning as part of the learning process to the students and will help them understand more and increase their performance in the field. The research objectives of this paper is to determine what is the most influential factor that affecting blended learning towards student's performance. To answer this objectives, a quantitative survey with total of 110 sample were distribute among pastry students at Kolej Komuniti Selayang. Data were analysed using the SPSS and the results showed that all hypotheses are supported. Blended learning gives a positive impact on their performance. It hope that the study can contribute to the improvement of teaching and learning process in Kolej Komuniti Selayang as a whole and pastry programme to be specific.

Keywords: Blended Learning, Kolej Komuniti Selayang, Online Learning.

1. INTRODUCTION

This research examines the most influential factor that affects the performance of blended learning usage among pastry students at Kolej Komuniti Selayang (KKSY). The study comprises a mixture of traditional teaching and learning process which comprises of 'chalk and talk' and the usage of internet. The use of blended learning will help to increase their performance in learning process. Pastry programme at KKSY have 5 semesters starting with cake making, cake decorating, bread making, dessert making and lastly industrial attachment. Starting from semester one to semester four, students will be in campus, while during industrial attachment students will be at the industry.

Blended learning was introduced by implementing the use of online videos such as from YouTube to be part of the teaching and learning process. Some relevant and appropriate online videos were selected in respective learning area to be presented to students before they start their practical class every day. Before this, teaching method for pastry modules used the age old method of lecturing using white board and explanation without any other technologies such as video presentation. This is because there are no theoretical assessments focusing the curriculum; it only depends on the lecturer to add on the theoretical aspects in their teaching and learning process.

Blended learning was introduced for pastry students in March 2017. The results of the study comprises data from March 2017 to July 2017. Student's performance was compared between these two semesters during their first learning area based on their examination results.

2.0 RESEARCH OBJECTIVE, QUESTION AND HYPOTHESIS

The following research objective will help to conclude this study's objective:

RO1: To determine the most influential factor affecting blended learning towards student's performance.

Research question:
RQ1: What is the most influential factor affecting blended learning towards student's performance?

Thus, the hypothesis are:
H1: There is a significant relationship between student learning motivation and student's performance.
H2: There is a significant relationship between student learning communication and student's performance.
H3: There is a significant relationship between student learning collaboration and student's performance.

3.0 METHODOLOGY

Since the main objective of this study is to examine the most influential factor that affects the performance of blended learning usage among pastry students at Kolej Komuniti Selayang (KKSY), a quantitative approach is believed to be the most suitable method for the process of data collection. Nevertheless, owing to the substantial amount of time, effort, cost and restriction of large amounts of data to be collected (Salkind, 2003; Marican, 2006), a quantitative approach through survey questionnaire was selected as it is naturally immediate and has the ability to reach more respondents at a relatively low cost (Babbie, 2001; Holmes, Dahan & Ashari, 2005).

This present study also adopted the cross-sectional research design which essentially means that the collection of the data is done only once. Even though the formula of longitudinal research design provides a better capacity for a researcher to gain in-depth view and the changes are apparent over time, it is burdened with serious problems of sampling and biases of the responses.

This study employed quantitative research method and using questionnaires that will be distributed to the pastry students. In addition, the strength in quantitative is in it's the ability to analyse a large group of data and provides significant information (Sekaran, 2003).

The target population for this study will be among pastry students at KKSY. A convenient sampling method will be used as this approach is less expensive and it is the easiest way to conduct the sample (Cooper et al., 2003). Furthermore, the involvement of the selecting sample is readily available to participate in the study. Currently there are 180 students (SPT 1 = 32 students, SPT 2A = 29 students, SPT 2B = 29 students, SPT 3 = 30 students, SPT 4A = 30 students and SPT 4B = 30 students). Based on the calculation by Krejcie and Morgan (1970), 110 samples are expected to be collected from the population of 150 students (30 samples were used for pilot test).

The instruments were adapted from various sources, which have been proven to be reliable and valid. To increase the validity and reliability of the study, researchers chose to conduct a survey questionnaire in the experimental group of students involved. The questionnaires were given after the completion of the process of teaching and learning using blended learning mode. This questionnaire is aimed at reviewing the students' performance. Some of the items in each dimension (independent and dependent variables) in the survey questionnaire will be adapted and modified based on other researcher's works. Modification will be made on the wordings to suit the research objectives.

The table below elicits the dimensions and sources from which they will be adapted. Seven point Likert scale were used in measuring items in all dimensions (learning motivation and learning collaboration and communication) ranging from 1= strongly disagree to 7= strongly agree.

Considering the differences in respondent profiles, questions used will be simple and understandable with the least reading and writing. In other words, the respondents should be able to read an item which will be formulated as clearly as possible with simple wording and language to reduce any possible ambiguities. The questionnaire will also undergo a pilot test before it can be used as the final version of structured questionnaire to be delivered to the respondents. Pilot study is also conducted to ensure that the instrument developed and used for the study measures what are supposed to be measured (Neumann, 2006). With that, the pilot study carried out in two days from 5 to 6 October 2017 among pastry students from semester 1 to semester 4 at Kolej Komuniti Selayang. Approximately thirty (30) students were approached randomly. These students were

excluded from answering the questionnaire after the pilot test. This is in line with Moser and Kalton (1989) who suggested that thirty (30) respondents are considered sufficient for the pilot testing.

4.0 PROBLEM STATEMENT

The traditional teaching 'chalk and talk' teaching method can be boring for some students. Students prefer to have their learning sessions and activities to be more interactive. Students nowadays spend most of their time with gadgets including smart phones and most of them are very information technology savers. They spend more time with their smart phones rather than books. Perhaps by introducing blended learning, which is the combination of traditional and modern teaching and learning process, will improve and increase their performance in learning process.

Blended learning is an instructional approach that substitutes online learning for a portion of the traditional face-to-face classroom time. With few drawbacks it offers many advantages to institutions, faculty, and students. For example, institutions see it as a model that makes efficient use of classroom space; faculty benefit from increased flexibility in their teaching schedules; and students appear to be more satisfied and achieve higher grades than in either fully face-to-face or fully online classes (Cavanagh, 2011; Dziuban, Hartman, Juge, Moskal, & Sorg, 2006). Features such as these spurred a large urban university to embark on a strategic initiative to promote the adoption of blended learning across its campus.

The progression of information technology such as internet surged the growth of online educational programmes which changes the traditional system of education (Sher, 2009). The emergence of technology has become a competitive advantage for higher education institutions as it can provide an alternative approach in providing better quality of learning. Even though Malaysia is still in the infancy stage in implementing teaching and learning using technology, many public universities in Malaysia are transforming themselves to be a fully electronic university in future (Lim, Fadzil,and Mansor, 2011; Raja Maznah, 2004).

This plan includes teaching and learning programme which is conducted via online or web based mode to replace the traditional classroom learning. As a result, public higher education institutions need to be ready for the online delivery learning which supports distance education (Raja Maznah, 2004). The notion of combining face-to-face and online learning, blended learning, have emerged to be a popular method of delivering knowledge in the knowledge era.

5.0 ANALYSIS AND RESULTS

Quantitative data analysis is one way of identifying the findings of the research carried on. Through the analysis, researcher is able to identify the correlation between the variables involved plus it is a requisite to answer the research questions and research objectives. In this chapter, all the data that had been gathered will be analysed. All the data have been analysed using the Statistical Package for Social Science (SPSS) version 21.0. The data was analysed according to the needs of the study such as mean, standard deviation, reliability, correlation analysis and regression. The findings were based on the data collected from pastry students at KKSY. 150 pastry students were approached from semester 1 to semester 4 and only 110 (81.5% response rate) usable questionnaires were available for further analysis. Data were coded in the statistical system (SPSS) version 22.0 and analysed through the system.

Table 5.1 illustrates 9 items on the student learning motivation that focused on student motivation while learning using blended learning. Based on the table shown above, the instrument measures on student learning motivation with minimum mean score range is from 6.33 to 6.60, this indicates all instrument mean score is high. The highest mean score stated in this study are 'Blended learning makes learning more fun to me' (M= 6.60, SD= 0.98) and this is followed by 'Blended learning increases my motives to learn' with score (M= 6.59, SD= 0.97), and 'Blended learning increases self-confidence in doing my assignments' (M= 6.50, SD= 0.97). Additionally, another 6 items scored high in mean and standard deviation and the least mean score is 6.33 with standard deviation at 0.94, that is 'Diversity of learning stimuli in blended learning increases my desire to complete assignments'.

Table 5.2 illustrates 6 items of student communication that have been measured with their mean scores and standard deviation. The instrument measures on student communication with a range from 6.23 to 6.49, indicates all instrument mean score is high. Among the highest mean score stated from the table are 'Blended learning develops my ability in reflective thinking' (M= 6.49, SD= 0.97), 'Blended learning gives me enough opportunities to chat with peers out of lecture time' with a score of (M= 6.45, SD= 1.15), and 'Blended learning helps me to get lecture notes any time' and 'Blended learning develops my skills in generating new ideas' which indicates the same mean score (M= 6.35, SD= 0.98 and 1.14).

Table 5.3 illustrates on the descriptive analysis for student collaboration that has been measured with their mean score and standard deviation on 5 items. From the result the mean scored rank high with the range of 5.97 to 6.11. Among the highest mean score is 'Blended learning develops my skills in searching for knowledge throughout web pages' (M=6.11 SD= 0.97), followed by 'Blended learning gives me more chance to participate effectively with peers in doing e-learning activities' (M=5.97 SD= 0.96).

Additionally, another 3 items also scored high means, 'Blended learning gives me more opportunities to cooperate with peers in making decisions related to learning' (M=5.96 SD= 0.98), 'I always get the support and help from my peers to complete the learning activities' (M=5.95 SD=0.97) and 'Blended learning increase the gap between me and my peers' (M=5.78 SD=0.96).

Table 5.4 indicates all 14 items on students performance have been measured with their mean scores and their standard deviation. According to students' performance, students are required to indicate their level of agreement on the performance items such as blended learning gives them more freedom in choosing an appropriate time to do the assignments and blended learning increases their desire to do homework in electronic way rather than paper.

Among the highest mean score stated in this study are 'Blended learning increases my desire to do homework in electronic way rather than paper.' (M= 6.34, SD= 0.95), followed by 'Blended learning gives me more freedom in choosing an appropriate time to do the assignments' with a score of (M= 6.41 SD= 0.94), and 'Blended learning develops my skills in self-management' at (M= 6.46, SD= 0.93).

Additionally, the item of 'Blended learning develops my typing and editing skills' scored at (M= 6.30 SD= 0.93), 'Blended learning develops my ability for searching new scientific information' scored at (M= 6.39, SD= 0.90), 'Blended learning increases my knowledge in the area of study' scored at (M= 6.48, SD= 0.86), 'Blended learning helps me to find methods to connect theoretical knowledge to real life situations' scored at (M= 6.32, SD= 0.85) and 'Blended learning increases my ability to participate effectively' scored at (M= 6.27, SD= 0.84).

Table 5.5 showed the Cronbach's Alpha coefficient score for each dimension. Cronbach's Alpha for each dimension indicates that all measures had a high reliability score ranging between .948 and .872 (Namkung & Jang, 2007; Kattara, Wahebba & El-Said, 2008; Barber, Goodman & Goh, 2011).

From the analysis, the independent variable for elements of blended learning indicates that learning motivation determine to high reliability with the score (α = .948) followed by student collaboration (α = .896) and student communication (α = .872) respectively. Meanwhile, dependent variable of students' performance with the Cronbach's Alpha scored at α = .905. According to Hair et. Al, (2007), the data gathered can be measured by referring to table 5.6 given below. Somehow, there was also a suggestion from Pallant (2001) that Cohen (1988) measurement in table 5.7 was more practical. The difference between both measurements was how the measures have been separated. As shown below, the Hair's table had been divided into five stages of relationship. However, the Cohen's had only 3 divisions of measures. The results have been compared between both measurements according to the hypotheses that had been developed from the study.

Table 5.8 shown above indicates a result from the relationship of independent variable (Factors Affecting Blended Learning) with the sub dimension of student learning motivation, student communication and student collaboration towards dependent variable of student's performance.

From the Pearson correlation (r) value, all variables indicate for a strong relationship towards students' performance. Student learning motivation achievement rank as the first variable that has a strong relationship which indicate for (r value= .814, p< .01), followed by student communication (r= .799, p< .01), and the least ranked is student collaboration with (r value = .726, p< .01). From the result, it shows that student who experienced blended learning particularly satisfied with the student learning motivation, student communication and student collaboration while learning using blended learning.

Based on result in Table 5.9 the multiple regression of the student's performance of blended learning on pastry student's performance at KKSY, student learning motivation indicates for (β= 0.307, P=<0.05), student collaboration (β= -0.46, P=<0.05) student communication (β= 0.177, P=<0.05). Therefore it is notified that all the variables have a significant relationship with students' performance. Hence, this study is parallel with the first hypothesis that is: There is a significant relationship between student learning motivation and students' performance.

6.0 CONCLUSION

The most influential factor that affects the performance of blended learning usage among pastry students at Kolej Komuniti Selayang (KKSY). It is probably due to the fact that students these days are searching for diversity in learning process and as well as increased their learning performance and learning motivation. Therefore, it is important for KKSY to improve the quality of teaching method with the implementation of blended learning to other subjects and programmes, align with the 21st century classroom.

This study will benefit both academicians and students. For KKSY, which offers seven courses, it has the opportunity to expand the usage of blended learning to other subjects and courses. Furthermore, blended learning is the new method of teaching and learning process. For the academicians, this study will be useful in providing valuable information in the teaching and learning for other subjects and module at other institutions.

Accordingly, the Ministry's overriding aspiration is to create a higher education system that ranks among the world's leading education systems and that enables Malaysia to compete in the global economy. The MEB (HE) builds on the system's achievements to date and proposes major changes in the way the Ministry and system will operate in order to realise the goal.

For others, this study would provide significantly to the Ministry of Education in Malaysia, higher education institutions, academics, community and nation as a whole because students are our future leaders. Therefore, they need to be well exposed on the importance of blended learning as one of the new approaches in learning. For education institutions and academics blended learning serves as an alternative to learning from the traditional perspective. Blended learning can enhance the quality of learning by attracting more students and give a better platform and exposure for them. The results of this study suggests additional directions for future research.

The community college is a really exceptional component of Malaysia's higher education. It provides a flexible and adaptive form of higher education made to order to local needs. It helps complex students to have a full range of education and training depending on the demands and needs of society and the workplace. Learning process programmes are open largely to all, because the community college also provides the development and remedial coursework necessary for individuals with the capacities, but not the formal education, which is a prerequisite for entry into this education.

The success of achieving Vision 2020 for the country will significantly depend upon the country's capacity to face new challenges. Greater collaborative measures between industry and education and training providers must be undertaken to minimise this differences. In Malaysia, this is obvious through measures initiated by Community Colleges and the industry to work together to ensure that graduates are really employable with complete learning styles that suit them well.

The study also found that the most influential factor that affects the performance of blended learning usage is student learning motivation. Community colleges should consider educators' need to evaluate their curriculum to assume that their graduates are introduced to the theories, concepts and technical aspects of their profession. This review and curriculum modification will enable students to meet the expectations of learning style.

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APPENDIXES

Table 5.1: A descriptive analysis for student learning motivation

No	Instrument	N	Mean (M)	Standard Deviation (SD)
1	Blended learning develops my skill in self-regulation.	110	6.39	0.99
2	Blended learning develops positive attitudes to me towards subject matter.	110	6.39	0.97
3	Blended learning increases my interests in follow-up lectures and do more readings.	110	6.39	0.99
4	Blended learning makes learning more fun to me.	110	6.60	0.96
5	Blended learning increases my motives in doing team work.	110	6.45	0.98
6	Diversity of learning stimuli in blended learning increases my desires to complete assignments.	110	6.33	0.94
7	Blended learning gives me more chance to show my skills and abilities in my area of study.	110	6.42	1.06
8	Blended learning increases self-confidence in doing my assignments.	110	6.50	0.97
9	Blended learning increases my motives to learn.	110	6.59	0.97

Table 5.2 : A descriptive analysis for student communication

No	Instrument	N	Mean (M)	Standard Deviation (SD)
1	Blended learning helps me to get lecture notes any time.	110	6.35	0.98
2	Blended learning develops my communicative skills in getting information.	110	6.23	1.04
3	Blended learning provides learning environment for me and my peers based on social interaction.	110	6.30	0.92
4	Blended learning develops my skills in generating new ideas.	110	6.35	1.14
5	Blended learning gives me enough opportunities to chat with peers out of lecture time.	110	6.45	1.15
6	Blended learning develops my ability in reflective thinking.	110	6.49	0.97

Table 5.3 : A descriptive analysis for student collaboration

No	Instrument	N	Mean (M)	Standard Deviation (SD)
1	Blended learning develops my skills in searching for knowledge throughout web pages.	110	6.11	0.97
2	Blended learning gives me more chance to participate effectively with peers in doing e-learning activities.	110	5.97	0.96
3	Blended learning gives me more opportunities to cooperate with peers in making decisions related to learning.	110	5.96	0.98
4	Blended learning increase the gap between me and my peers.	110	5.78	0.96
5	I always get the support and help from my peers to complete the learning activities.	110	5.95	0.97

Table 5.4 : A descriptive analysis for student's performance

No	Instrument	N	Mean (M)	Standard Deviation (SD)
1	Blended learning gives me more freedom in choosing an appropriate time to do the assignments.	110	6.41	0.94
2	Blended learning develops my skills in self-management.	110	6.46	0.93
3	Blended learning develops my ability for searching new scientific information.	110	6.39	0.90
4	Blended learning develops my typing and editing skills.	110	6.30	0.93
5	Blended learning increases my desire to do homework in electronic way rather than paper.	110	6.34	0.95
6	Blended learning increases my knowledge in the area of study.	110	6.48	0.86
7	Blended learning increases my ability to participate effectively.	110	6.27	0.84
8	Blended learning provides me with more opportunities for participating and exchanging ideas and information with peers.	110	6.38	0.82
9	Blended learning provides a learning environment which helps me to generate and develop new ideas.	110	6.45	0.80
10	Blended learning meets my learning needs.	110	6.32	0.83
11	Blended learning develops my ability in problems-solving skills.	110	6.27	0.81
12	Blended learning teaches me patience and endurance when doing assignments.	110	6.30	0.84
13	Blended learning helps me to find methods to connect theoretical knowledge to real life situations.	110	6.32	0.85
14	Blended learning develops my ability to understand the relationship between my specialization and other (interdisciplinary science).	110	6.40	0.83

Table 5.5: Cronbach's Alpha Analysis

Variables	Items	Cronbach's Alpha Coefficient, (α)
Independent Variable		
Student Learning Motivation	9	0.948
Student Communication	6	0.872
Student Collaboration	5	0.896
Dependant Variable		
Student's Performance	14	0.905

Table 5.6 : Rules of Thumb on Correlation Coefficient Size

Coefficient Range	Strength of Association
± 0.91 - ± 1.00	Very Strong
± 0.71 - ± 0.90	High
± 0.41 - ± 0.70	Moderate
± 0.21 - ± 0.40	Small But Definite Relationship
± 0.01 - ± 0.20	Slight, Almost Negligible.
*Assumes correlation coefficient is statistically significant	

Table 5.7 : Pearson Correlation Value by Cohen (1988)

r = .10 to .29 or -.10 to -.29	Small
r = .30 to .49 or -.30 to -.49	Medium
r = .50 to 1.0 or -.50 to -1.0	Large
*Assumes correlation coefficient is statistically significant	

Table 5.8 : Pearson Correlation for Student's Performance

Independent Variable(Factors Affecting Blended Learning)	Dependent Variable (Student's Performance)
Student learning motivation	.814**(Strong)
Student communication	.799**(Strong)
Student collaboration	.726**(Strong)

a. Predictors: (Constant), student learning motivation, student communication, student collaboration
b. Dependent Variable: Student's Performance
c. ** Correlation is significant at the 0.01 level (2-tailed).
Table 5.8: Correlation coefficient analysis all Independent Variable toward Dependent Variable

EDUCATORS' READINESS IN IMPLEMENTING THE 4CS OF 21ST CENTURY LEARNING: STUDIES AMONG EDUCATORS OF 7 COMMUNITY COLLEGE IN SARAWAK

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ABSTRACT

The most effective way to prepare students for the workforce environment is to implement what is already known as effective learning and teaching, generally named as the 21st century learning. Acknowledge Technical and Vocational Education and Training (TVET), teaching knowledge and skills for the world of work are relatable. Unfortunately, there is no guidance in the syllabus on how to implement the 21st century learning for the educators to follow. Therefore, the aim of this research is to identify the readiness in implementing the 4cs of 21st Century learning among the educators of 7 Community Colleges in Sarawak including; (Kuching Community College, Santubong Community College, Mas Gading Community College, Sarikei Community College, Betong Community College, Sibu Community College and Miri Community College). The study is a quantitative research and was conducted by using questionnaires as research instruments. The questionnaire was adapted from Ravitz (2014) which was designed to assess the teachers' readiness in studies of 21st century teaching and learning. The data were analysed using the SPSS version 21.0 to determine average mean score of 4 main variables found in the 21st century learning, namely Communication, Critical Thinking, Collaboration and Creativity. Through this study, we hope that action should be taken in order to upgrade the educators understanding and knowledge of teaching the 21st century learning skill.

Keywords: 21st Century Learning, 4C's, TVET, Educators, Community College

1. INTRODUCTION

It is believed through TVET that Malaysia can achieved a desire to become an industrialized nation by producing more high skilled workers to match up the nation economic growth (Minghat & Yasin, 2010). Malaysian Community colleges therefore are among the premier higher education TVET providers that possess techniques and hands-on skills education. TVET education encourages students to be more enterprising and this involves implementing the 21st Century learning to generate greater competencies, creative and innovative students.

The call for 21st-century learning is relevant nowadays where yesterday's focus on memorization learning would not prepare students for an information saturated complex world (Haider & Zargham, 2011). Basically, 21st Century Learning is a method in preparing todays digital students the skills they need in order to face the fast-changing new world. The days of spoon feeding have ended now and knowledge should be delivered effectively through varieties of techniques such as mind mapping, team collaboration discussion, role play, problem solving activities and any other pupil-centred learning activities required (Azmi & Nurzatulshima, 2017). Therefore, the 21st century educators need to serve as a guidance and be more forward thinking with the world outside of the education system. A study conducted by Brown , Thomas and Bosselman (2015), stated that the ability to think critically and creatively, communication and collaboration skills are needed in order to set students to be well accustomed to the industry that they will be joining after they completed their studies.

Teaching 21st century learning method must be aligned with the expected learning outcomes of TVET training. The educators' perception towards 21st century learning should be nourished with critical and innovative thinking besides implementing the creativity while collaborating with each other to solve their job scopes problem (Osman & Basar, 2016). It was said that some of the TVET graduates are so passive and have been reported to have lack problem solving skills by their employers (Zaliza, Mohd & Khamis, 2015). This indicate that there is a tendency in certain areas, some educators don't even acknowledge the importance 21st Century teaching. A survey conducted by Puteh, Ghazali, Tamyis and Ali (2012) identified that the failure of educators in implementing the 21st Century learning was caused by low educators' exposure in understanding the new curriculum reformation. The methods are more towards 'teachers-centred' that generate students to

be less participating which can lead to low self-esteem and do not help in improving the students' interpersonal skills, creativity skills, collaborations skills and any other skills that can equip them in the future to face the digital working era (Osman & Basar, 2016).

Framework

Figure 1 : 21st Century Skill Framework

Just as the 3R's serve as an umbrella for all core subjects, so the 4C's serve for all other 21st Century Skills. 21st century learning and innovation skills focuses on four different elements, namely communication, critical thinking, collaboration and creativity as cited in the international Innovative Teaching and Learning study by Shear et all, 2010. Critical thinking skill refers to how students look at problem and come out with conclusions based on reasoning and evidence. Communication skill is about sharing thoughts, findings, solutions, ideas and discussions through variety ways. Collaboration skills refer to students can work effectively with different group of people in different cultures. While creativity and innovation skills refer to students' ability to produce new and unique ideas from different perspectives not restricted to rules and norms.

Problem statement

Educators of 21st century have to take in account to self-equip with various skills and knowledge in order to produce a more prepared student to meet the working era of the future. Educators should change their teaching practice from traditional method oriented to pupil centred creative teaching that focus on the 4Cs' of the 21st century education (Osman & Basar, 2016). Educators must not only be knowledgeable about the content of their lesson plan, but also content of various skills in order to sustain a more quality outcome (Yunos, 2015). But how well equip community colleges educators in developing a thinking, creative and innovate skills based on the 4Cs workforce is still a question mark. Or do they even know the existence of 21st century education system?

Research Objectives

The objective of this study is to identify the level of the educators' readiness in implementing 21st century learning and to determine whether there is significant relationship between teaching experience and level of understanding related to 21st century learning. Based on the objectives above, the research question of this study are:
  i.   What are the level of the educators' readiness in implementing 21st century teaching and learning?
  ii.   Are there any significant relationship between teaching experience period and the readiness of implementing the 21st century teaching and learning among the educators?

Methodology

This is a quantitative research. The sample size of this research are 120 lecturers, who responded to the questionnaire. The questionnaire consists of 2 parts, part A and part B. Part A is to identify the respondents' demography, consists of gender, age, academy level and teaching experience. Part B consisted of 24 questions and is constructed with a 5-point scale agreement. The questionnaire used was developed by Ravitz (2014) with validation approved (std. alpha >.90, inter-item correlations >.58).

Findings

Table 1 : Respondent Profile

VARIABLES		F	P (%)
COMMUNITY COLLEGE	KUCHING	23	24.5
	SANTUBONG	12	12.8
	MAS GADING	20	21.3
	BETONG	4	4.3
	SARIKEI	21	22.3
	SIBU BRANCH	2	2.1
	MIRI	12	12.8
SEX	MALE	52	55.3
	FEMALE	42	44.7
AGE	BELOW 25	5	5.3
	25 - 34	48	51.1
	35 - 44	41	43.6
ACADEMIC LEVEL	DIPLOMA	14	14.9
	1ST DEGREE	66	70.2
	MASTER	14	14.9
TEACHING EXPERIENCE	1 – 5 YEARS	37	39.4
	6 - 10 YEARS	22	23.4
	11-15 YEARS	33	35.1
		2	2.1

Based on table 1, respondents are consisting of 8 different community colleges in Sarawak, namely Kuching Community College, Santubong Community College, Mas Gading Community College, Betong Community College, Sarikei Community College, Sibu Branch Community College and Miri Community College. There are 52 (55.3%) male educators and 42 (44.7%) female educators. The respondents come from 3 categories of academic level where 14 (14.9%) are diploma holders, 66 (70.2%) of the respondents study to 1st degree level, and 14 (14.9%) of the respondents study to master's degree level. As for the teaching experience, 37 (39.4%) of the respondents have been teaching for 1-5 years, 22 (23.4%) of the respondents have been teaching for 6-10 years, 33 (35.1%) have been teaching for 11-15 years while 2 (2.1%) have been teaching for 16 – 20 years.

Analysis of the educators' readiness in implementing the 4C's elements analysed and interpreted through table 2 below.

Table 2: Mean score of the 4C's

VARIABLES	MEAN	SD	INTERPRETATION
Critical thinking	2.30	1.29	LOW
Communication	3.16	0.90	AVERAGE
Collaboration	3.48	1.30	AVERAGE
Creativity and Innovation	2.28	1.32	LOW

Score : 0.00 -2.49 = Low; 2.50 -3.49 = Average; 3.50-5.00 = High

Table 2 shows the mean score of the 4C's and standard deviation value for each item. The findings show educators' readiness in implementing critical thinking in teaching is low, (M = 2.30, SD = 1.29). In implementing creativity and Innovation teaching, respondents also show a low level of agreements related to ability in evaluating 21st century skills among the pupils (M = 2.28, SD = 1.32). However, there are different agreements levels among respondent related to involving pupils in the activities that foster 4cs skills in 21st century learning. Respondents shows average agreement in fostering two of the 21st century learning skills where respondents implemented learning activity that fostering communication, (M = 3.16, SD = 0.90) and collaboration with M = 2.28 and SD = 1.32.

Table 3 : Result of Pearson Correlation (r) between Teaching Experience and mean score of the 4Cs elements

TEACHING EXPERAINCE		
The 4Cs Elements	Pearson Correlation Sis. (2 tailed) N	-.167 .107 94

Table 3 shows there is no significant correlation between Teaching Experience and the mean score of the 4Cs elements, (r = 0.167, p <0.107).

Discussions

With regards to critical thinking skills and creativity innovation skills, the low mean finding indicates that the educators were aware of their low expertise in understanding the visions of new curriculum reformation. This is in line with the claim of previous study indicating that educators face the most challenges in fostering innovation and critical thinking compared to other skills (Osman and Basar, 2016). Frankly, the critical thinking and creativity innovation skills were not being taught nor mentioned in the syllabus (Puteh, Ghazali, Tamyis and Ali, 2012). In addition, there were no fixed opinions in teaching these skills as per the educator's opinion that the students are only in their certificate level.

Considering the mean value of teaching communication skills and collaboration skills, educators are well prepared to teach these two elements but is still at the average level. Generally, students were asked to do a group presentation minimum once every semester. However, students were only active when there are preparation for passing examination. This finding is similar to the findings by Faridah and Mohini (2012) in which educators are more accustomed to evaluating students achievement based on examinations and technical competencies but not really teaching and preparing the students for the real world situations. This shows that, Community College student who have been prepared for group presentation may not know how to react to non-routine situations and are still passive to speak out when facing challenging mirror real life situation.

Correlation test shows that teaching experience does not influence the level of the educators' understanding in implementing 21st century learning. The educators' shows the same teaching pattern despite of their academic level. A research carried out by Azmi and Nurzatulshima (2017) has withdrawn the same result that, educators still under the paradigm of implementing traditional teaching and learning with teacher-oriented strategy till now. They feel that students can learn the 4Cs of the 21st century teaching at a later point of time, maybe when they pursue their studies at their diploma/ degree level or even when they undergo their industrial training the next semester.

CONCLUSIONS

The focus of the community college educators should be on empowering the students rather than focusing on the content. Apparently, most of the educators think that the 4cs elements can be learnt later and they focus more on developing students' technical skills instead. This mind-set must change. Motivating students with grades however wouldn't exposed them to learn how to equip themselves with different skills, tools, knowledge, attitudes and values in the future. As educators, letting students to make mistakes and even failed in particular circumstances is one good example of necessary learning experience. They must then be given further opportunities to consider alternatives and make a better choice.

Previous research showed that, educators still do not have a standardized guideline in their syllabus to teach critical thinking skills, communication skills, collaborations skills and creativity and innovation skills required in implementing the 21st century teaching and learning (Chan, 2011). Hence, educators require more standardized guideline and assessment strategies to teach these generic skills. Therefore, a new module should be designed in each of the teaching syllabus that can be used as a guideline to actively implementing the 21st century learning elements.

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THEME 5 :

SOCIOLOGY OF TVET

FACTORS AFFECTING THE PERFORMANCE OF SMEs' IN FASHION INDUSTRY AT MALAYSIA

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ABSTRACT

The Small and Medium Enterprise (SMEs) sector contributes greatly to the economic growth and SMEs have an important role to play in the development of the country. The purpose of this study is to determine the factors affecting the performance of Small and Medium Enterprise (SMEs) in fashion industry at Malaysia. To achieve this, the study was guided by three objectives which included: to examine the factor of internet skills that affecting the performance of entrepreneur SMEs in Malaysia; to examine the factor access to finance that affecting the performance of entrepreneur in Malaysia and to examine the factor of entrepreneur's characteristics that affecting the performance of entrepreneur in Malaysia. The study adopted a descriptive research design. This study used simple random sampling to sample 300 respondents. The study used a questionnaire in order to collect data. From the findings the study concluded that the internet skills have the most significant affecting on performance of SME's. The study also concluded that the accessing to finance and entrepreneur's characteristic has no significant affecting on performance of SME's. Entrepreneur of SMEs must overcome the difficulties in obtaining finance by improving their credit profile. Malaysia government should help the SMEs to allocate more budgeting on the SMEs especially in training to help entrepreneur to grow, encourage more SMEs in fashion industry by enhancing entrepreneurship activities and reward highly innovation SMEs entrepreneur who successfully transform the business activities.

Keywords: SMEs, Performance of SMEs, Entrepreneurship

1. INTRODUCTION

The Small and Medium Enterprise (SMEs) sector contributes greatly to the economic growth and thus currently recognized and therefore there are high expectations of the Small and Medium Enterprise (SMEs) sector (Mwihaki, 2015). Small and Medium Enterprises (SMEs) have an important role to play in the development of the country. Globally, the application of online business has been promptly gaining acceptance. The level of international acceptance and popularity of online business among women entrepreneur is largely enhanced due to the ability to go beyond international boundaries and enable actions within the virtual marketplace. This enables women entrepreneurs to expand business globally at comparatively low cost.

Consumers are also highly satisfied in availing of goods and services through online business portals from the convenience of their homes or offices. With the help of online businesses entrepreneurs enable to avoid expenses on logistics such as physical spaces, smaller human resources and sometimes lower inventory levels are able to provide an offer lower prices on products and services, contributing towards greater customer satisfaction.

Online business is one of the biggest markets in Malaysia. According to SME Annual Report (2012/13) presented by National SME Development Council, 139 programs worth RM7.1 billion were employed in the year 2012 by government bodies to assist more than 430,000 SMEs. These programs included access to financing 29%, human capital development 22% and market access and innovation and technology adoption 21%. Innovation and technology adoption were considered as the most important determinant of SME performance by the SME master plan and thus were primarily focused in SME Development Programs in 2012.

The fashion industry has a clear opportunity to act differently, pursuing profit and growth while also creating new value for society and therefore for the world economy. It comes with an urgent need to place environmental, social and ethical improvements on management's agenda. In recent decades, the fashion industry has been an engine for global development. The fashion industry has attracted the attention of researchers for many years. The interest in this area has increased mainly due to the growing complexity within this dynamic context. In the fashion industry, the markets undergo rapid changes which require the players to be more flexible and responsive.

As retailers are on the frontier, they are crucially important to the flexibility and responsiveness of the supply chain. Hence, in the fashion industry, the retailing end plays a much more crucial role to sustainability than that in most other industries. Fashion brands with targeted initiatives will be best placed to improve their environmental and social footprint and counteract the rising costs of apparel production. They will pull ahead of their competitors with innovative ways of doing business and efficient production techniques that minimize the use of water, energy, and land as well as hazardous chemicals. By realizing better working conditions and improving workers' safety, they will minimize their operational and reputational risks and create significant value for themselves and the world economy.

Small and Medium Enterprises (SMEs) have an important role to play in the development of the country. A strong SME sector contributes highly to the economy, contributing to the gross domestic product, reducing the level of unemployment, reduction in poverty levels and promotion of entrepreneurship activity (Siti Fatimah etl, 2015).

This study is to determine the factor of internet skills that affect performance of SME in Malaysia. Revolution of modern technology has rapidly emerged and the internet becomes one of the important tools in business environment. The use of technology is vital for business owners today to get updated information and sharpen their strategies in running their businesses. Technology provides greater access of market, networking opportunities and greater capabilities (Wu, 2009). Computerization and office automation using internet have facilitated great advantages to business companies such as high productivity, job freedom, work quality improvement and nurture good responsibility on one's own work.

Women face more high barriers when it comes to initial access, affordability of digital services and use of information and communication technology (ICT). Especially, lower levels of technical and digital literacy skills as well as lower confidence impact women's access to and use of ICT. In general, more women than men report difficulties in using mobile phones or how to use the internet. Women are 1.6 times more likely to report lack of skills as a barrier for internet use. Women also tend to have little formal training in ICT skills compared to men. Mostly, female users develop their skills at home, in the workplace or in trusted local community environments. Another problem is that online content is often not catered to women and thus leave out topics even languages that speak to them.

Next, this study is conducted to determine the factor of access to finance that affect the performance of SMEs to the entrepreneur in Malaysia. SMEs generally face difficulties in obtaining finance with lack of collateral and insufficient documents to support loan application. SMEs are vital for economic growth and development in both industrialized and developing countries because they play a key role in creating new jobs. Financing is necessary to help them set up and expand their operations, develop new products and invest in new staff or production facilities.

Many small businesses start out as an idea from one or two people, who invest their own money and probably turn to family and friends for financial help in return for a share in the business. But if they are successful, there come at times for all developing SMEs when they need new investment to expand or innovate further. That is where they often run into problems because they find it much harder than larger businesses to obtain financing from banks, capital markets or other suppliers of credit (Hasnah etl, 2013).

This study also to determine the factor of entrepreneur's characteristics that affecting the performance of entrepreneur in fashion industry in Malaysia. Many empirical studies have focussed on the relationship between the characteristics of the entrepreneur and the performance of a firm. Five elements which are likely influencing the performance of a firm are age, gender, education, motivation, previous work experience of the owner or manager. On gender of entrepreneur, reported that most SMEs firms owned by men were bound to perform better than those owned by women. This could be attributed to the following factors, limited access to finance, stringent collateral requirements and women's double duties. On the influence of the age of the entrepreneur, the younger entrepreneur has the necessary motivation, energy and commitment to work and is more inclined to take risks as the older entrepreneurs are likely to have reached their initial aspiration (Mwihaki, 2015).

SMEs are characterized by some specific aspects due to their own dimensions and abilities, showing points of strength and contemporarily aspects of weakness. Owners and the managers typically have a good knowledge of the local market and are aware of the clients' demands. The relationships with the clients and the after-sales services are often more intensive in SMEs than in large organizations.

Moreover, the restricted number of managers, executives and experienced figures inside SMEs decreases notably the amount of expenses, as the restricted investment in infrastructures. In SMEs it is possible to

dedicate efforts to niche markets, since it is easier to focus on a category of selected clients and satisfy them with customized products and personalized. For these reasons it is evidently obvious the importance for SMEs to measure and understand their own performances (Taticchi etl, 2008).

Some studies state that the fact that a business owner has a higher level of education seems to stimulate the growth and better performance of the firm, thus having an impact on survival, growth and performance. The converse argument is that SMEs entrepreneurs who have higher level of education generally achieved lower performance rates than those less well educated. Mostly people who run SMEs are usually is lacking in educational background. Hence, they may not well be equipped to carry out managerial routines for their enterprises. Management skills relate to the owner or manager and the enterprise (Mwihaki, 2015). Studies have found SME that is more managerial, sector experience or prior SME experience as owners tend to parallel with greater performance. It reported that the probability of SMEs failure was also found to be related with the owner or manager's work experience prior to business launch and education. The ability of the SMEs entrepreneur to motivate affects the performance of a firm. It makes a distinction between positive and negative motivation (Mwihaki, 2015).

The objectives of this study is to determine the factors affecting the performance of Small and Medium Enterprise (SMEs) in fashion industry at Malaysia. Three hypothesis have been developed for this study, which is given below:
H1: There is relationship between internet skills and performance of SME's.
H2: There is relationship between access to finance and performance of SME's.
H3: There is relationship between entrepreneur characteristic and performance of SME's.

2. METHODOLOGY

Quantitative research method was adopted in this study. Quantitative research is the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect (Jia, 2012). This study outlines the factor affecting the performance of SME's in fashion industry at Selangor. It is appropriate to categorize this research as exploratory research and causal research. Exploratory research is conducted to clarify ambiguous situations or discover ideas that may be potential business opportunities. Conversely, causal research is the seeking to identifying cause-and-effect relationships among variables when the research problem has already been narrowly defined (Jia, 2012).

Population and sampling in this study focusing on perspective of the SMEs at Klang Valley, Selangor which is running an online and offline business. The targeted respondent of the SMEs in Selangor is total about 179, 599 (Economic Census 2016: Profile of SMEs by the Department of Statistics, 2017). With considering information limitation on SMEs of the population, convenience sampling method which is one of the sampling methods that not based on probability has been applied in this study.

Questionnaire technique has been applied in obtaining research data. Basically, the questions in the questionnaire were adopted from previous researchers and modified based upon the necessity to fit into this study (Jia, 2012). Generally, there are four sections in the survey conducted that is section A, B, C and D.

In Section A, it consists of six questions which are closely related to the demographic data that is age, number of employees, business ownership type, work status, income and online platform of the respondents. Section B contains information to determine the factor of internet skills that influence SMEs in Malaysia. Section C contains questionnaires about factor influence of performance of SMEs in terms of access to finance or credit among entrepreneur in fashion industry in Malaysia. Section D contains questionnaires about the factor that influence the performance of SMEs from entrepreneur characteristics factor. The questionnaires was distribute to 300 respondents of SMEs in fashion industry at Klang Valley, Selangor.

3. FINDING AND DISCUSSION

3.1 Descriptive Analysis

Table 1 displays the demographic profiles of respondents which were divided into age, number of employees, types of business ownership, work status, income and online platform of the respondents. There is a total respondent of 300 participated in the survey questionnaire.

Table 1: Summary of Respondents' Demographic

	Response	Percentage (%)
Age group	27-33 years old	28.3
	34-49 years old	27.0
Age group	Between 11-50	42.7
	Less than 10	31.7
Number of employees	Sole-Proprietorships	42.0
	Partnerships	30.3
Year operation the business	Run a business > than 3 years	41.7
	Run a business < than 2 years	27
Monthly income	RM5,000-RM10,000	29.7
	RM1,000-RM5,000	25.7
Online platform	Have online platform	93.0
	No online platform	7.0

3.2 Scale Measurements

For the reliability test, questions for independent variables (internet skills, access to finance and entrepreneur characteristic) and dependent variable (performance of SME entrepreneur) are reliable since each test indicates its value.

Pearson Correlations Test shows all the four independent variables are free from multicollinearity problem as all correlation values are less than 0.9. Pearson correlation test also used to measure the relationship between each individual independent variables and dependent variable. All these four independent variables establish significant relationship with purchase intention as their p-values are less than 0.05. However,

internet skills have positive relationship whereas access to finance and entrepreneurs' characteristics has negative relationship toward performance of SME's in Fashion Industry in Malaysia. Multiple Linear Regressions (MLR) shows that the value of Correlation Coefficient (R value) in 0.281. Independent variable can explain 28.1% of the variation in Dependent variable. However, it is still 71.9% unexplained in this study.

In order to validate the research objectives and hypotheses the major findings are refer to Table 2.

Table 1: Summary of Respondents' Demographic

No.	Hypothesis	Finding
1	H1: There is relationship between internet skills and performance of SMEs	Accepted
2	H2: There is relationship between access to finance and performance of SMEs	Rejected
3	H3: There is relationship between entrepreneur characteristic and performance of SMEs	Rejected

H_1 indicates that internet skills have the most significant affecting on performance of SME's. Result shows p-value is 0.000 and β-value is 0.697 which expressed that H1 is supported.
H_2 indicates that access to finance has no significant affecting on performance of SME's. Result shows P-value is 0.595 and β-value is 0.032 which expressed that H2 is not supported.
H_3 indicates that entrepreneur characteristic has also no significant affecting performance of SME's. Result shows P-value is 0.270 and β-value is 0.089 which expressed that H3 is not supported.

4. CONCLUSIONS

In this research, business performance was influences by the three factors. The results show from the data collected is valuable for helping the SMEs in Malaysia understand what are the factors that will influence the business performance and try improving on these factors. In order to increase the business performance, the SMEs in fashion industry Malaysia should continue to improve on their internet skill in order to make customer knew about their product and services in fashion industry and it would able to help the business continue to grow.

In this finding, most of the respondents gain profit for monthly income only RM1,000-RM5,000 and the business operation age is more than three years. And this is the time to test whether the business can be survived in the cruel world, and if they survived, they can continue to grow and become larger company in coming future. To satisfy the customers, SME's should continue to have employee's development and improving on their internet skill such as provide better learning program on internet skill and continue to train employees, it would make sure it will increase in internet skill and improve on business performance.

Internet technology in Malaysia is very advanced. Although the connection to broadband services outside the major cities is still developing, the general technology does not fall behind the international level. For SMEs entrepreneur, they must embrace the technology and utilize government initiative or platform towards greater access of market networking opportunities and greater capabilities. Moving from this point, SMEs entrepreneur must overcome the difficulties in obtaining finance by improving their credit profile.

SME Corporation Malaysia also can develop strategic plan on these factors and help the SMEs in Malaysia enhance the business performance. SME Corp. Malaysia should allocate more budgeting on the SMEs and it would help them to grow, this is because most of the SMEs is lacking funds to make more changes such as on internet skill. SMEs need more fund in order to provide more training for the entrepreneurs or even investing in latest technology in the businesses process and help the organization to act faster to compete with others. The SME Corp. Malaysia should encourage more SMEs in fashion industry to growth and continue to enhance the export activities, not just only focus in few areas but try to diversify into different area and to lower down the risks of being taken by other countries. SME Corp. Malaysia should continue to give more encourage and reward to those SMEs that having the innovation, flexibility and dare to transform the business activities.

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MJII GRADUATE MARKETABILITY: A COMPARATIVE STUDY BETWEEN ELECTRONIC ENGINEERING PROGRAMS

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ABSTRACT

This study is aimed to identify the graduates of Diploma in Electronics Engineering, MARA - Japan Industrial Institute (MJII) with reference to the status of a career obtained by a graduate after graduation. The research instrument used was the questionnaire adopted by the standards supplied by the Ministry of Higher Education against 528 MJII graduates from year 2016 to 2018 which involving five departments program and they are departments of Data Transmission and Network (DKR), Robotic and Automation (DKS), Electronic Measurement and Control (DKC), Microelectronic (DKM) and Embedded System (DKE). From the analysis of the study, the employment status can be subdivided into four categories and they are employed, entrepreneurship, pursuing human resource strengthening programs and unemployed. The percentage of MJII graduates' marketability increased by 12% in 2018 (96%) compared to 2016 (84%). From the survey analysis, the graduates from the department program of Electronic Measurement & Control show high marketability compared to other departments program. Graduates also show a tendency to choose entrepreneurship as their career as the statistic shows the increasing of percentage from 5.77% in 2016 to 5.92% in 2018. Overall, MJII graduates' marketability is well regarded due to additional program offered to graduates such as Graduate Employability Training Scheme (GETS) and Industrial Boot Camp (IBC). However, there is room for improvement to ensure that all MJII graduates can compete in the job market as well as create business opportunities and further their studies.

Keywords: Marketability, Employability, Graduate, Soft Skill.

1. INTRODUCTION

Graduates employability has been a great concern of many educational institutions [1]. Employability study is required to know that the relevance and the quality of programs implemented in institutions to meet the needs of the national labour market and supply a semi-skilled workforce in various sectors of the economy and employment [2],[3],[4]. Currently the student's intake does not depend on industry demand, so this study is expected to be an indicator for the student intake quota based on market research. The main objectives of this study were to identify the marketability of MJII graduates in meeting the job market and to evaluate the effectiveness of the diploma program conducted at MJII. The findings will be used to further empowering the MJII Collaboration, Industrial Services and Professional Certification by providing training on the employability skills to MJII graduates that are actually required by the potential employers in addition to the most significant effect of the job performance to reduce the unemployment rate among the graduates of the MJII.

Referring to the National Employment Returns Report 2008 and 2009, Malaysia requires a total of 72,000 new jobs annually [5]. A survey done by JobStreet.com [6] discovered a steady increase in job availability in most industries since 2009. Most of the Malaysian registered with Jobstreet.com but a significant number of job seekers do not have the required skills and knowledge, and are as such unable to land themselves a job.

HrmASIA reports that graduate from Malaysia's universities every year is 150,000 people, but many of them fail to get a job. This report shows that some 44,000 Malaysian graduates had yet to find work in 2011. This figure represents an increase from 43,000 in 2010 and 41,000 in 2009 [7].

Statistics in 2015 by the Prime Minister's Department show that 161,000 graduates aged between 20 and 24 are still unemployed [8]. The unemployment trend is seemingly more prevalent among graduates from Malaysian public universities [9]. Recent data in 2018 on the Higher Education Ministry's website reveal that the most number of these unemployed graduates were studied arts and social sciences (51.6%), followed by those from technical fields (17.7%), science (17.6%), ICT (7.5%) and education (5.7%). Interestingly, statistics provided by the government show that job seekers armed with certification from community college & TVET Institutions only 1% were unemployed [10].

MJII is one of the Technical and Vocational Education and Training (TVET) institute under Bahagian Kemahiran dan Teknikal (BKT), MARA. Through TVET Malaysia, the government will increase the number of skilled workers to 35 per cent by 2020 as well as increase the quantity and quality of TVET graduates with the aim of producing 225,000 TVET graduates by 2020 so that the agenda of providing skilled workers under the 11th Malaysia Plan (11MP) [11]. Data in 2015 by BKT MARA shown the marketability rate of graduates were employed, further their studies and become entrepreneurs after completing their studies is 81% [12].

Table 1: Employability rate for Institute BKT MARA in 2015 [12].

Employability status	Total of students	Percentage(%)
Employed	2948	51
Further Study	298	25
Entrepreneurship	1408	5
Unemployed	1065	19

2. METHODOLOGY

Tracer Study System also known as Sistem Kajian Pengesanan Graduan TVET (SKPG TVET) is an online survey that has been established by The Ministry of Education Malaysia (MOE). The main purpose of this study was to look at the status of new graduate jobs by the time of their respective convocations, that is, either working, pursuing a degree or still actively looking for a job. Through this system, it will facilitate users to provide information and assist management in the process of data collection and analysis of reports.

Starting in 2013 [13], the implementation of Graduate Tracking Studies has been extended to graduates of training / skills institutions under other ministries / agencies categorized as Technical, and Vocational Education and Training (TVET).The TVET institutions involved include Ministry of Education (KPM), Ministry of Rural Development (KKLW), Ministry of Agriculture (MOA), Ministry of Works (KKR), Ministry of Youth and Sports (KBS) and Ministry of Human Resources (KSM) [14].

The study involved MJII graduates who graduated in 2016, 2017 and 2018. It involved students from five programs namely DKC, DKR, DKS, DKM and DKE. Data were obtained from the online survey from SKPG and the graduates will fill out this online survey based on their graduation and graduation date. Table 2 shows the percentage of respondents of TVET SKPG where the proportion of respondents who participated in this online survey each year exceeded 90%.

Table 2: Data of respondents

Convocation Year	Number of students	Number of Respondents	Percentage of Respondents
2016	172	172	100
2017	199	196	98.49
2018	157	146	92.99

This survey consists of 7 sections which is Section A to G [15]. Section A contains basic and academic background information of the graduates while Section B covers questions about current employment status, whether full-time or part-time, not working or anything. In Section C, the questions asked are about graduate job information such as job status, employment sector, monthly income and so on. For nongraduates, they will need to answer the questions in Section D and Part E specifically for graduates immediately after graduation. Section F consists of graduate feedback on curriculum content, assessment systems, teaching and infrastructure facilities and guidance and the counselling provided in MJII and the last Section G is a confirmation of the information provided.

3. RESULTS AND DISCUSSIONS

3.1 Overall Graduate Employability Rate

The overall graduate marketability rate for MJII in this study shows an increase of 12% from 2016 (84%) to 2018 (96%). This is in line with the efforts to put the student's practical training in line with the programs taken and to collaborate with the electronics and Japanese. Additionally, the success of MJII alumni in entrepreneurship opens up opportunities and paves the way for other students to venture into entrepreneurship as well as introducing entrepreneurship module during their studies [16],[17].

Figure 1 : Overall marketability rate from 2016-2017
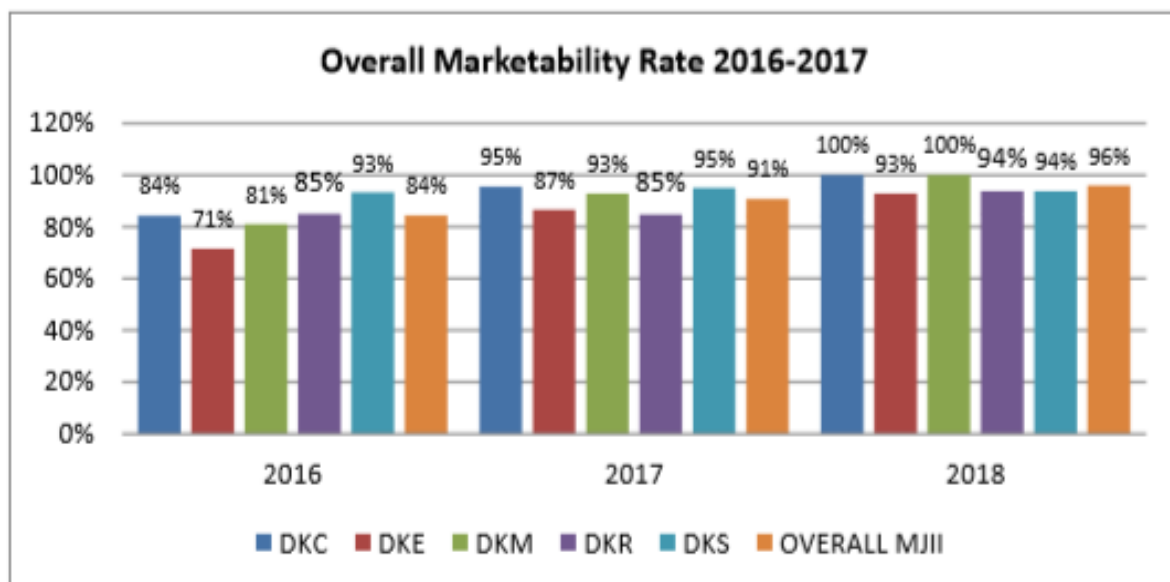
Graduate marketability for each department in MJII is displayed in Fig. 1. From the chart, graduates from Electronic Measurement and Control (DKC) and Microelectronic (DKM) show an outstanding performance with 100% employment rate in 2018. The highest employment rates on 2017 with 95% are from DKC and Robotic and Automation (DKS). DKS also show highest employment rates on 2016 with 93%. Graduates from Embedded System (DKE) and Data Transmission and Network (DKR) also show increasing trend for employment between 2016 until 2018.

The data in Table 3 show that graduation session also play a significant role for three consecutive years. Graduates who finish their studies in Jan-June session show a better percentage in term of marketability status than the Jul-Dec session as they are influenced by the length of time between graduates and convocation sessions to penetrate the job market or continue their studies.

Table 3. Graduate Marketability Status By Graduation Session

GRADUATE MARKETABILITY	JJ 2016	Percentage (%)	JD 2016	Percentage (%)	JJ 2017	Percentage (%)	JD 2017	Percentage (%)	JJ 2018	Percentage (%)	JD 2018	Percentage (%)
Working	60	60%	43	60%	73	62%	47	60%	53	56%	38	75%
Enterpreneur	5	5%	4	6%	5	3%	5	6%	7	7%	2	4%
Further Study	21	21%	9	13%	31	16%	12	15%	35	37%	5	10%
Waiting For job Placement	3	3%		0%	1	1%	2	3%		0%		0%
Skills Upgrading		0%		0%	2	1%		0%	0	0%	6	12%
Unemployed	11	11%	16	22%	6	3%	12	15%		0%	6	12%
Total	100	100%	72	100%	118	60%	78	100%	95	100%	51	100%

3.2 MJII's Graduate Salaries

The data in Fig 2 found that the highest percentage of graduate income is RM1001-RM1500 which is between 38% -46% for the years 2016 - 2018. This trend is in line with the annual report published by the country's central bank 27th of March 2019 which stated that a fresh graduate with a diploma earned a real salary of RM1,376 in 2018 [18].

Figure 2 : MJII's Graduate Salaries Between 2016-2018
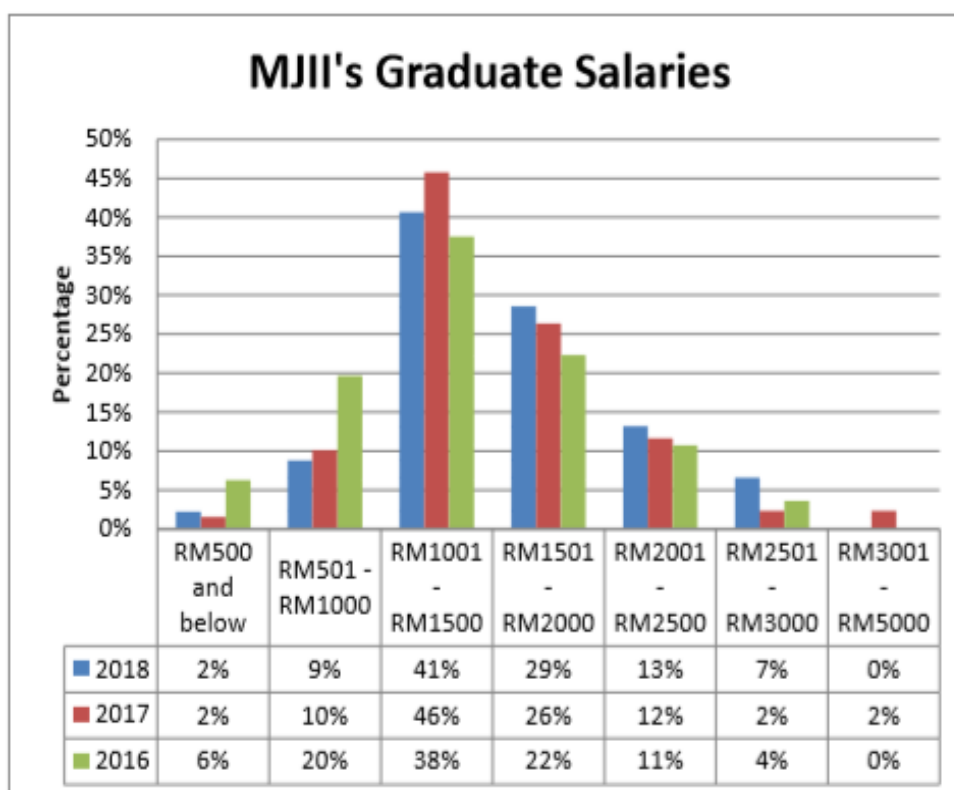
Figure 3 : MJII's Graduate with Income Higher than Average (above RM1500)

MJII's Graduates Salaries by Department (above RM1500)

	DKC	DKE	DKM	DKR	DKS
■ 2016	3	13	9	9	7
■ 2017	13	11	6	14	11
■ 2018	9	7	9	10	9
■ Percentage	18%	22%	17%	24%	19%
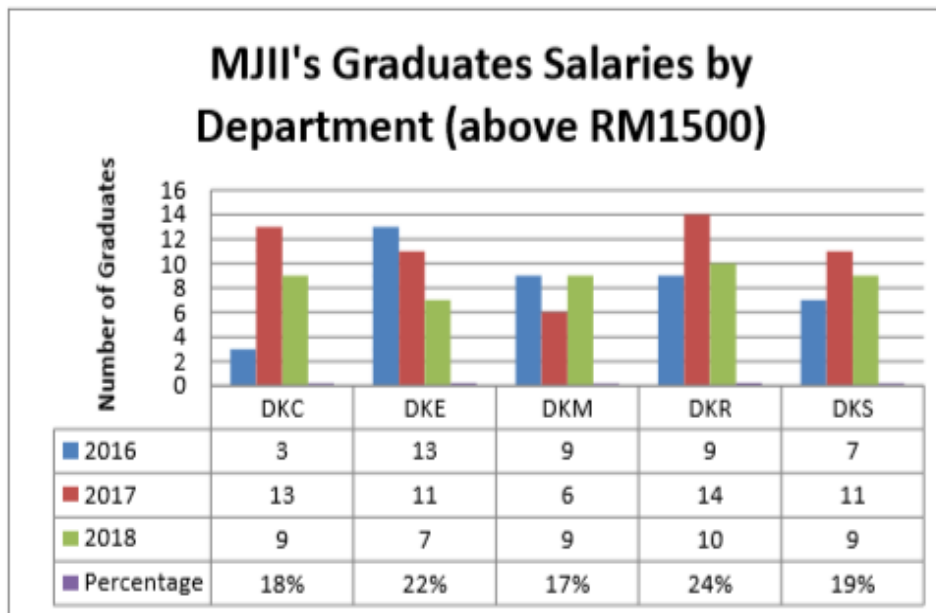
The number of MJII's students with income higher than average (above RM1500) are tabulated in Figure 3. The DKR program represents the highest percentage of students earning over RM1500 between 2016 until 2018. Among the major reasons is the industry sector where the graduate work is related to the field of study at MJII. Another factor that contributes to high income graduates (between RM2500 - RM5000) is entrepreneurship and Japanese Language [19],[20].

4. CONCLUSIONS

From the finding of the study, the graduates of Diploma in Electronics Engineering from MJII increase by 12% from 2016 to 2018. The highest percentage of graduate income is RM1001-RM1500 which is between 38% -46% for the years 2016 - 2018. MJII graduates' marketability is well regarded to additional program offered to graduates such as Graduate Employability Training Scheme (GETS) and Industrial Bootcamp (IBC). To further enhance MJII's graduate marketability, the MTEC and MTAC programs are also being implemented to get the views and suggestions of industry and external academic panels on the curriculum being conducted at MJII. Apart from that, MJII also offers professional certificates and software skills to students such as MIKROTIK and LabVIEW.

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A TRACER STUDY ON SULTAN SALAHUDDIN ABDUL AZIZ SHAH POLYTECHNIC'S GRADUATE EMPLOYABILITY (2014 – 2018)

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ABSTRACT

An aspect of quality in higher education is the quality of the outcomes achieved. Higher education add value by developing job-related skills and competencies. The purpose of this study was to examine the employability of graduates of Sultan Salahuddin Abdul Aziz Shah Polytechnic from 2014 to 2018. The instrument used was an adopted tracer study questionnaire that was then validated by a pool of experts in the field. The descriptive method was used in the study. The study involved a total of 5968 graduates. Findings indicate that the majority of them are already employed. The results further show that most of the employed graduates are working in private agencies. Futher research findings should be conducted on current and future needs of the industries to enhance or improve graduate employability.

Keywords: Tracer Study, Skills, Quality

1. INTRODUCTION

One of the factors that determine the effectiveness of an academic institution is through the employability of its graduates. The quality of graduates is very much a function (Dr. Mark Irvin C.Celis, 2013). Tracer studies or graduate survey is a means of maintaining curriculum relevance and providing targeted benefits to graduates to enhance the marketability of educational programs. Students, particularly graduates of any course, are required to earn a sense of competence in their field of interest and develop the confidence to explore new possibilities and new employment especially if there is increasing competition among rivals at work. Higher education is a key institution for transforming a country to the aspired level of development. Academic institutions have the responsibility to keep track of the employability of their graduates to determine accountability and whether or not their diploma programs have impacted on the person, the institution or the country (Dr. Roger S Malahay & Petmar M Saing). The alumni are considered as the best proof of a program's effectiveness in term of employment and positions held. (Dr. Roger S Malahay & Petmar M Saing)

Through this study, Sultan Salahuddin Abdul Aziz Shah Polytechnic (PSA) would like to substantiate the transfer of skills and knowledge to its graduate students. Tracer studies served as a basis for assessment and enhancement of existing educational programs offered by every academic institution. (Dr. Maria Lourdes D. Cervantes, 2015)

2. METHODOLOGY

This survey method was applied in the study. The instrument for data collection was the questionnaire. The survey questionnaires were answered by the respondents through a platform. The questionnaires were sent to 5968 students who had graduated from 2014 to 2018. Table 1 below reveals the distribution of the respondents according to the year they graduated.

Table 1 : Distribution of respondents according to year graduated

Year Graduated	Frequency	Percentage (%)
2018	779	13.1
2017	993	16.6
2016	1178	19.7
2015	1671	28
2014	1347	22.6
Total	5968	100

The questionnaires consist of respondents' profile, job placement of the respondents and relevance of school related factors to the job placement and skills acquired from their program. The researcher used a platform called as Anjung. It was convenient and fast way for the graduate respondents as they use computers at PSA to solicit their participation in the study. They respond to the questionnaires before their convocation.

3. RESULTS AND DISCUSSIONS

3.1 Distribution

Table 2 : Gender of the respondents

Sex	Frequency	Percentage
Male	3158	52.9
Female	2810	47.1
Total	5968	100

As disclosed in Table 2, majority of the respondents are male. This indicates that males are more inclined in polytechnic.

Table 3 : Employment status of the respondents

Year Graduated	Employed		Unemployed		Further Study		Total (N)
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
2018	688	88.3	13	1.7	78	10	779
2017	573	57.7	138	14	282	28.3	993
2016	717	61	97	8.2	364	30.8	1178
2015	1110	66.4	291	17.4	270	16.2	1671
2014	900	66.8	205	15.2	242	18	1347
Total (N)	3988	66.8	744	12.5	1236	20.7	5968

Table 3 above reveals that majority of the respondents (3988 or 66.8%) were employed while (744 or 12.5%) unemployed and (1236 or 20.7%) further study. This indicative of the high demand for PSA students and it can be concluded that graduates from PSA can easily find a job due to the demands from industries.

Table 4 : Employment sector of the respondents

Year	2018		2017		2016		2015		2014	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Government Agency	88	11.3	77	7.8	82	7	76	4.5	80	5.9
Non-Government Agency	514	66	437	44	558	47.4	884	53	807	60
Further Study	177	22.7	479	48.2	538	45.6	711	42.5	460	34.1
Total	779	100	993	100	1178	100	1671	100	1347	100

Table 4 shows that majority of the respondents are currently working with non-government agency followed by further study and the remaining are working for government agency. Most respondents prefer to work with private sectors as it easy to get job rather than government agency whereby they need to wait for long period. It's also indicates that more job vacancies in the private sectors need PSA's students.

Table 5 : Distribution of respondents in terms of monthly income

Monthly Salary	RM500 -RM1000	RM1001 -RM1500	RM1501 -RM2000	RM2001 -RM2500	RM2501 -RM3000	RM3001 -RM4000	RM4001 -RM5000	RM5001 -RM10000	Total
2018	242	193	154	54	21	19	3	2	688
2017	60	155	167	95	48	41	4	3	573
2016	96	214	248	100	38	17	3	1	717
2015	197	416	335	103	36	19	3	1	1110
2014	162	392	256	65	14	6	3	2	900
Total	757	1370	1160	417	157	102	16	9	3988

The monthly income distribution received by the respondents is shown in Table 5 above. A closer look at the findings reveal that out of 3988 graduates, only 9 are compensated within RM5,001-RM10,000 from 2014-2018. The range of salary received the most is RM1,501-RM2,000 by 1160. The data also demonstrates that 757 of them received RM500-RM1,000. While 1370 is remunerated with RM1,001-RM1,500. The table also indicates were 417 who received their salary RM2,001-2,500 whereas 157 are given a higher salary between RM2,5001-RM3,000. The data also show 102 received RM3,001-RM4000. It could be noted that 16 get the second highest salary where by RM4,001-RM5,000. The data demonstrated a clear variance of monthly income distribution among the 3988 graduates from 2014-2018 and that probably most of these graduates have not been promoted yet to a higher rank thus receiving either a hiring scale for entry level positions or the succeeding rank that is appropriate to those employed within the lower to the middle key positions. This implied that PSA has produced graduates who were either not continuing further advancements in their chosen field or were not given opportunities to get to a higher position in their current employment situation. There are also graduates that get a job after 6 months as they fail in their job hunting such as interview. There also said that excellent oral and written communication skills and functional skills are the factors that affect the employability of graduates. (Dr. Maria Lourdes D. Cervatas, 2015) Communication skills is also important tools in job hunting but the graduates are lack of it.

4. CONCLUSIONS AND RECOMMENDATIONS

Majority of the respondents are gainfully employed and landed a job from one to two years after graduation. Most of them are on contractual basis. Majority are professionals working as a rank and majority are still holding their first job after graduation. Salaries and benefits play a big role in staying or leaving the first job. Communication skills are deemed to be the most useful competencies learned by graduates. Language play an important role in their work.

PSA may encourage the students to be more motivated to work hard and persevere in whatever task and project assigned to them to develop their sense of responsibility and leadership. Their competencies may be further strengthened through exposure to various competitions and other related training and seminars. Students should be encouraged continue to participate in the English Proficiency Programs to further enhance their oral and written communication skills. Work skills and values of PSA students must be further emphasized in the application of the outcomes based curriculum. PSA needs more improvement by evaluating the current curriculum to cater the current and future needs. PSA may encouraged to continue to update and enhance teaching skills through various training programs, whereby can choose partner industries which can provide competent and competitive on the job training skills to the students. PSA must continue to tap linkages that will bring possible employment opportunities for its graduates.

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FACTORS INFLUENCING CUSTOMERS' SATISFACTION ON AR-RAHNU SERVICES AT POST OFFICE

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ABSTRACT

In this day and age, the cost of living has gradually risen and the financial procedures in banking systems is stringent; Ar-Rahnu in financing field in Malaysia was implemented based on these two factors. The Ar-Rahnu scheme is an alternative method for demographics of lower income to receive loans by reducing time and cost of profit rate. The establishment of this system is a provision of instant financing with less complications and eliminating riba to the public; individuals are able to pawn their jewelries at banks or pawnshops as a form of safekeeping. Low income employees can seek financial stability by utilizing this scheme as a micro-credit and financial equipment to encounter rapid building capital or personal requirements. The purpose of Ar-Rahnu's contact is to initiate the security of a debt and will not endorse any form of investment or profitable objectives. This study aims to examine the factors influencing customer satisfaction of Ar-Rahnu services at Post Office since it is a new service provided by Malaysia Post Office. A survey was conducted with 200 respondents and additionally, tangibles, responsiveness, assurance and empathy as factors of service quality will assist scholars in discovering the significant factors affecting customer satisfaction towards the utility of Ar-Rahnu at Post Office. The data of distributed questionnaires was analyzed using t-test, ANOVA, correlation analysis and multiple regression analysis. Results presented that tangibles, responsiveness, assurance and empathy have significant association with customer satisfaction. Conclusively, the research was beneficial for Post Office personnel to improve their customer services to gain more customers in utilizing their system. In Malaysia, Ar-Rahnu institutions convey the capability of completing and dominating conventional pawnshops with perpetuating chronological history in its nation because the system of the scheme provides protection of welfares to assist low-income demographics in comparison to conventional pawnshops with operation that emphasizes on profitable interest.

Keywords: Tracer Study, Skills, Quality

1. INTRODUCTION

Islamic banking is established as an organization providing services and banks that cater specially to Muslims in accordance to a system that abides the Shariah Law. A loan system as one of the Islamic banking and finance products was introduced: Ar-Rahnu. Relatively, Ar-Rahnu is dated as a historic lending transaction system in the past but in Malaysia, pawn broking is a new conceptual system. The purpose of Ar-Rahnu's contract is to implement financial security upon a debt and it does not apply to investments or intentions of profit gain. The development of Ar-Rahnu in Malaysia provides an alternative service of pawn broking to clients based on principles of Syariah. Islamic pawn broking is recommended as a one stop center for clients that require instant financial support and convenient loan (Amin, Chong, Dahlan & Supinah, 2007).

Pos Malaysia Berhad is one of the popular premier provision of postal services in Malaysia. The postal service has more than 1000 sanctions in Malaysia inclusive of Pos Malaysia Outlets, Pos Minis, Self-Service Terminals, Mobile Outlets, postal agents and stamp agents. Pos Malaysia has rapidly risen as a mail service and postal provider to a dynamic communication, financial services and provision of chain solutions supplement since the first day of its operation. Pos Malaysia Berhad offers a new service known as Ar-Rahnu and the scheme provides instant financial support to the public with a pawning system that requires the trade of a client's jewelry or property to the bank as a security. The system is also one of the micro-credit and financial instruments catering to classes of low income that require financial support to meet the capitalistic system and their personal necessities.

A finding presents that Malaysian citizens fluctuate towards the utility of Ar-Rahnu financing personal use instead of productive purposes or capitalistic commercializing (Azila, 2011). The system of Ar-Rahnu thrives in the system due to its convenience for wedding ceremony, huge assets, education and investment (Mohd Rafi, Ghazali, Mohamed Dahlan, 2012). Acquisition of funds from the bank is difficult and thus, it encourages people to use pawn broking for household purchases. However, investment opportunities are also offered by Ar-Rahnu other than prevention of illegal or unlicensed financing activities (Hisham, Abdul Shukor, Ummi Salwa & Kamaruzan, 2013). Improvement of living standards in the long term requires investments (Pellegrina, 2011). The objective of Ar-Rahnu is to establish socio-economic security for the poor; thus, the system acts as a tool for encouragement of saving and investment. Therefore, the purpose of commencing this study is to ascertain the impact of service quality upon customers' satisfaction of loaning from Ar-Rahnu at Post Office.

1.1 Problem Statement

Customers raise concern and preference in choosing Islamic-based products due to the system with a possibility of having no riba, interest, gharar or elements of uncertainty. Most Muslim customers prefer the choice of Islamic bank according to perspectives of religion instead of bank's features such as location and profit. A loan shark is an illegal approach of lending funds that goes against the law for those who are in need of funding. Loan sharks do not involve tedious procedures and it provides a complete loan but it affects customers in terms of imposing higher rate interests upon the loan. Islamic pawn broking or Ar-Rahnu provides instant cash to those in dire need of funding. Ar-Rahnu is an alternative system that prevents fraudulent transaction based on conventional-oriented banking. In this age, various outlets offer Ar-Rahnu services such as Ar-Rahnu @ POS; the franchise has a rapid development that proportionate to its demand increment. Therefore, it is essential for researchers to acknowledge the development of offer of services by Post Office in lower-income classes. The policy of Ar-Rahnu varies from institutions although many have promoted Ar-Rahnu on a large scale. Ar-Rahnu is a familiar system that provides simple financial support in haste to Malaysians especially to the Malay community and it is convenient for the low-income and middle classes. There is an increment of living cost that affects the middle and lower-income classes financially. Low-income group is one of the underlying factors to the preferred choice of utilizing Islamic pawn broking.

According to previous researches, the research on Ar-Rahnu emphasizes on the banks and non-banks such as Bank Kerjasama Rakyat, Agrobank, YaPEIM MGIT and PKB (Selamah & Abdul, 2014). Norudin, Bashir, Semanat and Irwan (2014) conducted a research on Ar-Rahnu in MAIDAM Dungun; Ar-Rahnu product is fairly new in Malaysia and there is only an ample quantity of studies relating to Post Office. Ar-Rahnu @ POS holds the potential to expand today's market as most individuals acknowledge the offered various services by Post Office as a one stop center. Post Office is required to obtain the most effective method of promoting Ar-Rahnu services; this research can assist to determine the best solutions. Based on the survey, the total number of Ar-Rahnu @ POS has rapidly developed since its operation in the mid year of 2013. Therefore, the improvement of limitations can be attained through the conduction of this research to determine customer satisfaction upon Ar-Rahnu @ POS in Selangor.

2. LITERATURE REVIEW

2.1 Customer Satisfaction

Customer satisfaction is discovered to perpetuate positive aspects to company and thus, it has contribution to a successful business. Therefore, companies' main concern should be complying to customers' demands and needs to obtain customer satisfaction. Customer satisfaction is a prominent indicator for the service and Islamic banking; it is important for theoretical and practical modern marketing. Previous researches provided suggestions that service quality is a multidimensional construct. Five dimensions are defined as the followings: reliability; referring to the ability of performing promised service dependably and accurately; responsiveness is the obligation to help customers and providing prompt service; assurance; the knowledge and courtesy of employees and their ability to project trust and confidence. Moreover, empathy is the ability to care, assorting attention to customers and tangibles; referring to the appearance of physical facilities, equipment, personnel and communication materials (Parasuraman, Zeithaml & Berry, 1985). In this contextual research, tangibles, responsiveness, assurance and empathy as four dimensions of service quality are prominent in factoring customer satisfaction upon Islamic pawn broking. This method is very renowned among academics and researchers to evaluate the perception of customers on services quality for a variety of services industries.

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2.2 Service Quality

The findings of the concept and theories of service quality perception are still debatable in several literatures (Caceres & Paparoidamis, 2007). The acknowledgement of important elements such as employees' performance and working facilities is prominent; however, the prominent factor still focuses on the service quality offered by the provider (Norudin, 2010). The importance of service factor is acknowledged (Mohammed, Daud & Sanusi, 2005). The Islamic-based pawnshop requires to maintain the record of customers; preserving the records confidentially and treat the customers fairly despite of their demographics. Similarly to contextual development of organization, elements of requiring perceiving performance of employees and the nature of working environments are to be acknowledged by service providers (Norudin, 2010). Service quality is one of the prominent factors that influence customers' acceptance of Ar-Rahnu (Ahmad, Mansor & Nadiah, 2012). Quality of provided services contributes to success of the institution. Customers perceived that the quality of their services represents the superiority of the service providers (Tsoukato & Rand, 2006).

Overall, the result from the correlation analysis showed significant relationship between the variables being tested; management observation, safekeeping charge, service quality and locality. Lao (2005) claimed that Islamic pawnshop is easy to access compared to commercial bank. In addition, by practicing the convenient method and providing faster fund, quality services of Islamic pawnshops can be maintained. Rejected loan by the financial institution often occurs amongst the low-income group; with majority of the people switch their option to Islamic pawnshop. The Islamic pawnshop services shall achieve to be maximized to meet the high customers' expectation. Besides, friendly customer service by the front liner, professionalism of Ar-Rahnu workers, and integrity are also of concern which should be evaluated and categorized as service quality as well (Mohd Rafi et al., 2012). The success of the institution is also contributed by the quality of the provided services. Customer believed that superiority of the service providers is reflected by the quality of their services (Tsoukato & Rand, 2006).

Additionally, acceptance among customers depends on the performance of customer services; the time of approval process for customers should not be in a long period and it requires to be considered as a prominent element under the service quality provisioned by pawnbrokers (Amin et al., 2007). This finding is relatable to the discovery of Azizah, Norashidah and Syahrina (2012); it was indicated that customer's selection of service quality is a strong factor in the adoption of Ar-Rahnu scheme offered by state and private Ar-Rahnu providers in Kelantan. A number of researchers discover that the service quality factor is moot and most approve the important of this element Ar-Rahnu and preserving the service quality inclusion of confidentiality of customers' data and treatment without any bias (Ahmad et al., 2012). Service quality is defined as the result of the assessment between expectation and performance of reality (Bolton & Drew, 1991). Therefore, preservation of customers' expectations contributes to an effective ranking of service quality by the institution provider. A study was conducted by Siti Zuraini (2014) to evaluate the service quality upon Ar-Rahnu owned by state in Kelantan, Ar-Rahnu Permodalan Kelantan Berhad. Based on the regression analysis, the service quality shows 55% of variance in customer satisfaction. Thus, the perception of customers upon service quality is prominent in confirming effective relationship management that will flourish customer satisfaction (Mansor, Hamid & Muda, 2011). According to meta-analysis of customer satisfaction (Symanski & Henard, 2001), results of satisfaction have been analyzed and there is an inadequate study on the outcomes of customer satisfaction upon Ar-Rahnu at Post Office. Figure 1 presents the conceptual model constructed for this research. The model posits that tangibles, responsiveness, assurance, and empathy influence customer satisfaction.

2.3 Conceptual Framework

The conceptual framework has been developed from the above theory:

Figure 1: Conceptual framework
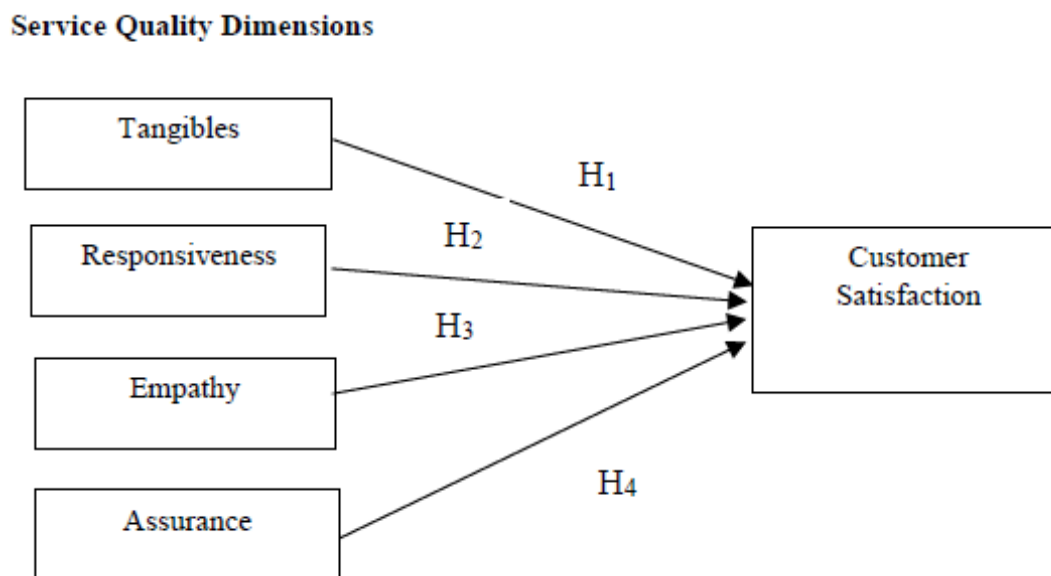
For that, hypotheses have been developed:
H1: Tangibles has an influence on Customer satisfaction of borrowing Ar-Rahnu
H2: Responsiveness has an influence on Customer satisfaction of borrowing Ar-Rahnu
H3: Empathy has an influence on Customer satisfaction of borrowing Ar-Rahnu
H4: Assurance has an influence on Customer satisfaction of borrowing Ar-Rahnu

3. RESEARCH METHODOLOGY

3.1 Sample

The sample of this study comprised of Ar Rahnu customers in Selangor area. In order to participate in this study, they must at least use Ar Rahnu once. Since Selangor state is a large area, researcher divided it based on eight designated sub-districts. Non- probability sampling was employed in this study since the exact population of Ar Rahnu users is unidentified. Data collection is based on personally administered questionnaire.

3.2 Research Instruments

Questionnaires were grouped into demographic, dependent variable, independent variable. The questionnaire was adapted from past research (Bedi, 2010). A total of 238 questionnaires were distributed; however, only 200 questionnaires were returned and deemed usable. Thus, the response rate was about 84 %. The first section gathered the general questions. The second section gathered the information on factors influencing customers' satisfaction of Ar-Rahnu services. Meanwhile, the third section gathered the demographic information. The above variables were used to determine the customer satisfaction of borrowing Ar Rahnu. All of the questions were measured using 5 Likert scales ranging from 1- strongly agree to 5- strongly disagree. A pilot study was conducted to determine the reliability of the items used in the questionnaires and the validity of measuring instruments to ensure the accurate parameters. The pilot study was conducted on 30 Ar-Rahnu's customers in Selangor. The feedbacks obtained from the questionnaires were analysed using SPSS and the reliability coefficient alpha scores for each dimension were presented in Table 1.

Table 1: Reliability Analysis for Each Construct

Constructs	Cronbach's Alpha (N= 30)
Tangible	0.718
Responsiveness	0.778
Assurance	0.729
Empathy	0.772
Customer Satisfaction	0.801

Reliability coefficient of not less than 0.5 is usually acceptable, thus the questionnaires used are considered acceptable in terms of reliability coefficient. It can be seen that all the variables used in the questionnaire recorded an α value greater than 0.7, indicating that the questionnaire had internal consistency. As such, the reliability test supported the appropriateness of the instrument used in the study.

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

Table 2 depicts that 97 of the respondents were male (48.5 %), while 103 of the respondents were female (51.5). Furthermore, majority of the respondents were between the age of 23years old to 27 years old (89 %). With regards to educational background, 48.5% respondents obtained undergraduate degree. Other respondents obtained qualifications of professional / diploma (9.5%), SPM/STPM (19%), and postgraduate degree (6.5%). In terms of the respondents' income, more than half of the respondents were considered as low- to middle-level income earners who draw a monthly salary of less than RM3, 000.

Table 2: Demographic Profiles of the Respondents

Demographic Profiles	Frequency	Percentage (%)
Gender		
Male	97	48.5
Female	103	51.5
Age		
18 - 22	33	16.5
23-27	89	44.5
28-32	32	16
33-38	16	8
39 - 43	19	9.5
44 above	11	5.5
Education Level		
SPM	19	9.5
Diploma/STPM	71	35.5
Degree	97	48.5
Master/ PhD	13	6.5
Monthly Salary		
Below RM3000	132	66
RM3001 – RM5000	41	20.5
RM5001 – RM7000	20	10
More than RM7000	7	3.5
Reason for borrowing Ar-Rahnu		
Cash	134	67
Business	27	13.5
Investment	17	8.5
Others	17	8.5

4.2 Correlation Analysis

Correlation analysis use to examine the nature of relationship that exists between independent variables which are tangible, responsiveness, assurance, empathy and customer satisfaction. Pearson correlation was used to analyze the data collected in this study. Based on Table 3, the result shows that all independent variables are significant and positively correlated with the customer satisfaction of borrowing Ar-Rahnu at post office, at the confidence level of 95% ($p < 0.05$).

Table 3: Correlation between Customer Satisfaction of Ar-Rahnu Services @ POS and independent variables

Variables	Correlation	Significant level
Tangible	0.401	.000
Responsiveness	0.169	.000
Assurance	0.537	.000
Empathy	0.559	.000

It can be briefly explained as the stronger the independents variable are, the greater customer's satisfaction of Ar-Rahnu services at post office. Empathy has high strength of association with the customer satisfaction to Ar-Rahnu services at post office (55.9%) followed by assurance (53.7%), tangibles (40.1%) and responsiveness (16.9%). These results explained that empathy and assurance has a strong relationship with the customer's satisfaction towards Ar-Rahnu services at post office while for tangibles and responsiveness, the results show moderately correlates with the customer's satisfaction towards Ar-Rahnu services at post office.

4.3 Regression Analysis

Table 4 has shown that R Square is 0.718 for regression of customer satisfaction of 0.651. Meanwhile, 71.8% of variation in the customer satisfaction was influenced by independent variables (tangibles, responsiveness, assurance and empathy). The remaining 28.2% remain uninfluenced.

Table 4: Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
	B	Std Error	Beta		
1 (Constant)	.603	.291		2.073	.039
Tangible	.055	.084	.018	-1.743	.086
Responsiveness	.001	.029	.453	4.319	.017
Assurance	.382	.067	.468	4.222	.000
Empathy	.425	.073	.154	-1.439	.068
R^2 =0.715	Adjusted R^2=0.0.701		F value =41.886	Sig F = 0.000	

a. Dependent Variable: Customer Satisfaction

Table 4 summarised the results of multiple regression with customer satisfaction as a dependent variable for tangible, responsiveness, assurance and empathy. The results show that responsiveness displayed a strong significant Beta=0.453 t-value of 4.222, and p=0.000. Moreover, the standardised regression coefficient revealed that assurance (Beta=0.468, t=4.222, p=0.000) makes the strongest contribution in explaining customer satisfaction followed by responsiveness (Beta=0.453, t=4.319, p=0.017). Hence H2 and H3 are accepted. This result was same as founded (Mansor et al., 2011; Szymanski & Henard, 2001; Bedi, 2010). Whereas, tangible and empathy have less influence on customer satisfaction of borrowing Ar-Rahnu with beta value of -1.743 with significance .086 and beta value is -.154 with significance .168 respectively.

Table 5 : Overall Results of Hypotheses

Hypotheses	
H1: Tangibles has an influence on Customer satisfaction of borrowing Ar-Rahnu	Rejected
H2: Responsivenesshas an influence on Customer satisfaction of borrowing Ar-Rahnu	Accepted
H3: Assurance has an influence on Customer satisfaction of borrowing Ar-Rahnu	Accepted
H4: Empathy has an influence on Customer satisfaction of borrowing Ar-Rahnu	Rejected

5. CONCLUSIONS

This research aims to analyze the predecessor and impacts of customer satisfaction upon Ar-Rahnu service; survey questionnaires were conducted. The primary corroboration of this research is provision of a better comprehensive model of predecessor and impacts of customer satisfaction upon Ar-Rahnu service. The results presented that the precursors of customer are receptiveness and assurance. Recognition of the importance of antecedents of customer satisfaction has several practical implications. Institution offering Islamic pawn broking service requires to consider the prominence of receptiveness and assurance in their service to improve customer satisfaction. Institutions with provision of Islamic pawn broking are advised to bring offer promised services, receptiveness to customers' demand and train their staff with equipped knowledge to answer questions of customer. The results acquired from this study must be perceived in the aspect of the study's limitation. This study is confined to institutions that offer Ar-Rahnu services and thus, future researchers are required to expand to other sectors in their research.

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ENGLISH LANGUAGE SPEAKING ANXIETY AMONG TVET LEARNERS

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ABSTRACT

Difficulty in communicating in English language is a common issue among students who are studying in the Technical and Vocational Education and Training (TVET) field. The anxiety varies according to situation one is involved in. This anxiety hinders the students from giving their best while learning. This study aims to investigate factors that cause anxiety and provide possible solutions to overcome the problem. A Foreign Language Anxiety Scale question-aire designed by Horwitz, Horwitz and Cope (1986) was administered to a group of TVET learners undertaking Communicative English module. The results were analyzed using frequency. The findings indicated that respondents had fear of negative evaluation as their main concern. It is recommended that more English language activities should be conducted from time to time to assist them in overcoming their anxiety in communicating in the language.

Keywords: Speaking anxiety, Negative evaluation, Foreign language anxiety, Communication apprehension

1. INTRODUCTION

A very essential skill that is needed by students leaving the higher education is communication skill. This is a skill that students need to possess in order to prepare them for their future workplace (Iksan et al. 2012). Employers prefer a fresh graduate who has a good command in English as well as someone who has good academic qualification.

Malaysian Employers Federation (2016) conducted a survey in 2016 and found that 90 percent of the respondents agreed that graduates need to hone their proficiency in speaking English. The federation believes that a good command in English language would enhance the fresh graduates' employability rate. However, in Malaysia, this is a distressing matter, as students in this country have learned English language for about 11 years in schools.

The chief economist from Malaysian Rating Corp Bhd (2017) interviewed employers from different industries and discovered that there are two major causes for the high unemployment rate among Malaysian fresh graduates. The first cause is their lack of real-world experience and second is their poor English speaking skill. These fresh graduates were not able to speak well during interviews thus become unattractive to their potential employers. There must a reason why these fresh graduates have difficulties in speaking after learning the language for 11 years.

Researchers in the field of second and foreign language learning have carried out many studies and found out that people tend to have a mental block against learning a foreign language, even though these same people are highly motivated and good learners in other situations. These same people also have strong desire towards the target foreign language. Many people feel that learning a language is stressful. If this stress is limited to the language learning situation, it is categorized as specific anxiety.

Learners of English often express a feeling of stress, nervousness or anxiety while speaking the language. Among these feelings, anxiety is found to have a negative effect on language learning (Horwitz, 2001). Anxiety has been found to impede with many types of learning. Any type of anxiety associated with learning a second or foreign language is termed as second /foreign language anxiety. The term language anxiety refers to being nervous in a specific situation, thus, the phrase specific anxiety.

Numerous researchers have carried out studies on speaking anxiety among English language learners. A study conducted by Indrianty (2016) in 2006 revealed that fear of negative evaluation by peers, teachers and parents, fear of not performing well in English test, and fear of communicating to others in English are among the main sources of anxiety among English language learners. She carried out the study among first – year students in hotel and tourism college in Bandung, Indonesia.

Sadighi and Dastpak (2017) conducted a research to investigate the sources of speaking anxiety among 154 Iranian learners in language learners in Shiraz, Iran. They administered the foreign language anxiety questionnaire which was developed by Horwitz, Horwitz and Cope (1986). The results of the study disclosed that the main source of anxiety while speaking English are lack of vocabulary knowledge, fear of making mistakes when speaking English, and fear of negative evaluations by teachers and peers.

Creswell (2005) pinpointed that it is very essential to construct research objectives when carrying out a study. These objectives act as the target for the researcher to achieve at the end of the research. This small scale study aims to investigate the factors that cause anxiety. With these information, the researcher later aims to provide possible solutions to overcome the problem of anxiety among learners in an English language classroom. Thus, the following research question was formulated:

What possible factors contribute to speaking anxiety among learners in an English language classroom?

2 METHODOLOGY

This study was conducted using quantitative method. A questionnaire entitled Foreign Language Classroom Anxiety Scale (FLCAS) was administered to students undergoing Communicative English module. The questionnaire which originally had three components comprising of 33 items was developed by Horwitz, Horwitz and Cope (1986). The three components were Communication Apprehension, Fear of Evaluation and Text Anxiety. However, for this study, the questionnaire included only two components which were Communication Apprehension and Fear of Evaluation, thus only 17 items from the 33 items were used. This is because these items were directly related and relevant to language speaking anxiety. The current study seeks to look at speaking anxiety and not test anxiety. It helps the researcher to identify language speaking anxiety. The Cronbach Alpha for these 17 item is 85, indicating that the reliability is good. The items in the questionnaire were categorized in table 1.

Table 1: Categorization of items according to factors

Factors of Speaking anxiety
Lack of self-confidence
Fear of evaluation
Lack of language proficiency

The questionnaire has two parts. The first part seeks the respondents to fill in their demographic details. The second part consist of two sections: Communication Apprehension and Fear of Negative Evaluation. It uses a 4-point Likert-scale items, which requires the respondents to tick options ranging from 1 (Strongly Disagree) to 4 (Strongly Agree). The scale does not include Not Sure as an indecisive respond will fail to offer any explanation. The 58 respondents were chosen through convenient sampling as the researcher teaches the same learners. According to Creswell (2005), convenient sampling is a method whereby the researcher choses the respondents from a population that is conveniently available. As there are no pre –requisite to be a respondent in this type of sampling method, everyone has an equal opportunity to be chosen. In this study, learners of English who are from Semester 1 undergoing Communicative English 1 module were chosen to be participants. As the researcher teaches these groups of student, they became easily available as respondents. Furthermore, both these modules needed the students to continuously speak English in their interactions.

3 RESULTS AND DISCUSSION

Semester 1 learners of English language became the respondents for this study. There were   equal numbers of female (n=29) and male (n=29) who answered the questionnaires. The 58 students comprised of 43 Mechanical and Electrical engineering students, while the rest of the 15 students were from the Graphic Design department.

Table 2 illustrates the items in the questionnaire which is closely related to the factors that contribute to speaking anxiety. The factors were divided into three types, namely Lack of self-confidence, fear of evaluation and lack of language proficiency. As per table 2, it can be seen that in communication apprehension, there are 5 items for lack of self-confidence,1 item for fear of evaluation and 4 items for lack of language proficiency. While in fear of negative evaluation, there are 2 items for lack of self-confidence and 5 items for fear of evaluation. However, there are no items related to lack of language proficiency.

Table 2: Items related to factors of speaking anxiety

Factors of Speaking anxiety	Communication Apprehension	SA & A	Fear of Negative Evaluation	SA &A
Lack of self-confidence	2,4,8,9,10		4,5	
Fear of evaluation	7		1,2,3,6,7	
Lack of language proficiency	1,3,5.6			

The research question that needs to be answered is:

RQ1:   What possible factors contribute to speaking anxiety among learners in an English language classroom?

The results in table 3 indicates the number of respondents who answered Strongly agree and Agree.

Table 3: Results from the Foreign Language Anxiety Scale

COMMUNICATION APPREHENSION	Factor	SA & A	D& SD
It frightens me when I do not understand what the teacher is saying in my English class	Proficiency	47	11
I start to panic when I have to speak without any preparation	Self- confidence	49	9
I never feel quite sure of myself when I am speaking in English language class.	Proficiency	51	7
I would be nervous speaking the foreign language with native speakers.	Self- confidence	44	14
I get upset when I do not understand what the teacher is correcting.	Proficiency	49	9
I feel confident when I speak in English language class.	Proficiency	24	34
I feel very self-conscious about speaking the English language in front of others.	Evaluation	52	6
I get nervous and confused when I am speaking in my language class.	Self-confidence	51	7
I get nervous when I do not understand every word the language teacher says.	Self-confidence	45	13
I would probably not feel comfortable around native speakers of English language.	Self-confidence	44	14
FEAR OF NEGATIVE EVALUATION	Factor	SA & A	D &SD
I worry about making mistakes in language class	Perception	55	3
I keep thinking that others are better at English than I am	Perception	49	9
It embarrasses me to volunteer answers in my language class	Perception	55	3
I am afraid that my language teacher is ready to correct every mistake I make.	Self-confidence	48	10
I always feel that the other students speak English language better than I do	Self-confidence	56	2
I am afraid that other students will laugh at me when I speak in English	Perception	56	2
I get nervous when the language teacher asks questions which I have not prepared in advance	Self-confidence	48	10

The table above indicates the answers given by the 58 respondents. Results of the Strongly agree (SA) and Agree (A) are combined while Disagree (D) and Strongly Disagree (SD) were totaled up. More respondents gave SA and A responses for all the items in the questionnaire. These clearly show that they strongly agree and agree to all the items found in the questionnaire.

The following tables show the number of respondents who respondent to the questionnaire according to the factors for speaking anxiety, starting from the highest to the lowest number of respondents in which the items in the questionnaire aligns with.

Table 4: Factors in Communication apprehension (Lack of self-confidence)

Item	Number of Respondents
8	51
2	49
9	45
4	44
10	44

In the above table, it is indicated that item 8 has the highest number of respondents. The question I get nervous and confused when I am speaking in my language class recorded 51 responses. This is followed by item 2 which states I start to panic when I have to speak without any preparation. Having a lack of self-confidence in speaking a language is one of the most inhibitor factor for any language learners. This factor aligns with the research carried out by Moualeh (2013) who found that lack of self -confidence influences one's feelings of anxiety.

Table 5: Factors in Communication apprehension (Fear of Evaluation)

Item	Number of Respondents
7	1

Fear of being evaluated seemed to a be factor that cause anxiety among language learners. Item 7 states that I feel self-conscious about speaking English language in front of others. However, only one respondent gave such responses. This response does not concur with numerous studies carried out in regards to factors related to foreign or second language anxieties.

Table 6: Factors in Communication apprehension (Lack of language proficiency)

Item	Number of Respondents
3	51
5	49
1	47
6	24

In table 6, a total of 51 respondents strongly angered and agreed that: I never feel quite sure of myself when I am speaking in English language class. Sadeghi (2017) found limited vocabulary knowledge and low language proficiency were two factors causing learners' level of speaking anxiety. Zhiping and Paramasivam (2013) also found problems with language accuracy as a reason for learners' anxiety in speaking in the target language. Learners with low language proficiency feel anxious about speaking because they lack mastery in the target language.

Table 7: Factors in Fear of Negative evaluation (Lack of self-confidence)

Item	Number of Respondents
5	56
4	48
7	48

Learners of second and foreign language normally have fear of being evaluated negatively by others. According to Kitano (2001), learners whose personalities tend to fear negative evaluation seem to be strong candidates for experiencing anxiety in foreign language classrooms. In table 7 almost all (57) respondents stated that I always feel that the other students speak English language better than I do. These learners constantly compare their ability with others and fear that their speaking abilities are not as good as others (Young, 1991). Speaking abilities are the primary concern that learners reliably compare with their friends, tutors and native speakers.

Table 8: Factors in Fear of Negative evaluation (Fear of evaluation)

Item	Number of Respondents
6	56
1	55
3	55
2	49

Finally, table 8 shows the fear of being evaluated as a factor that debilitates a learner from learning a language. Item 6 received 56 responses from a total of 58 respondents. Item 6 reads: I am afraid that other students will laugh at me when I speak in English. Learners create a shield to protect themselves from being evaluated. This finding concurs with studies carried out by Hasheimi (2011). It is illustrated here that lack of self-confidence, fear of evaluation and lack of language proficiency are factors that are closely related to speaking anxiety among language learners

4   RECOMMENDATION

It is natural to feel anxious and stressed in various situations. However, it is essential that learners are able cope with it so that this anxiety does not inhibit their learning. Learning a language should be fun and enjoyable. The learners should be surrounded by an environment that motivates them to learn. Fear of being evaluated negatively and communication apprehension should be minimal. Following are a few suggestions to help students overcome their speaking anxiety. Most importantly, language educators should acknowledge that there is an existence of language learning anxiety among learners of English. Once this is done, they should assist the learners to rectify the situation (Asma, 2013). Educators should reassure learners that making mistakes are part and parcel of learning. Every new learner undergoes the same process (Hasheimi, 2011).

Furthermore, any kind of presentations or discussions needs to be carried out in small groups, especially at the early stage of learning (Kitano, 2001). This is because a large crowd would create anxiety among learners who are beginners in a foreign or second language classroom. Teaching and learning of the language should not only be confined inside the classrooms. Bringing learners for field trips who encourage learners to open up to a whole new world. The non- threatening real life environment could motivate them to speak without fear.

Familiarity with the culture and ethnic background of the language learners and an awareness of their previous language learning experiences can also assist language teachers to understand and assist during anxiety related behaviours (Liu, 2007).

5   CONCLUSION

It is natural to feel anxious and stressed in various situations. However, it is essential that learners are able cope with it so that this anxiety does not inhibit their learning. When students have a high level of anxiety in speaking a second language, particularly English, they will be demotivated from using the second language to communicate with their peers and teachers.

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FACTORS THAT INFLUENCE MALAYSIAN POLYTECHNIC STUDENTS' CHOICE OF LOW-COST AIRLINE

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Politeknik Sultan Salahuddin Abdul Aziz Shah[1], Politeknik Port Dickson[2]

ABSTRACT

Nowadays, most countries in the world have low cost airlines. The low cost airline concept came in vogue with the airlines operating on lower costs and influence many passengers to fly. The main purpose of research to investigate the factors that influence Malaysian polytechnic students' choice of low-cost airline. The other objectives of this research is to determine influence factors such as price, service reliability, flight availability and quality of service given by airline companies. This research is conducted through distribution of questionnaire to 336 students of Politeknik Sultan Salahuddin Abdul Aziz Shah from four different departments. The result shows that quality of service is the most important and significant factor that influence polytechnic students' to choose of low-cost airline. Other influential factors of polytechnic students' choice of low-cost airline are service quality, flight availability and price.

Keywords: Low-Cost Airline, Price, Quality Of Services, Service Reliability And Flight Availability

1. INTRODUCTION

Airline deregulation created conditions that allowed companies with the brand-new business model to join the local air travel industry. Such firms, later referred to as cheap or free baggage carriers, offered lower prices but did not include additionally provided services and services that usually raised prices (e.g. food services, rigid baggage standards) (Huse & Evangelho, 2007). A low-cost carrier or low-cost airline is also known budget carrier airline or cheap flight is an airline that generally has lower fares and fewer comforts. The first low cost airline began its operations in USA in 1949 when a flight of the Pacific Southwest Airlines flew on its maiden flight. In Europe, the leading low-cost airline company include Ryanair based in Ireland was established in 1990, operating more than 1,800 daily flights from 76 bases, connecting 200 destinations in 31 countries (Ryanair, 2018). Currently the world's largest low-cost carrier is Southwest Airlines, which operates in the United States and some surrounding areas. Nowadays, most countries in Asian regional have low cost airlines examples Air Asia, Cebu Pacific, Jetstar Asia, Lion Air, Nok Air and others. In Malaysia, there are few company airlines operate in low cost carrier which is Air Asia, Malindo Air and Firefly (Yeoh & Chan, 2011).

Since low-cost airlines offer lower prices than their full-fare counterparts, they will develop quickly and ultimately have much on the market. But, because of intense competition, this was not always the case. Low cost airline companies have succeeded in adjusting to the change in the market due to lower Airline deregulation created conditions that allowed companies with the brand-new business model to join the local air travel industry. Such firms, later referred to as cheap or free baggage carriers, offered lower prices but did not include additionally provided services and services that usually raised prices (e.g. food services, rigid baggage standards) (Huse & Evangelho, 2007). A low-cost carrier or low-cost airline is also known budget carrier airline or cheap flight is an airline that generally has lower fares and fewer comforts. The first low cost airline began its operations in USA in 1949 when a flight of the Pacific Southwest Airlines flew on its maiden flight. In Europe, the leading low-cost airline company include Ryanair based in Ireland was established in 1990, operating more than 1,800 daily flights from 76 bases, connecting 200 destinations in 31 countries (Ryanair, 2018). Currently the world's largest low-cost carrier is Southwest Airlines, which operates in the United States and some surrounding areas. Nowadays, most countries in Asian regional have low cost airlines examples Air Asia, Cebu Pacific, Jetstar Asia, Lion Air, Nok Air and others. In Malaysia, there are few company airlines operate in low cost carrier which is Air Asia, Malindo Air and Firefly (Yeoh & Chan, 2011).

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Since low-cost airlines offer lower prices than their full-fare counterparts, they will develop quickly and ultimately have much on the market. But, because of intense competition, this was not always the case. Low cost airline companies have succeeded in adjusting to the change in the market due to lower Research Background.

This research focused on factor affecting the selection of low-cost airlines among polytechnic students. Generally, the basic idea of low-cost airline model is that airline cuts down the unnecessary costs and frills from its product offering and thereby minimizes its costs of operation and management and offers competitive fares. Some of the most common cost savings include using the internet booking online and promo tickets in distributing airline tickets (Ros, 2016).

The lower the price an airline can offer the higher the possibility of increasing the ticket sales. Low cost airlines use complex yield management to capitalize the demand and maximize the revenues. Airlines use different pricing to offer varying prices to different segment of traveller simultaneously. Low cost choice was the price followed by on time performance, regardless if it was the case of business or leisure travellers. Most authors had a tendency conclude that the travellers selected low cost option only because of an airfare (Chan, 2014). Quality of carrier services also one of the most factor in selecting low cost airlines (Kos Koklic, Kukar-Kinney, & Vegelj, 2017).

1.1   Research Objectives

a)   To identify whether price influence Malaysian polytechnic students' choice of low-cost airlines.
b)   To determine whether the service reliability that given by airline company influence Malaysian polytechnic student's choice of low-cost airlines.
c)   To determine also whether flight availability of service that given by airline company influence Malaysian polytechnic student's choice of low-cost airlines
d)   To determine also whether quality of service that given by airline company influence Malaysian polytechnic student's choice of low-cost airlines

1.2   Scope of The Study

This research study is being conducted in order to understand the factors that affect the selection low cost airline among Malaysian polytechnic students. This research also provides information on how this low-cost airline do a marketing in way they promote their services to passenger.

2.   LITERATURE REVIEW

Low cost carriers have reshaped the airline industry competitive environment within liberalized markets and have made significant impacts in the world's domestic passenger markets, which had previously been largely controlled by full service network carriers. Understanding and meeting customers' expectations and subsequently being different from competitors are important in order to survive in the today world of globalization. It is imperative that service companies measure and monitor service quality and satisfaction with a view to influencing the behavioural intentions of their customers (Park, Robertson, & Wu, 2004).

Challenge in the airline markets in Malaysia is becoming globally tough as the passengers' needs and wants are growing in variety. In such an occasion, airline companies need to be aware of the latest shift and trend to be able to react on time. Thus, precise and timely information on a wide range of customer needs and expectations become critically important nowadays. Air Asia pioneered low cost traveling in Malaysia as well as Asia in general. AirAsia beginning its' operating just two aircraft domestically in early 2002 as a full service domestic carrier, AirAsia (recast as a low-cost Carrier – LCC) now has a fleet of some 43 aircraft, and both domestic and international operations carrying over 4.5 million passengers per annum (Poon & Waring, 2010).

As the number of low cost carriers has grown, these airlines have begun to compete with one another in addition to the full service airlines. In these challenging circumstances, a comparative study on the similarities as well as differences between low cost carriers and full service airlines is obviously pertinent and important. Airline services regardless of whether they are full service or low cost carriers are made up of a very complex mix of intangibles (O'Connell & Williams, 2005). Thus, measuring customers' expectations, as well as their service quality is a real challenge because customer satisfaction is determined by many intangible factors such as atmosphere and ambiance of the cabin.

Airlines companies need to review its service strategy to increase customer satisfaction and subsequently customer loyalty. They should have strong commitment to service excellence as they also act as the ambassadors that carry the image of Malaysia. The main purpose of this study is to identify the underlying service quality dimensions for the low cost carriers. This study also seeks to determine the dimensions or factors that significantly influenced the satisfaction level of low cost carriers' passengers. The service dimensions to be explored in this study are based on passengers' level of expectations towards the airline services.

2.1   Theoretical Framework

Previous research have shown that factors like choice of air carrier (Whyte & Lohmann, 2015), flight availability (Deshpande & Arikan, 2012), and fare class (Grigolon, Kemperman, & Timmermans, 2012) as an important factors that concluding the choice is made based on the trade-off between carrier market presence, service quality, passenger participation in carrier frequent flyer program, schedule convenience, and fare levels. (Proussaloglou & Koppelman, 1999) suggested a conceptual framework for carrier choice behaviour based to price, service provided, flight availability and quality of services.

Based on (Proussaloglou & Koppelman, 1999), we design a conceptual framework for carrier choice behaviour that is shown in figure 2.1.

Figure : 2.1. Theoretical Framework of Research
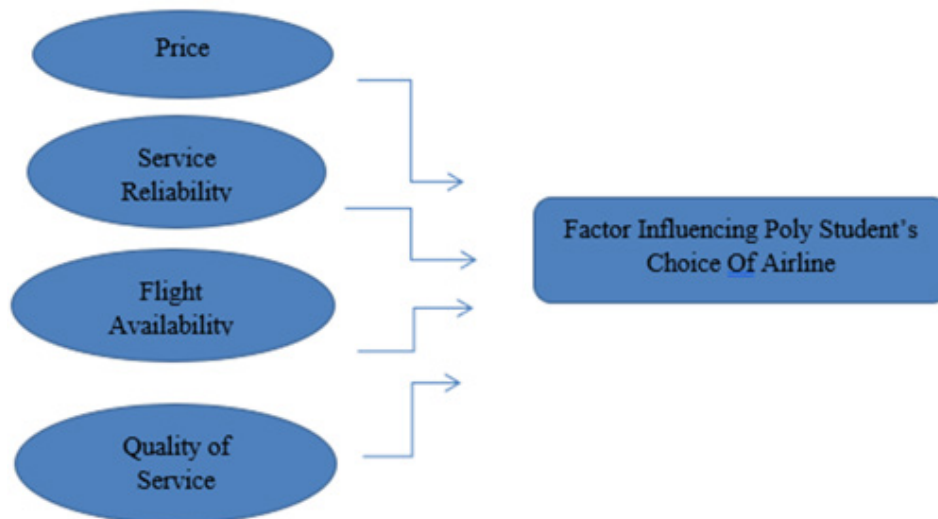
2.2   Related Variables

Most authors that conducted studies involving business travellers found out that in general they are much less price sensitive than leisure travellers (Marin-Pantelescu, 2011). Most studies found that the most important factors for leisure travellers were price (Malighetti, Paleari, & Redondi, 2009), along with schedule (Deshpande & Arikan, 2012)and direct flight availability (Abdelghany, Abdelghany, & Azadian, 2017; Alderighi & Gaggero, 2018). Factors like safety (Koo, Caponecchia, & Williamson, 2015), frequent flyer program (Terblanche, 2015) and flight frequency (Vlachos & Lin, 2014) were also considered important by most leisure travellers. In case of business passengers, the most significant factors were flexibility (fare and schedule), frequent flyer program, overall service quality, comfort, access to business lounges (Sokolovskyy, 2012).

2.3   Variables Definition

Firstly, price is very important factor especially for Malaysian polytechnic students. Majority of them are like of leisure travellers, more price sensitive than business travellers (Marin-Pantelescu, 2011). Almost all studies that investigated the choice of airline, and other travel products too, found price, in one interpretation or another, to be a vital factor affecting consumer behaviour. Secondly, according to (Mikulić & Prebežac, 2011), researcher is going to include two attributes in this factor refer airline safety perception and on-time performance. Safety was found to be extremely important factor in all studies related to choose of any travel product. It is crucial for both leisure and business travellers. Most studies found on-time performance to be often very significant for business travellers on short-haul flight.

Thirdly, flight availability is the availability of flight by the time it is needed either for business or leisure. Flight availability is the next factor that is related in the research. The final factor is quality of service, sometimes referred as to the level of quality of service, for example the guaranteed service quality. Quality of service-related factors were found to be highly important in previous studies.

3   RESEARCH METHODOLOGY

Research methodology is a structured, organized, systematic review or investigation into a specific problem, started with the objective to finding answers (Sekaran, 2012). Research design defines as a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings (Piaw, 2012).

For this research, researcher using the quantitative methods by questionnaire. The questionnaire distribute to Malaysian polytechnic students' at Politeknik Sultan Salahuddin Abdul Aziz Shah who take a low cost flight. Also researcher decided to choose the stratified random sampling as our sampling technique. The sample that we have been selected is based on the known stratified random sample of students at Politeknik Sultan Salahuddin Abdul Aziz Shah.

The sample size of research are 336 people based to (Kenpro, 2012). To measured sample size for a given population of 2600, a sample size of 336 would be needed to represent a cross section of the population. For our research, the respondents that we will be using are the student of Politeknik Sultan Salahuddin Abdul Aziz Shah. Quantitative data will be measured or identified through statistical, mathematical or computational techniques with Statistical Package for the Social Science for Windows (SPSS). Apart from that descriptive will be used to analyse factor that influence Malaysian polytechnic students' choice towards low cost airlines. The common measure such as mean to analyse the data acquired through the questionnaires.

4 RESULTS AND FINDINGS

For effectiveness and efficiency, researcher choose to use Software Package for Social Science (SPSS) for Window version 20.0. This software is among the most widely used programs for statistical analysis in social science.

4.1 Pilot Test

We stratified randomly find the respondents to answer the questionnaire around 30 respondents to answer the questionnaire during the pilot test. Afterwards, the data collected that has been done, is used for the reliability test using SPSS software. We used the method of measuring the reliability in Cronbach's Alpha for pilot test and result in the table 1 below. The Cronbach's alpha is 0.870 and this is found to be reliable (Goforth, 2015).

Table 1 : Reliability Statistic For Pilot Study

Section	Cronbach Alpha	No. of Items
Section A: Price	0.830	5
Section B: Service Reliability	0.807	5
Section C: Flight Availability	0.625	5
Section D: Quality of Service	0.662	5
Overall	**0.870**	**20**

4.2 Likert Rating

Based on Likert scale, the value is an absolute figure, representing the range. The range or scale between 1.00 until 1.79 is very low, 1.80 until 2.59 is low, 2.60 until 3.39 consider as moderate, 3.40 to 4.19 is high and 4.20 until 5.00 is very high. The Likert Rating scale using to explain the finding. The classification of participation level of respondents was given on a discrete scale, the so-called "Likert scale", which is the most widely used method to scale responses in survey research (Kuntiyawichai, Dau, & Inthavong, 2017).

4.3 Finding

The factors that influence polytechnic students' choice of low-cost airlines in terms of price. Students tend to rely on several reference points such as ticket price, baggage overweight fees, inflight shop price and loyalty program discount or rewards when inferring price to choose certain low-cost airlines. The highest mean 3.89 which is the airline provides a good service for the price. The average mean score of this variable exhibit a sum of 3.73. This is a study or level of strongly agree. More information about the finding refer to table 2.

In service reliability, Malaysian students tend to rely on several reference points such as airline safety perception and on-time performance when inferring service reliability to choose certain low-cost airlines. The researcher has analysed and calculate the percentage of respondents that is satisfied or not in every question about the service reliability factor. The highest mean 4.20 which indicates that reliable airline safety information accessible. The average mean score of this variable is strongly agree with a sum of 4.08 from a total of five items that were being tested. This shows that the mean is strongly agree.

Table 2 : Reliability statistic for pilot study

SECTION	MEAN SCORE	HIGHEST MEAN	LOWER MEAN
Section A (Price).	3.73	3.89	3.58
Section B (Service Reliability)	4.08	4.20	3.97
Section C (Flight Availability)	3.88	4.11	3.76
Section D (Quality of Service)	3.93	4.32	3.66

Next, researcher was analysed the factors that influence student's choice of low-cost airlines in terms of flight availability. Students tend to rely on several reference points such as convenient flight schedule and availability of non-stop flight when inferring flight availability to choose certain low-cost airlines. The highest mean for this section is 4.11 which is airlines company provides flight service to various destinations. The average mean score of this variable exhibits a sum of 3.88 from a total five items that being were tested. This shows that the mean is also strongly agree.

Lastly, researcher analyse the factors that influence Malaysian polytechnic students' choice of low-cost airlines in terms of quality of service. Students tend to rely on several reference points such as seating comfort, seat space and others when inferring quality of service to choose certain low-cost airlines. The highest mean record of 4.32 indicates that the staff is customer friendly. The average mean score of this variable exhibits a sum of 3.93 from a total 5 items that being were tested. This shows that the mean is strongly agree.

5 CONCLUSION

Based on the findings, the main factor influenced Malaysian polytechnic students choose the low-cost airline are service reliability at 4.08 average mean score. Secondly, follow by the quality of service factor at 3.93 average mean score. Next factor is flight availability at 3.88 average mean score. The price factor is the last factor at 3.73 average mean score. Based on the finding, researcher was concluded that the service reliability, quality of service, flight availability and price are the most important determines of Malaysian polytechnic students' in selecting low cost airlines.

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HOW STORE ENVIRONMENT AND SALES PROMOTION INFLUENCE HEDONIC SHOPPING VALUE THROUGH IMPULSE BUYING

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ABSTRACT

This study aims to analyze and prove the effect of store environment and sales promotion on hedonic shopping value, which has an impact on impulse buying.The research method used in this research is descriptive survey method and explanatory survey with a sample size of 336 respondents, and the data analysis method used was SEM (Structural Equation Modeling). Based on the results of the study, the following findings were obtained: the store environment was able to increase impulse buying both directly and indirectly through hedonic shopping value, but the indirect effect was more dominant, so that impulse buying on Hypermarket customers in Banten province will increase if the store environment hypermarket conducted in Banten province is mediated by hedonic shopping value. Sales promotion can increase impulse buying both directly and indirectly through hedonic shopping value, but indirect influence is more dominant, so impulse buying on hypermarket customers in Banten province will be increased if sales promotion conducted on hypermarket in Banten province is mediated with hedonic shopping value. Based on the results of the two analyzes above, the hedonic shopping value variable in this study is a full mediating variable due to the increase in impulse buying which is influenced by the store environment and sales promotion as a whole mediated by hedonic shopping value.

Keywords: Store Environment, Sales Promotion, Hedonic Shopping Value, and Impulse Buying

INTRODUCTION

Rook and Fisher (2005) stated that impulse buying as the tendency of consumers to buy spontaneously, reflexively, suddenly and automatically. Nicholas et al., in Coley and Burgess (2003) showed that 50% of department store's customers shop impulsively, while in America and Europe impulse buying contributes to 60-70% of total sales at retail stores (Bell et al., 2011). In addition, 70-75% of buying decision was happened at the store (POPAI,).

Around 61% of Indonesia's customers have a habit to plan what to buy, yet always buy additional products in sudden. While only 10% of them never plan what to buy (Nielsen, 2007). This explains that impulse buying provides opportunities for retail businesses to increase sales, which in turn has an impact on increasing company profits. Therefore, many retail companies strive to use integrated marketing strategies, sustainable and with a large marketing budget to encourage impulse buying behavior. One example commonly used by retail companies is weekend promotions, by lowering prices and presenting promos for branded products. This is what makes many retail companies view that impulse buying is the main problem, given its existence can be profitable for the company, but on the other hand if impulse buying can have a low impact on company losses in terms of declining sales levels and the company must bear losses due to marketing costs that have been used.

Marketers need to identify the factors that cause impulse buying, in order to formulate an appropriate marketing strategy. Among of them is creating emotional feelings of consumers to encourage impulsive buying through the application of appropriate marketing mix strategies. The marketing mix is one indicator that is controlled by the company in order to attract consumers to come and shop. There are six elements of a marketing mix strategy in the context of retail business, namely location, merchandise, prices, advertising and promotion, outlet atmosphere, and retail services. The six elements of the retail marketing mix affect the company's survival and can be used to create added value compared to its competitors (Ma'ruf, 2006)

Cinjarevic et al., (2011) revealed that hedonic shopping value is one of the factors that influence the behavior of consumers who tend to make impulsive purchases. Rook and Fisher in Park (2006) state that impulsive buying behavior is often influenced by several things, one of which is a hedonic experience. Meanwhile, according to Silvera et al., (2008), impulsive purchases are pleasures that are driven by the achievement of hedonic goals where most consumers in Indonesia are currently more recreation-oriented who are concerned with the aspects of pleasure, pleasure, and entertainment when shopping (Ma'ruf, 2006). Hedonic values can be realized through entertainment in a shopping environment and large-scale retail outlets have the ability and resources to keep consumers entertained in shopping (Zhang et al., 2011).

Consumers who are more oriented towards hedonic motives assume that the outlet is not only seen as a place to shop but also a place for recreation and entertainment (Zhang et al., 2011). Consumers like this are happy with the enjoyment and fantasy gained from the shopping experience offered at the booth. Ballantine et al., (2010) states that the shopping environment can be designed in such a way with the aim of causing emotional effects in consumers, thereby increasing the likelihood of a purchase. Therefore, the outlet atmosphere is one of the important aspects that must be considered when managing business goals and consumer expectations (Grayson and Mc Neill, 2009). Retailers can provide stimuli in the shopping environment to encourage purchases because consumers who are concerned with the hedonic experience will prioritize a memorable shopping environment (Fam et al., 2011)

While Aruman (2007) states that the advertising budget and sales promotion is 70 to 30, now turned to 30 to 70, in other words sales promotions have an impact on sales, this is because the trend of consumer behavior. This fact makes sales promotions diverse. Forms of sales promotion to increase sales in stores are price discounts, free gifts, and banded or sales together (bundling). But in its development the original forms of sales promotion developed and experienced modifications. In addition, Abir Sahraoui Kchaoul and Rim Ben Amara (2014) stated that sales promotion and hedonic benefits have an effect on impulsive purchases. The form of sales promotion includes point of purchase (POP). POP includes all visual forms made by the brand owner, from the installation of hanging displays, advertisements on the floor to the placement of products in interesting shapes or sequences. In addition to POP, sales promotions can also be done in the form of contests, usually brand owners put game stands in supermarkets and hold several prize competitions. Another form is to provide lottery coupons that can be exchanged directly for discounted prices or provide gifts and samples attached to the product being sold. Most sales promotions do have short-term effects. For some marketers, sales promotions in the form of gifts that can anesthetize the purchasing power of consumers, meaning consumers buy only because of the gifts given.

This study was focused to analyze the influence of store environment and sales promotion to hedonic shopping value, which may affect to impulse buying of customers of hypermarkets in Banten province, which is the province of the top five in the rate of population growth in Indonesia.

METHOD

The mehods used on this study was using explanatory research design to validate whether store environment and sales promotion affects to hedonic shopping value towards impulse buying.

Population, sample and sampling technique

A cross-sectional survey was conducted to 336 costumers of 10 Hypermarkets in Banten province on July up to December 2016. The sampling technique was a purposive sampling accordance to Sugiono (2012) provided that they have visited Hypermarket for at least two times within 6 months and purchased unplanned products. Stores were chosen based on proportional random sampling. All the scales used Likert type to measure the correspondents agreement to each question in questioner.

Data analysis

In this study to validate the questioners, initially, confirmatory factor analysis was conducted. In addition, Gozali (2006) 's steps were followed by performing reliability analysis (Nandan Limakrisna, 2013). While, data was analyzed based on SEM (Structural Equation Modeling) with confirmatory factor analysis (Anderson and Gerbing, 1998) and regression weight (Gozali, 2008) using LISREL 8.8 program.

Statistical analysis

Hypothesis analysis for each variable was done by using the t-statistical test (partial test). As a comparison to see the significant effect, a significance level criterion of 5% (0.05) was used and comparing the t-count with the t-table with the following criteria:

a. If t-count <t-table means H0 is accepted and Ha is rejected
b. If t-count> t-table means H0 is rejected and Ha is accepted

The t-table provisions are obtained by comparing the number of samples with a significant level (0.05), then the t-table is obtained for 1.96.

While, to test the effect of all variables together a statistical test of F (simultaneous test) was performed. As a comparison to see the significant effect, a significance level criterion of 5% (0.05) was used and comparing the F-count with the F-table with the following criteria:

a. If F-count <F-table means that H0 is accepted and Ha is rejected
b. If F-count> F-table means H0 is rejected and Ha is accepted

The F-table provisions are obtained by comparing the number of independent variables with a significant level (0.05), then the F-table is obtained at 3.84. All the statistical analysis was done using SPSS 1.7 version.

RESULT AND DISCUSSION

This study was an empirical study using SEM method based on Anderson and Garben (1998), using two step approach; Measurement Model Analysis (MMA) and Structural Model Analysis (SMA). MMA would determine the validation and reliability each construct (relation of each latent variable) with dimension/manifest using CFA. To detect whether the items accurately measured each factor, all the dependent and independent variables were included in the factor analysis for each factor to be disclosed separately (Wijanto, 2008). While, SMA would analyze the relationship of them and used two kind of measurement based on Hair et al. (2006), they are that the Construct Reliability Measure (CR) value must be ≥ 0.7 and Variance Extract Measure value must be ≥ 0.5.

Validity of Measurement Scale

As regards the CFA, the variable's criteria must have standardized loading factor (SLF) ≥ 0.7 and value of │t│≥1.96 (at α = 0.05). The VE (Fornell and Larcker, 1981) were calculated for the validity and reliability analysis, with which the internal consistency and proportion of variance explained were identified by reflective constructs. It values more than 0.5 are acceptable. The CR are acceptable for values more than 0.7 (Bagozzi and Yi, 1988).

Tabel 1 : Measurement Analysis Model Hybrid (Full Model)

Measure Modelling		SLF	STD. Error (SE)	Valuet$_{count}$	Construct Reliability (CR)	Extract Variance (VE)
Variabel Laten	Var. Manifest					
Store Environment	Design factor (X1)	0.95	0.047	20.42	0.983	0.952
	Ambience factor (X2)	0.95	0.047	20.31		
	Social factor (X3)	0.97	0.046	21.25		
Sales Promotion	Free sample (X4)	0.92	0.048	19.17	0.989	0.945
	Bonus pack (X5)	0.93	0.048	19.44		
	Instore display (X6)	0.95	0.047	20.03		
	Price discount (X7)	0.90	0.049	18.23		
	Souvenir (X8)	0.88	0.050	17.57		
Hedonic Shopping Value	Adventure shopping (Y1)	0.95	0.033	29.12	0.993	0.960
	Gratificationshopping (Y2)	0.92	0.032	28.25		
	Role shopping (Y3)	0.89	0.035	25.74		
	Value shopping (Y4)	0.87	0.037	23.83		
	Social shopping (Y5)	0.91	0.033	27.84		
	Idea shopping (Y6)	0.90	0.035	25.96		
Impulse Buying	Spontaneity (Y7)	0.96	0.025	37.82	0.993	0.973
	Power, Compulsion and Intensity (Y8)	0.96	0.025	37.57		
	Excitement and stimulation (Y9)	0.95	0.026	36.08		
	Disregard for consequences (Y10)	0.95	0.026	36.48		

Notes : The criteria of both CR and VE was adapted from Hair et al., (2006 :636):
a.   Composite Reliability Measure, mostly called reability with condition CR ≥ 0,7.
b.   Variance Extract Measure (VE) with condition VE ≥ 0,5.

As observed in Table 1, the store environment factor is formed by three items, the sales promotion factor comprises four variables, both of them belong to exogenous latent variables. While, the endogen latent variables are the hedonic shopping value factor, which is formed by six variables, and finally, the impulse buying factor is made up of four variables. All latent variables exceeded the minimum limits of VE and CR, means that all those variables are good validated.

Data analysis

The assessment and construction of structural model was designed using LISREL 8.8 program. There are two forms of testing carried out in the structural model analysis namely Goodness Fit of Statistics (GOF) and structural model suitability test. The results of this conformity test are GOF values that can be seen from the relationship between the independent variable and the dependent variable (Figure 1). While the structural model suitability test is carried out through an examination of the significance of the resulting coefficients along with the tvalue value. If the structural path has a tvalue ≥ 1.96, then the coefficient of the path is declared significant. As observed in Table 2, in which strengthen the significant of relationship between exogenous and endogenous latent.

Figure 1 : SEM Model SE and SP Towards HV and IB

Chi-Square=1118.13, df=129, P-value=0.00000, RMSEA=0.075
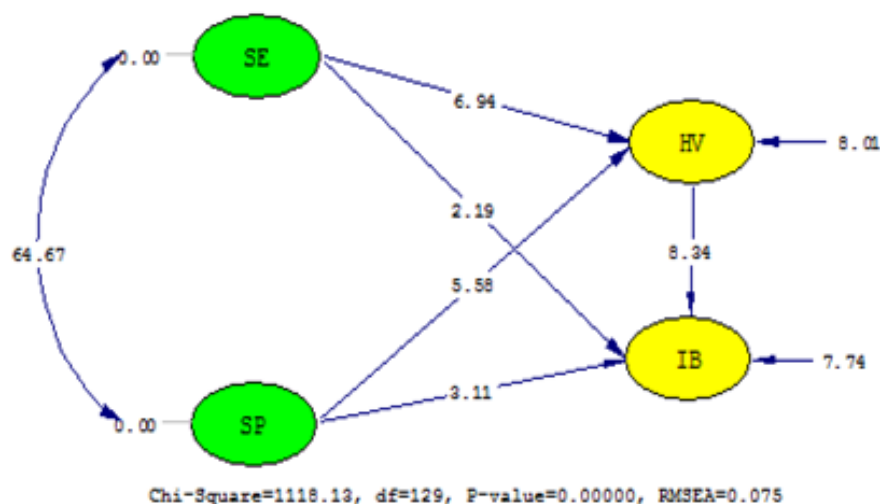
Table 2 shows that hedonic shopping value is significantly affected by store environment and sales promotion, furthermore, impulse buying is also affected by them. Its shows that H1B are similar to H2B. Similarly, the results suggest that thebehavioral intention of the visit is directly and significantly influ-enced by a mall's affective response.

Table 2 : Significance for exogenous and endogenous latent variables

No	Path Coefficient	Coef. Line	t_{value}	$T_{criteria}$	Results
1	Store Environment - Hedonic Shopping Value	0,53	6,94	1,96	Signicant
2	Sales Promotion - Hedonic Shopping Value	0,42	5,58	1,96	Signicant
3	Store Environment - Impulse Buying	0,16	2,19	1,96	Signicant
4	Sales Promotion - Impulse Buying	0,21	3,11	1,96	Signicant
5	Hedonic Shopping Value - Impulse Buying	0,61	8,34	1,96	Signicant

Effect of Store Environment and Sales Promotion towards Hedonic Shopping Value

The magnitude of the store environment variable path coefficient of the hedonic shopping value is 0.53 with a tcount of 6.94> 1.96, so it can be said to be significant. The magnitude of the path coefficient shows that the direct contribution of store environment influences the hedonic shopping value of $(0.53)2 = 28.09\%$, while the indirect effect on hedonic shopping value contributes 20.03% so that the total effect of the store environment to hedonic shopping value with a contribution of 48.12%. Thus the store environment is proven to have a positive and significant effect on hedonic shopping value or in other words that H1 is accepted.

The magnitude of the path coefficient of the sales promotion variable to the hedonic shopping value is 0.42 with a tcount of 5.58> 1.96, so it can be said to be significant. The magnitude of the path coefficient shows that the magnitude of the contribution of the influence of sales promotion directly on hedonic shopping value of $(0.42)2 = 17.64\%$, while the indirect effect of sales promotion on hedonic shopping value with a contribution of 20.03% so that the total effect sales promotion of hedonic shopping value with a contribution of 37.67%. Thus, sales promotion is proven to have a positive and significant effect on hedonic shopping value or in other words that H2 is accepted.

Store Environment and Sales Promotion together have a positive effect on Hedonic Shopping Value

The magnitude of the coefficient of determination (R2) of store environment and sales promotion variables together with the hedonic shopping value is 0.70 with a calculated F value of 392.52> 3.84, so it can be said to be significant. The magnitude of the coefficient of determination (R2) shows that the magnitude of the contribution of the influence of the store environment, and sales promotion together to hedonic shopping value of 70%, while the remaining 30% is a large influence outside the variable store environment, and sales promotion. The most dominant variable influencing hedonic shopping value is the store environment variable. Thus, the store environment, and sales promotion together proved to have a positive and significant effect on hedonic shopping value in other words that H3 was accepted. The coefficient of determination (R2) is the total

direct and indirect influence of store environment and sales promotion variables on hedonic shopping value can be seen in Table 3 below.

Table 3 : The coefficient of determination (R2) Hedonic Shopping Value

Variables	The Amount of Contribution			
	Direct	Indirect	Notes	Total
Store Environment (SE)	0.2809			0.4033
		0.1224	Through SP	
Sales Promotion (SP)	0.1764			0.2988
		0.1224	Through SE	
The joint effect of SE and SP on HV			R2	0.7021
Effect of Variables Other Than SE and SP on HV			ζ_1	0.2979

Testing the Effect of Store Environment, Sales Promotion and Hedonic Shopping Value on Impulse Buying

Effect of Store Environment on Impulse Buying

The magnitude of Store Environment variable path coefficient on impulse buying is 0.16 with a t_{count} of 2.19> 1.96, so it can be said to be significant. The magnitude of the path coefficient shows that the direct contribution of store environment influence on impulse buying is (0.16)2 = 2.56%, while the indirect effect of store environment on impulse buying with contribution of 11.85% so that the total effect of store environment to impulse buying with a contribution of 14.41%. Thus the store environment is proven to have a positive and significant effect on impulse buying or in other words that H4 is accepted.

Effect of Sales Promotion on Impulse Buying.

The magnitude of the path coefficient of the sales promotion variable on impulse buying is 0.21 with a t_{count} of 3.11> 1.96, so it can be said to be significant. The magnitude of the path coefficient shows that the magnitude of the contribution of the influence of sales promotion directly on impulse buying is (0.21)2 = 4.41%, while the indirect effect of sales promotion on impulse buying with a contribution of 14.49% so that the total effect of sales promotion to impulse buying with a contribution of 18.90%. Thus, sales promotion is proven to have a positive and significant effect on impulse buying or in other words that H_5 is accepted.

The Effect of Hedonic Shopping Value on Impulse Buying.

The magnitude of the path coefficient of the hedonic shopping value variable to impulse buying is 0.61 with a tcount of 8.34> 1.96, so it can be said to be significant. The magnitude of the path coefficient shows that the magnitude of the contribution of the influence of hedonic shopping value directly on impulse buying is (0.61)2 = 37.21%, while the indirect effect of hedonic shopping value on impulse buying with a contribution of 19.87% so that the total effect hedonic shopping value to impulse buying with a contribution of 57.08%. Thus the hedonic shopping value is proven to have a positive and significant effect on impulse buying or in other words that H6 is accepted.

The Effect of Store Environment, Sales Promotion and Hedonic Shopping Value Together on Impulse Buying.

The magnitude of the coefficient of determination (R2) of store environment, sales promotion and hedonic shopping value variables together with impulse buying is 0.76 with a Fcount of 356.32> 3.84, so it can be said to be significant. The magnitude of the coefficient of determination (R2) shows that the magnitude of the contribution of the influence of store environment, sales promotion and hedonic shopping value together to impulse buying by 76%, while the remaining 24% is a large influence outside the variable store environment, sales promotion and hedonic shopping value. The most dominant variable influencing impulse buying is the hedonic shopping value variable. Thus, the store environment, sales promotion and hedonic shopping value together proved to have a positive and significant effect on impulse buying or in other words that H7 is accepted. The determinant coefficient (R2) is the total effect of the variable environment, sales promotion and hedonic shopping value on impulse buying can be seen in Table 4 below.

Table 4 : The coefficient of determination (R^2) Impulse Buying

Variables	The Amount of Contribution			
	Direct	Indirect	Notes	Total
Store Environment (SE)	0.0256			0.1222
		0.0185	Through SP	
		0.0781	Through HV	
Sales Promotion (SP)	0.0441			0.1266
		0.0185	Through SE	
		0.0641	Through HV	
Hedonic Shopping Value (HV)	0.3721			0.5142
		0.0781	Through SE	
		0.0641	Through SP	
The joint effect of SE and SP on HV			R2	0.7630
Effect of Variables Other Than SE and SP on HV			ζ_1	0.2370

Direct and indirect influence of Store Environment on Impulse Buying through Hedonic Shopping Value

The direct effect of store environment on impulse buying is $(0.16)2 = 0.0256$, while the indirect effect of store environment on impulse buying through hedonic shopping value is $0.53 \times 0.61 = 0.3233$. This shows that the store environment can increase impulse buying both directly and indirectly through hedonic shopping value, but the indirect effect is more dominant. So that impulse buying for Hypermarket customers in Banten province will be increased if the hypermarket store environment in Banten province is mediated by hedonic shopping values.

Direct and indirect effect of Sales Promotion on Impulse Buying through Hedonic Shopping Value value

The direct effect of sales promotion on impulse buying is $(0.21)2 = 0.0441$, while the indirect effect of sales promotion on impulse buying through hedonic shopping value is $0.42 \times 0.61 = 0.2562$. This shows that sales promotion can increase impulse buying both directly and indirectly through hedonic shopping value, but indirect influence is more dominant. So that impulse buying to hypermarket customers in Banten province will increase if sales promotion conducted at hypermarket in Banten province is mediated by hedonic shopping value.

Based on the results of the two analyzes above, the hedonic shopping value variable in this study is a full mediating variable because of the increase in impulse buying which is influenced by the store environment and overall sales promotion is mediated by the hedonic shopping value.

CONCLUSION

DISCUSSION

Store Environment has a positive and significant effect on Hedonic Shopping Value

Based on the analysis of respondents' perceptions of the description of store environment variables in hypermarkets in Banten province, the store environment level is in the medium category with a score of 3.20 in the range of 2.61 - 3.40 in the Fair category. This shows that hypermarkets in Banten province already have a fairly good store environment, especially on indicators such as lighting levels in the store, employees ready to help, the color of the store interior, sufficient number of employees, and the type of music played. However, there are several indicators that have to get attention and improvement by Hypermarket leaders in Banten province in establishing a store environment such as at the price markers, temperature regulation in the store, shelving arrangement, shop decoration, friendly and polite employees, employee appearance, and room aroma.

The results of data analysis with statistical tests prove that the store environment has a positive and significant effect on hedonic shopping value in hypermarkets in Banten province of 0.53, the path coefficient shows that the direct contribution of store environment to the hedonic shopping value is 28.09%. While the contribution of indirect influence of store environment on hedonic shopping value is 20.03%. This shows that if

the store environment is done well and maximally it will be able to significantly influence the hedonic shopping value in Hypermarket across Banten province. The most dominant store environment element is in the social factor dimension, which means that the store environment will be formed better if the store environment is carried out with social factors, both through employee performance, friendly and polite employees, sufficient number of employees, and ready employees help, so it will have an impact on increasing the hedonic shopping value, especially on the adventure shopping dimension.

Therefore the facts of the research results prove that the store environment has a positive and significant impact on hedonic shopping value. The results of this study are in line with the results of research conducted by Zhang et al., (2011), who found that the outlet atmosphere will affect the hedonic (emotional) value of consumers. Likewise, the results of this study are in line with the results of research conducted by Yistiani et al., (2012), which shows that store atmosphere has a significant effect on hedonic shopping value. The same thing was expressed in the research of Kusuma, et al., (2013), to increase sales, retailers must pay more attention to the shopping environment considering that hedonistic consumers tend to prefer a comfortable store environment

Sales Promotion has a positive and significant effect on Hedonic Shopping Value

Based on the analysis of respondents' perceptions of the description of sales promotion variables in hypermarkets in Banten province, it shows that sales promotion is in the medium category with an average score of 3.24 in the range of 2.61 - 3.40 in the Fair category. This shows that hypermarkets in Banten province have done quite well sales promotion. Fairly good Hypermarket in Banten province is indicated by several indicators such as the level of price discounts given by customers feeling benefited, indicators for customers interested in attractive product displays, free samples, namely the level of customer interest in free samples given and the level of frequency of free until given to the customer, and bonus pack especially at the level of frequency the bonus pack is given to the customer. However, good enough sales promotion on hypermarkets in Banten province, there are still some indicators that still need attention and improvement so that sales promotion will be much better, such as indicators of the level of customer interest in souvenirs given and also on the indicator of the frequency level of souvenirs and also at the price discount, especially on the indicator of the frequency of the price discount that is given, as well as on the bonus pack especially at the level of customer interest in the given bonus pack.

The results of data analysis with statistical tests prove that sales promotion has a positive and significant effect on hedonic shopping value in hypermarkets in Banten province of 0.42, this coefficient indicates that the direct contribution of sales promotion to hedonic shopping value is 17.64%. While the large contribution of the indirect influence of sales promotion on hedonic shopping value is 20.03%. This shows that if sales promotion on hypermarkets in Banten province is carried out better or increased, it will be able to significantly influence the increase in hedonic shopping value in hypermarkets in Banten province. The most dominant element of sales promotion is on the instore display dimension, which means that the higher the sales promotion support that is woven through the increase in instore displays, namely through the level of customer interest in attractive product displays or through the level of customers is easy to get the product, it will have an impact on an increase in hedonic shopping value, especially in the adventure shopping dimension of hypermarkets in Banten province.

Therefor the facts of the research results prove that sales promotion has a positive and significant impact on hedonic shopping value. The results of this study are in line with the results of research conducted by Kwok and Uncles (2005), which suggests that the presence of sales promotion activities makes someone happy about shopping. Kwok and Uncles also explained that Sales promotion effectiveness: the impact of customer differences at ethnicgroup level. In addition to explaining the effect of sales promotion on hedonic shopping responses, this research also explains cultural or ethnic factors. The results of the study say there is no cultural relationship with the hedonic shopping motive, nor do sales promotions have a relationship with culture.

Store Environment and Sales Promotion together have a positive and significant effect on Hedonic Shopping Value

The results of data analysis with statistical tests state that the store environment and sales promotion jointly have a positive and significant effect on hedonic shopping value, with the amount of joint contribution of 70%, while the remaining 30% is influenced by factors other than the store environment, and sales promotion, such as price, service quality, customer satisfaction, and others. But partially the most dominant variable the effect on hedonic shopping value on Hypermarket customers in Banten province is the store environment variable that is equal to 0.53 with a total contribution of 48.12%.

The most dominant store environment dimension is the social factor dimension, while the most dominant dimension of sales promotion is the instore display dimension. This indicates that the better social factors that are given in building a store environment and supported by the better instore display approach in developing sales promotion, will have an impact on increasing the high hedonic shopping value of Hypermarket in Banten province.

The results of this study complement some of the results of previous studies, such as the results of research from Vika Ary Ratnasari et al., (2015), showing that the store atmosphere has a positive and significant effect on hedonic shopping value, this is because a comfortable atmosphere store will stimulate conditions emotionally positive so that it will lead to a pleasant shopping experience. Research conducted by Simon Kwok and Mark Uncles (2005), Sales Promotion effectiveness: the impact of customer differences at ethnicgroup level. In addition to explaining the effect of sales promotion on hedonic shopping responses, this research also explains cultural or ethnic factors. The results of the study say there is no cultural relationship with the hedonic shopping motive, nor do sales promotions have a relationship with culture.

Store Environment has a positive and significant influence on Impulse Buying

The results of data analysis with statistical tests prove that the store environment has a positive and significant effect on impulse buying in hypermarkets in Banten province with a coefficient of 0.16, the path coefficient shows that the direct contribution of store environment to impulse buying is 2.56%. While the contribution of indirect influence of store environment on impulse buying is 11.85%. This shows that if the Hypermarket store environment in Banten province is well and optimally arranged, it will be able to significantly influence impulse buying in Hypermarkets in Banten Province. The most dominant store environment element is in the social factor dimension, which means that the store environment will be formed better if the store environment is formed with a good social factor through the appearance of employees, friendly and polite employees, sufficient number of employees, and ready employees help, so that it will have an impact on increasing impulse buying, especially on the dimensions of spontaneity and Power, Compulsion and Intensity.

Therefore the facts of the research results prove that the store environment has a positive and significant impact on impulse buying. The results of this study are in line with the results of research conducted by Rock et al. (2005), which states that the stimulus store environment has a positive effect on impulse buying. Likewise, the results of this study are in line with the results of research conducted by Yingjao Xu (2007), which states that "Impact of store environment on adult generation consumers impulse buying", the results of the study concluded that store environment and emotional responses had a positive influence on the variable of impulse buying.

Sales Promotion has a positive and significant influence on Impulse Buying

The results of data analysis with statistical tests prove that sales promotion has a positive and significant effect on impulse buying in hypermarkets in Banten province of 0.21, this coefficient indicates that the direct contribution of sales promotion to impulse buying is 4.41%. While the large contribution of the indirect influence of sales promotion on impulse buying is 14.49%. This shows that if sales promotion on hypermarkets in Banten province is carried out better or increased, it will be able to significantly influence impulse buying on hypermarkets in Banten province. The most dominant element of sales promotion is on the instore display dimension, which means that the higher sales promotion support that is woven through the level of customers interested in attractive product displays or through the level of customers is easy to get the product, it will have an impact on increasing impulse buying, especially in the dimension of spontaneity and power, compulsion and intensity in hypermarkets throughout Banten province.

Therefore the facts of the research results prove that sales promotion has a positive and significant impact on impulse buying. The results of this study are in line with the results of research conducted by David S. Simatupang in Marketing (2007), which said that the purpose of sales promotion is to increase short-term sales

volume by creating attractive displays and activities to encourage impulse buying. Then the results of this study complement the results of research conducted by Mihic and Kursan (2010), examining the impact of several unplanned situational factors in buying, including: sales promotion, salesman efficiency and store location. They found that most of the factors that had a significant effect on impulse buying were sales promotions.

Hedonic Shopping Value has a positive and significant effect on Impulse Buying

The results of data analysis with statistical tests prove that hedonic shopping value has a positive and significant effect on impulse buying in hypermarkets in Banten province of 0.61, this coefficient indicates that the direct contribution of hedonic shopping value to impulse buying is 37.21%. While the large contribution of the indirect effect of hedonic shopping value on impulse buying is 19.87%. This shows that if Hypermarket customers in Banten province have a good hedonic shopping value, they will be able to significantly influence impulse buying in hypermarkets in Banten Province. The most dominant dimension of hedonic shopping value is the adventure shopping dimension, which means that the better the level of customers doing shopping activities because of new models / new products, customers do shopping activities with the aim of interacting with others, customers feel adventurous when shopping, customers shop because they get discounts, bonuses, samples etc., customers shop because they are influenced by the role of families, and customers shop because they meet the needs, it will have an impact on increasing impulse buying, especially in the dimensions of spontaneity and Power, Compulsion and Intensity in hypermarkets in Banten province.

Therefore the facts of the research results prove that hedonic shopping value has a positive and significant impact on impulse buying. The results of this study are in line with the results of research conducted by Park et al., (2006), showing that emotional (hedonic) values encourage impulsive buying. While Samuel (2006), found that emotional value has a direct positive impact on the tendency of impulsive buying behavior. The same thing was stated by Junghun Kim and Robert La Rose, (2007), someone shopped because of the shop situation it caused. They come by buying something but because of the placement of attractive goods, pleasant atmosphere, they finally make a purchase without a plan. This activity is related to hedonic and unplanned purchases called impulse buying. The point is that this hedonic will result in impulse buying.

Store Environment, Sales Promotion and Hedonic Shopping Value together influence Impulse Buying

The results of data analysis with statistical tests state that the store environment, sales promotion and hedonic shopping value together have a positive and significant effect on impulse buying. The contribution of store environment, sales promotion and hedonic shopping value together to impulse buying is 76%, while 24% is influenced by other factors besides store environment, sales promotion and hedonic shopping value, such as variable price, service quality, customer satisfaction and others. However, partially the most dominant factor influencing impulse buying in hypermarkets in Banten province is the hedonic shopping value variable that is equal to 0.61 with a total contribution of 57.08%.

The most dominant dimension of hedonic shopping value is the adventure shopping dimension, the most dominant store environment dimension is the social factor dimension, and the dominant sales promotion dimension is the instore display dimension. This indicates that the higher the adventure shopping in building hedonic shopping value, the better the social factors undertaken by hypermarket in Banten province in building a store environment and supported by the better instore display in building sales promotion, it will have an impact on increasing impulse buying in hypermarkets se Banten province, especially in the dimensions of spontaneity and Power, Compulsion and Intensity.

Thus the facts of the research results prove that the store environment, sales promotion and hedonic shopping value together have a positive and significant impact on impulse buying hypermarket customers in Banten Province. The results of this study complement some of the results of previous studies, such as the results of research conducted by Yistiani, N.N.M., Yasa, N.N.K., and I. Atmosphere. (2012), that "The influence of outlet atmosphere and retail services on hedonic values and impulsive purchases", the results concluded that store atmosphere has a significant effect on hedonic shopping value, hedonic shopping value has a significant influence on impulsive purchases. Also the results of research by Denny Kurniawan and Yohanes Sondang Kunto (2013), which states "The effect of promotion and store atmosphere on impulse buying with shopping emotion as an intervening variable", the results concluded that promotion and store atmosphere has a positive and significant effect on shopping emotion, and promotion and store atmoshphere has a positive and significant influence on impulse buying.

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THE EFFECT OF ISLAMIC RELATIONSHIP MARKETING ON THE CUSTOMER TRUST TOWARDS TAKAFUL AGENT

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ABSTRACT

The significant of Takaful agents as an intermediary in the Takaful market is unquestionable because the product offered need of human touch not merely technologies advancement. In Islamic point of view, the role of Takaful agents are not just limited to persuade people to join the Takaful scheme but further than that they have to behave according to Islamic norms when dealing with clients. Islamic Relationship Marketing (IRM) is the marketing way in building a relationship between marketers and clients based on Islamic guidance. Therefore, this research aims to examine the effect of IRM being practiced by Takaful agents on customers' trust besides determining the most dominant factor that effects customer trust. 108 Takaful participants from Polytechnic Sultan Salahuddin Abdul Aziz Shah had contributed to this study through the distribution of questionnaires. Descriptive and inferential analyses were used to study the data of the answered structured questions. According to results obtained from the study, three of the independent variables (Islamic Ethical Behaviour, Structural Bond, Financial Bond) give a positive and significant effect on customer trust and the most influential variable towards customer trust is Islamic Ethical Behaviour.

Keywords: Islamic Relationship Marketing, Customer Trust, Takaful, Takaful Agent

1.0 INTRODUCTION

Nowadays, people around the globe will no longer depend solely for conventional insurance for their life, property or liability protection. They have an option to choose Islamic insurance. Islamic insurance which is known as Takaful is based on the concept of takaful that is developed on three principles which are mutual responsibility, co-operation with each other and protecting one another from any kind of difficulties, disasters and other misfortune whereby the financial contribution (premium) is based on the concept of tabarru' (Osman, 2003). Tabarru' is derived from the Arabic noun that means the donation, gift and contribution (Billah, 2001). The word takaful is derived from the Arabic word kafala which means to guarantee, look after or trust. The noun takaful is derived from verb kafala which can be translated as "helping one another" or "looking after one another". Takaful products can also be offered in other different names such as Islamic insurance, Halal insurance, ethical insurance, Islamic mutual insurance, co-operative insurance and community insurance (Salman, 2014). In Takaful business, Takaful operators have two-fold motives, which are to earning a profit and complying with Shari'ah. A current marketing practice of the Takaful industry requires agents to market and distribute the Takaful products to the public. Consequently, Takaful agents play an important role on behalf of the Takaful operator, to represent the Takaful operators and their products. More importantly, the agents would present the image of the Takaful as an Islamic type of insurance. Islamic Marketing is a very new field in Marketing. Islamic Marketing could be defined as the process of identification and implementation of value maximization strategies for the welfare of the stakeholders in particular and the society in general governed by the guidelines given in Quran and Sunnah (Hussnain, 2011). Islamic Relationship Marketing (IRM) thus can be interpreted as the marketing process that emerged for the purpose of building a relationship between marketer and a consumer based on the Islamic guidance towards Allah's (God the Almighty) blessing (Marhanum, 2012). The practice of IRM is encouraged in the Takaful industry because it parallels the Islamic norms which uphold the spirit of brotherhood in the societies (Salleh, 2012).

1.1 RESEARCH PROBLEM

After 35 years of operation, The Malaysian Takaful industry is still considered a growing industry with a low penetration level. The penetration rate of the industry in 2015 for their Family business stood at 14.71% an increase only 0.23% from the previous year (Annual Report , 2015). On the other hand, this class of business also faced with a problem of surrendering policies by the participant. Based on information obtained from Bank Negara website, the number of customers who surrendered their Family Takaful Scheme has continued to increase since 2006. The highest number was recorded in 2010 in which approximately 139,021 of Family Takaful participants have surrendered their policies (Annual Report , 2010). It seems that, there is an issue with the customer trust in this industry. There are various reasons might lead to this situation. However, the fact there are numbers of cases regarding the unethical behavior of agents can be one of the reasons for participants decided to surrender the policy as they have no trust in the Takaful agents. Lately, the number of cases of unethical behavior of agents has been highlighted in the local newspaper. For instance, former director of insurance broker charged with cheating, bribing and using false documents involving more than RM 80,000 (Bernama, 2013). In another case, a customer wrote in the one of the local newspaper, alleging an agent had misrepresented facts in his proposal form and withheld medical document on the pretext of ensuring the approval of the proposal, while upon correcting the error, the client policy was suspended. Subsequently, when the client met with an accident, his medical claim was rejected (Ismail, 2014). According to the statement Financial Mediation Bureau in 2013, there is an increase of complaints related to the conduct of agents and repudiation of liability. Based on the abovementioned issues, it is crucial to examine whether agent-customer relationships has enormous implications and effect, especially on customer trust.

2.0   LITERATURE REVIEW

The concept of relationship marketing was defined as the attraction, maintenance and development of a relationship with the client (Berry L. L., 1991). This definition was extended by the same scholar in 2002 when he explained the target of relationship marketing is to build strong relationships with 'key people', who are in fact a company's existing customers (Berry, 2002). Relationship marketing refers to everything you do to develop strong, lifelong relationships with your customers. From influencer programs to referral campaigns to affiliate marketing, relationship marketing builds brand awareness and positions your brand as your customer's best option (Kapadia, 2017). This is reflected in the various definitions of relationship marketing used in the marketing literature (Nevin, 1995) (Blois, 1996) (Wu, 2007). Interestingly, (Keillor, 1999) found 26 definitions of relationship marketing and divided them into seven categories: birth, development, maintenance, temporality, interactions, outputs, and emotional content. Based on their content analysis study, the authors opined that one of the most comprehensive definitions of relationship marketing was that given by (Gronroos, 1994)'to establish, maintain, and enhance relationships with customers and other partners at a profit, so that the objectives of the parties involved are met' (Gronroos, 1994). Other than that, relationship marketing also refers to, research in relationship marketing encourages analyzing variables of satisfaction, commitment and trust through studying their consequences on the future behaviors, namely, loyalty, positive word-of-mouth activity, cooperation and performance (Adrian Payne, 2000) .

2.2 Relationship Marketing (RM) from the Islamic perspective

The subject of RM has received great attention in Western studies. However, Asian literature addressing this topic remains scarce. Although research on RM is a popular marketing topic and has escalated in the past three decades, research on this subject from the Islamic perspective is very limited. This subject is interesting from the Islamic perspective because from the very beginning, Islam has actively defined the types and forms of relationships. The unique nature of Islamic relationships is reflected in Islam's recognition of both vertical and horizontal interactions. Through the concept of tawḥīd, the vertical interaction of human beings with the Creator is emphasized (Yusuf, 2010) (Arham, 2010). Horizontal interactions occur between human beings and between them and other creatures (Yusuf, 2010) Additionally, Islamic marketing is "an acknowledgment of a God-conscious approach to marketing from a marketer's and/or consumer's perspective which draws from the drivers or traits associated with Islam". From the Islamic perspective, RM is not only concerned with human relationships as proposed by Western studies but also deals with the ultimate relationship between humans and their Creator. In Islam, there is a connection between these relationships; worshipping according to (Wilson, 2012). Accordingly, both Muslim and non-Muslim takāful agents are encouraged to be honest in dealing with customers, to be responsible and trustworthy when making promises to them, to deliver any information required by them, and to also be knowledgeable about customers, products, and the market (Marhanum, 2012). These marketing practices have become the common responsibility of all marketing agents, and the execution of these Islamic aspects of marketing may enhance the performance of marketers as they receive positive feedback and commitment from the customers. They will guarantee that marketers are successful in building good relationships with their customers, ensuring future customer retention for the marketers and the company. (Salleh, 2014)

2.3 The importance of Islamic Relationship Marketing (IRM) in takaful industry

The same circumstances are present in the Malaysian takaful industry, in which there are now many takaful operators offering a variety of takaful products. In this situation, takaful operators must have strategic plans to boost their position in the industry, and this can be done by offering special services with social benefits to the customers, based on their needs, via the IRM approach (Gwinner, 1998). Operators must take great care of their customers' needs and maintain good relationships with them because customers are their most profitable asset. Therefore, to raise profit and performance, operators have to ensure strong and long-term relationships with their customers (Berry L. , 1983). Accordingly, in the Takaful industry, the responsibility of the Takaful agents is considered as a financial consultant or advisor they are responsible to inform and advise the customer about the future financial preparation by proposing a suitable Takaful product based on their needs and executed based on the Islamic ethics. This relates to religious aspects that promote affiliation, commitment, motivation, knowledge, and social consequences, and is believed to influence customers' confidence with the salesperson (Nazlida, 2010). In the Takaful industry, the relationship between agents and their customers is automatically developed because the agent's knowledge of the products and services involves interaction and communication between agents and clients which may generate good relationships. Also emphasize that RM is not only to attract customers but to ensure maintaining existing customers (Maznah Wan Omar, 2010).

2.4 Customer trust

Trust is an ethical element in a relationship because it does not involve any sense of enforcement (Murphy, 2007). Trust and commitment may directly impose cooperative behaviours; thus, they help guarantee the success of relationship marketing (Morgan, 1994). They also stated that trust exists only when one party has confidence in an exchange partner's reliability and integrity. The majority of researchers are relied the trust, as a believed on the promise of exchange party whom the customers have confidence towards the trustworthiness, credibility, benevolence, reliability, and integrity of the sellers (Paul H. Schurr, 1985).

Ethics is described as the set of moral principles that distinguish what is right from what is wrong (Beekun, 2003). According to (Rizk, 2008), ethics is related to the establishment of general guidance for human action or conduct. Besides, (Hassan, 2008) have advocated that Islamic ethical behaviours play a significant role in the development and maintenance of the buyer-seller relationship. This is further supported by a more recent study by (Shamsudin, 2010), in which the authors claim that Islamic ethical behaviour has promoted a positive environment in relationship marketing practice, and this naturally would lead to customer satisfaction. Social bonds are described as 'the degree of mutual personal friendship and liking shared by the buyer and seller' (Wilson, 1995). In relationship marketing, the basis of this type of bond is from a business-to-business perspective, where it represents strong connections among business organizations (Smith, 1998). Meanwhile, from a customer's point-of-view, social bonding emerges as a result of the benefits received from the relationship with the company (Gwinner, 1998). Accordingly, a social bond is built through interpersonal exchanges that can be measured by the strength of the personal relationship between a buyer and a seller (Rodriguez, 1998).

It also represents a form of non-economic satisfaction for both parties in a relationship with an enduring social exchange (Dwyer, 1987). In that regard, (Lin, 2003) have advocated that this type of bond would contain interpersonal interactions that could help maintain customer loyalty. Meanwhile, (Berry, 1995) and (Parasuraman, 1991) described the importance of marketers' interference in building friendships that could help to persuade customers to stay loyal to the company's services. Marketers at this level would want to stay in touch with their customers, and when necessary offer social support to them as well (Berry L. , 1995).

Compare to social bonds, structural bonds are present when a business enhances its relationship with customers by facilitating them to fulfill their needs through a service-delivery system (Lin, 2003). Based marketing literature, (Wilson, 1995) describes a structural bond as a vector of forces that create an impediment to the termination of the relationship. It consists of economic, strategic, and technical factors that are developed in relationships that offer benefits to all contractual parties (Wilson R. &., 1999). In this case, a company might insert some value-added incentives to the product infrastructure that might not available elsewhere to the customer (Berry, 1995). A Service providers may also use structural bonds to maintain customer loyalty (Lin, 2003). This is because structural bonds provide an infrastructure that makes a customer feels convenient, and this would give the company a key advantage over its competitors (Sin, 2002). However, relationship marketing should only be exercised when it continuously gives advantage to the parties involved; which in this case are the company and the customer. For example, the company provides enough facilities to the customer and as a result, the customer remains loyal to the company. In this instance, both parties enjoy the benefits and may persevere with the relationship for a long-term period (Morgan, 1994).

Researchers in the past have argued that one of the motivations for engaging in relational exchanges is to save money (Berry G. e., 1998). In this respect, some researchers agree that this type of bond is at the lowest level of the relationship hierarchy because, in business, pricing is the most easily imitated marketing element (Chiu, 2007). Hence, service providers may reward loyal customers with special prices (Lin, 2003). (Hsieh, 2005) suggest that a marketer who demonstrates excellent social and financial bonds would able to retain their customers in the future. Moreover, by extending (Nelson Oly Ndubisi, 2005)'s earlier research, a recent study on relationship marketing conducted by (Peter Anabila, 2012) similarly found that social and financial bonds can become important determinants of customer loyalty.

3. METHODOLOGY

3.1 Sample and Data Collection

The population for this study was consists of lecturers from Polytechnics Sultan Salahuddin Abdul Aziz Shah who are customers to the Takaful services. The respondents were selected using cluster sampling method. They are lecturers from Commerce Department, Civil Engineering Department, Electrical Department, Mechanical Department, General Studies Department and Mathematical, Science and Computer Department. The numbers of respondents chosen for this study were determined by Krejcie and Morgan table. Therefore, the sample size chosen for this study was 108 respondents. The survey questionnaire consisted of three sections. In section A of the questionnaire is demographic (gender, age and educational level). Section B and C consisted of items that measured how the independent variables which are Islamic Ethical Behaviour (IV), Structural Bond (IV), Financial Bond (IV) and Social Bond (IV) effect the customer trust (DV). Each of the items used a five-point Likert Scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

3.2 Conceptual Framework

Figure 1: Islamic Relationship Marketing on Customer Trust
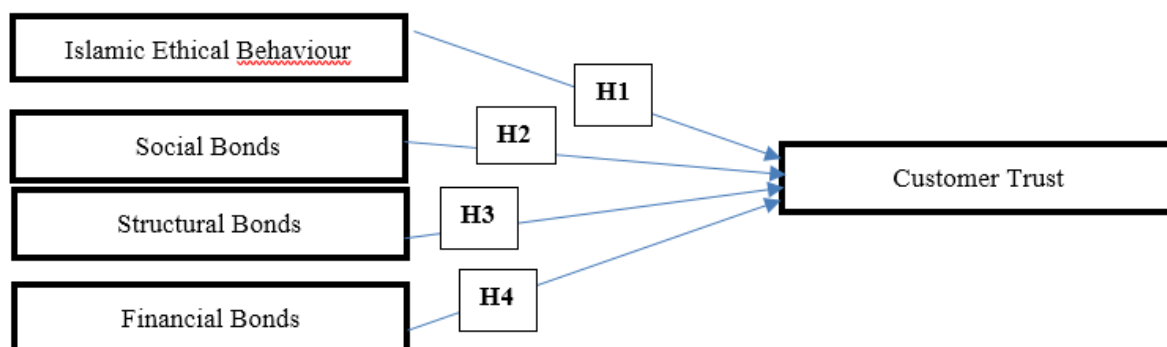
4. RESULTS

4.1 Respondents' Profiles

Results showed that a majority of the respondents were female (77.8%) compared to males (22.2%). Based on Table 1, a majority (30.6%) of the respondents were in the age group (31-40 years old). The education background of the respondents involved in the survey indicated that 49.1% were master's holders, 31.5% were Bachelor's degree holders and while the remaining respondents 19.4%, Ph.D.'s holder.

Table 1: Respondents' Demographic Profile (n = 108)

Demographic Variable	Frequency	Percentage (%)

Gender
    Male
    Female
	24
	84
		77.8
		22.2

Age
    30 years old and below
    31 – 40 years old
    41- 50 years old
    50 – 59 years old
    60 years old and above
	15
	33
	29
	12
	19
		13.9
		30.6
		26.9
		11.1
		17.5

Educational Level
    Degree
    Master
    PhD
	34
	53
	21
		31.5
		49.1
		19.4

4.2 Analysis of Results

Based on Table 2, it is shown that the mean for customer trust and Islamic ethical behavior is considered high. Meanwhile, with respect to social bond, structural bond and financial bond, it is encouraging that all the results showed moderate in terms of the mean.

Table 2: Descriptive Analysis for all Variables

Variable	Mean	Standard Deviation
Customer Trust (CT) – DV		
My takaful representatives gave me a free gift when I first participated in takaful	3.90	1.093
He/she fulfills promises	4.03	.767
He/She is concerned with my financial protection needs	4.04	.767
He/She can be relied on to do what is right	4.08	.699
He/She is a trustworthy person	4.09	.677
Islamic Ethical Behaviour(IEB) – IV		
My takaful representatives explain clearly about Sharia aspects of takaful compared to conventional insurance	3.99	.779
He/she gives me adequate information about takaful scheme	4.06	.740
He/she explains to me about the objective of takaful which is a donation scheme and cooperation among participants	4.10	.640
He/she practices professional attitudes in dealing with me	4.09	.756
Honest person	4.09	.704
Responsible person	4.03	.755
Maintains good relationship with me	4.18	.721
Protects my confidentiality	4.18	.681
He/she wears professional attire	4.19	.686
Social Bond (SB) – IV		
I receive greeting cards/gift on my special occasions	3.56	1.062
He/she would call/meet me whenever I counter any problem	3.81	.814
Asks my feedback about his/her services	3.82	.874
He/she provides services after I participate in takaful scheme	3.88	.862
My takaful agent contacts me to keep in touch	3.96	.864
Structural Bond (STB) - IV		
I receive a prompt response whenever I make a complaint	3.94	.759
I can retrieve information about the company and products from various sources	3.98	.749
The takaful operators provide various ways for payment of contribution	4.06	.701
My takaful representative provide personalized takaful scheme according to my needs	4.18	.667
Financial Bond(FB) - IV		
I will receive a sum of money at the end of the year in case I did not make any claim	3.35	1.146
My takaful representative gave me a free gift when I first participated in takaful	3.90	1.093
He/she offered a promotion package during my subscription to the scheme	4.00	.897
I am entitled to receive a sum of money from takaful company in case I am admitted to hospital	4.02	.864
I receive some profit from my takaful scheme as it is a saving/investment account	4.11	.868

Based on Table 3, it shows an R-squared of 0.829. The effect of Islamic relation marketing on customer trust as shown by an F-value 125.125 and a significant level of 0.000 (p<0.05). Results show that, from the four variables, only Islamic Ethical Behaviour is significant (p<0.05) with a beta of 0.682. Meanwhile, social bond is less significant (p>0.05) with a beta of 0.119. Followed by structural bond and the financial bond with beta 0.157 and 0.079 respectively.

Tests indicate that only Islamic relation marketing has a significant relationship with customer trust. Based on the t statistic for all the independent variables, it has indicated that Islamic relation marketing has a significant relationship due to a strong significant level (p<0.005) with customer trust. Therefore, hypothesis H2, H3 and H4 are all rejected, while hypothesis H1 is accepted as displayed in Table 4.

Table 3: Islamic Relationship Marketing on the Customer Trust towards Takaful Agent

	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	Beta	*t*	Sig.
(constant)	-.128	.194		-.658	.512
Islamic Ethical Behaviour	.682	.069	.625	9.848	.000*
Social Bond	.119	.049	.142	2.438	.016
Strctural Bond	.157	.066	.154	2.370	.020
Financial Bond	.079	.052	.093	1.512	.134
R^2 = 0.829	Adjusted R^2= 0.823		F value = 125.125		Sig F = 0.000

Table 4: Overall Results of Hypotheses

Hypotheses	Results	Sig
H1: There is an effect of Islamic Ethical Behaviour on customer trust		
towards takaful agent	Accept	.000
H2: There is an effect of social bond on customer trust		
towards takaful agent	Accept	.016
H3: There is an effect of structural bond on customer trust		
towards takaful agent	Accept	.020
H4: There is an effect of financial bond on customer trust		
towards takaful agent	Reject	.134

Based on Table 5, it shows that the most dominant factors that affect the customer trust towards the Takaful agents are the factor of Islamic ethical behavior with average mean 4.10 which is the higher average mean among all the variables.

5. DISCUSSION

All the variables in this research which are the Islamic ethical behaviour, social bond, structural bond and financial bond was found has a positive effect on customer trust towards Takaful agents. However, only the Islamic ethical behaviour has a significant effect. From the four hypotheses that have been developed, only the H1 has been accepted and the rest were rejected. That is means, the customers' trust depends greatly on how the Takaful agents behave. Therefore, Takaful agents must behave according to the Islamic norms when dealing with their customers to ensure the consistency of customer trust towards them. This will not be benefited only to the Takaful Operator as their principal but will help the Takaful agents in their career ladder. According to (Salleh, 2016), as a mirror to an Islamic type of insurance, Takaful agents play a significant role not only to sell the Takaful products but also to behave according to the Islamic norms in front of their customers. Parallel to the above findings, Islamic ethical behavior also becomes the most dominant factor that effects the customer trust towards Takaful agents.

6. CONCLUSION AND IMPLICATIONS

As conclusion, the outcome of the research indicates that Islamic ethical behavior has a significant effect and at the same time become the most dominant factor that giving effect to customer trust towards Takaful agents. Therefore, all the players in the Malaysian Takaful industry need to take this factor as a crucial factor in their marketing strategies. An Islamic ethical behavior should not emphasize only to Takaful Agent, but extended to any parties such as employees who have direct communication with customers in daily operation.

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MARKET OPPORTUNITY ANALYSIS AND MARKETING STRATEGY FERMENTATIVE FLOOR FOOD PRODUCTS NON EXTRUTION OF HIGH PROTEIN EMPIRICAL STUDY IN BOGOR DISTRICT, WEST JAVA PROVINCE

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ABSTRACT

The purpose of this study is to find out the market opportunities and marketing strategies of High Protein Non Extrusion Floating Feed in Bogor Regency, West Java Province. Research method with descriptive approach. The population in this study were all freshwater fish farmers in Bogor Regency, West Java Province, and samples used in this study were freshwater fish farmers, especially catfish in Bogor Regency, West Java Province. Data collection methods: observation, interview and documentation study. Data analysis method with descriptive statistics. The results showed that the market opportunities for High Protein Non Extrusion Floating Feed products in Bogor Regency, West Java Province were very high, dominated by the Catfish culture market by 82.397%, the remaining 11.165% by Ornamental Fish cultivators, and 6.438% by Gurame Fish cultivators. For the marketing strategy carried out, especially the distribution strategy (place) and promotion strategy (promotion), while the product strategy (product) and price strategy (price) have their own advantages and uniqueness compared to other catfish feed competitors.

Keywords: Market Opportunities, Marketing Strategies

INTRODUCTION

Indonesia has an area of 5,193,250 km (covering land and sea). Indonesia is ranked 7th largest country in the world after Russia, Canada, the United States, China, Brazil, and Australia. Compared to the size of countries in Asia, Indonesia ranks second and when compared to countries in Southeast Asia, Indonesia places itself as the largest country in Southeast Asia. Indonesia also places itself as the largest archipelago country in the world because Indonesia is an archipelagic country, hence the territory of Indonesia consists of land and sea. One-third of the area is land and two-thirds are ocean (Guruinesia, 2018).

Indonesia's land area is 1,919,440 km, which occupies Indonesia as the 15th largest country in the world. Indonesia is also often referred to as the archipelago. This can be seen from the existence of islands which number not less than 17,508 islands in the territory of Indonesia. Calculated mathematically, Indonesia's sea area is 96,079.15 km. Indonesia is the largest archipelago in the world. The coastline is around 81,000 km. The sea area is around 70% of the total area of Indonesia (Guruinesia, 2018).

Therefore, the area of Indonesia is very much dominated by water, sea, lake, bay, and river. The existence of these waters provides benefits for the lives of Indonesian people, especially from the fisheries sector which contributes protein to the community.

According to the Minister of Maritime Affairs and Fisheries Pudjiastuti, Susi (2018) explained that "the quality of Human Resources (HR) will be largely determined by the supply of quality food and fish to be the best alternative to meet the needs of the protein. At present the demand for fish will continue to rise along with the level of community fish consumption which shows an upward trend from year to year ie from 36 kg / capita / year to 43 kg / capita / year in 2017. For this reason the aquaculture subsector will continue to be encouraged in supplying food needs fish based for the community ". (Antaranews.com, 2018).

Fish cultivation can be done by utilizing the vast waters to produce alternative high protein sources. One of the regions in Indonesia that has a strategic geographical condition for fish farming is the area of Bogor Regency, West Java Province.

According to information that the author obtained from the Central Statistics Agency (BPS) of Bogor Regency (2015) that "Bogor Regency has an area of 2,301.95 Km2, meaning that Bogor Regency is about 5.19% of the area of West Java Province. Geographically, it is located between 6,19 0 NU - 6,470 South Latitude and 1060 1 '- 1070 103' East Longitude with varying types of regional morphology, from relatively low plains in the north to highlands in the south, which is around 29.28% located at an altitude of 15-100 meters above sea level (asl), 42.62% at an altitude of 100-500 meters above sea level, 19.53% at an altitude of 500-1000 meters above sea level, 8.43% at an altitude of 1,000 - 2,000 meters above sea level and 0.22% are at an altitude of 2,000 - 2,500 meters above sea level "...

Geographical and demographic strategic potentials of Bogor Regency Many people do fish farming, especially freshwater fish farming. This is due to the need for protein which continues to rise in trend every year, but there are many obstacles in the field at the level of farmers, including production costs, especially the price of fish feed which is very high when compared to the price of fish. Then the condition of fish ponds that are not conducive like water as a medium of living fish must meet the standards for fish. For growth and development, fish require several value requirements for several water quality parameters, namely (EPA, 1973; Boyd, 1982; Alabaster & Lioyd, 1982; Krismono et al, 2009; Stiekney, 1979). Then the occurrence of fish pond water pollution due to materials submerged into the pond resulting in fish contamination and death. In addition, siltation of the pond also occurred, according to Huet in Syamsunarno & Sunarno (2016), that the depth of water for the enlargement of freshwater fish ranged from 0.50 to 0.80 cm. If siltation occurs mainly from the rest of the feed itself, it will have a bad impact on the condition of the fish which results in the farmers themselves, because the fish die and or the fish are stunted in their growth and development.

On the other hand it is also necessary to pay attention to the protein content of fish contained in the feed (pellets). According to the Indonesian National Standard (SNI) 01-4087-2006 in Ahidin, Sriherwanto, Akbar, and Junaedi (2018), that the requirements for protein content of fish feed are containing proteins ranging from 20.35%, fat ranges from 2-10%, levels of ash ash of 12%, and water content of less than 12%.

The above phenomenon requires a practical solution from a fish feed (pellet). Therefore in this study a fish feed (pellet) will be examined. This product is the result of research between Pamulang University lecturers, BPPT, CV. Rama Engineering (2018). This fish feed is to provide solutions to freshwater fish farmers, especially farmers in Bogor Regency, West Java Province, in line with the trend of people's protein needs that continue to rise every year.

The fish feed product through this research is viewed from the marketing management perspective, the extent of market opportunities and marketing strategies, so that the producer, in this case CV Rama Teknik, can be considered for decision making. Therefore, the author wants to analyze market opportunities and marketing strategies of Non Protein High Extruded Fermented Floating Feed products in Bogor Regency, West Java Province.

B. Problem Formulation

Noting the background description above, to prevent confusion in the discussion, the formulation of the problem in this study:
1. What are the market opportunities for High Protein Non-Extruding Floating Fermentative Feed Products in   Bogor Regency, West Java Province?.
2. What is the marketing strategy for High Protein Non-Extruded Floating Feeding Products in Bogor Regency, West Java Province?

C. Research Objectives

The research objectives refer to the above problem formulation as follows:
1. To determine empirically the market opportunities for High Protein Non-Extruding Fermentative Buoyancy Products in Bogor Regency, West Java Province.
2. To find out empirically the marketing strategy of High Protein Non-Extruding Fermentative Buoyancy Products in Bogor Regency, West Java Province.

D. Review of Theory

1. Analysis

Anne Gregory (2008) argues "that analysis is the first step or stage that must be carried out in the planning process". This certainly shows that analysis is always needed in planning activities. For example, when you want to open a new business such as laundry, selling meatballs and others. Of course, proper analysis is needed related to business capital, profits, employee costs and so forth. By analyzing, then the possibility of a business that will lose money can be minimized. This is the function of the analysis in the planning stage.

On the other hand Umar (2010), explains "analysis is a work process of a series of stages of work before research, documented with the stages of making a report".

Opinions of the two experts above can be concluded that the analysis is a stage of activity in which to make observations, measurements in order to obtain important information related to the next plan of activities to be carried out. This information can be used as a basis for decision making.

2. Opportunities

According to Zimmerer (2002), Opportunity is "an application that consists of creativity and innovation to solve problems and see opportunities faced every day".

On the other hand Robbin and Coulter (2010) Opportunity is "a process involving individuals or groups who use certain businesses and means to create a growth value to meet a need without regard to the resources used".

The opinion above was clarified by Pearch and Robinson (2003), "opportunity is the main favorable situation in a company's environment, one of which is a business trend".

Therefore the opportunity can be explained as the greatest possible benefit or benefit from the organization's plan in this case the company will get

3. Market

Kotler and Keller (2013) define markets as "a set of actual and potential buyers of a product or service. The size of the market itself depends on the number of people who show needs, have the ability to exchange. Many marketers view the seller as an industry and the buyer as a market, where the seller sends the products and services they produce and communicates or communicates them to the market; instead, they will receive money and information from the market "

On the other hand Stanton (2004), the notion of the market is "a group of people who want to achieve satisfaction by using money to shop, and have the will to spend that money".

The above opinion is confirmed by Ma'aruf (2006), that the market is "a meeting place between sellers and buyers, where there is demand and supply interaction between sellers and buyers to occur buying and selling transactions".

The above explanation, the author can conclude that the market is a meeting place for sellers and buyers to conduct buying and selling transactions.

4. Market Opportunities

Market opportunities according to Kotler and Keller (2013) are "an area of buyer needs where companies can operate profitably".

Boone and Kurtz (2006) explained "that analysis of market opportunities is very useful in providing a foundation for the interests of planning and marketing strategies. Managers are seen as needing to evaluate the environmental situation, the place where they devote their marketing activities, and estimate the environmental effects that may arise in the future for consumers. Considering the future trends of the community will inspire new ideas and strategies, so that they are better actions because they can act as pioneers rather than simply reacting to changes that are taking place ".

The author can conclude that market opportunity analysis is an effort to recognize environmental conditions and market changes, so that it can be used as a reference in evaluating and making decisions on company management.

5. Strategy

According to Johnson and Scholes (1993), strategy is "the direction and scope of an organization in the long run that achieves profits for the organization through the configuration of resources in a challenging environment, to meet market needs and meet stakeholder expectations".

On the other hand Stephanie K. Marrus (2002), strategy is "a process of determining the plans of top leaders who focus on the long-term goals of the organization, accompanied by the preparation of a way or effort on how to achieve these goals".

The opinion above was made clear by David (2004), strategy is "a way to achieve long-term goals. Business strategies can be in the form of geographical expansion, diversification, acquisition, product development, market penetration, employee rationalization, divestment, liquidation and joint ventures.

Therefore the strategy can be explained that a way that is still overall to achieve the goals of an organization (company).

6. Marketing

According to Kotler and Keller (2013) "marketing is as a social and managerial process that makes individuals and groups get what they need and want through the creation and mutual exchange of products and values with others".

On the other hand Stanton (2004), "marketing is a whole system of business activities aimed at planning, determining prices, promoting and distributing goods and services that satisfy needs, both to existing buyers and potential buyers".

The opinion above was made clear by Swastha and Handoko (2018) stating that "Marketing is one of the main activities carried out by the company to maintain its survival, to develop, and make a profit". While Limakrisna and Purba (2017), emphasize that "marketing is to meet the needs of a profit."

The author can conclude that marketing is a process of satisfying consumers in a satisfying way.

7. Marketing Strategy

According to Kotler and Keller (2013), the notion "marketing strategy is a marketing logic where business units hope to create value and benefit from relationships with consumers".

On the other hand Boone and Kurtz (2006), the notion of "marketing strategy is the company's overall program in determining target markets and satisfying consumers by building a combination of elements of the marketing mix; product, distribution, promotion and price ".

The above opinion is confirmed by Tjiptono (2008) "marketing strategy is a fundamental tool that is planned to achieve the company by developing sustainable competitive advantage through the markets entered and marketing programs used to serve these target markets."

The Marketing Strategy can be concluded by the writer that a comprehensive way of a company in order to market a product or company offer to the market.

8. Components of a Marketing Strategy

According to Kotler and Keller (2013), the component "marketing strategy consists of market segmentation, setting market targets and determining market positions. For more details, it can be explained as follows: "Market Segmentation, is the act of dividing the market into different groups of buyers with different needs, characteristics, or behaviors that may require a separate product or marketing mix". Next "Market Targeting, which is the process of evaluating the attractiveness of each market segment and selecting one or more segments to be served, setting market targets consists of designing strategies to build the right relationship with the right customers, or a company big may decide to offer a complete range of products in serving all of its market segments, most companies enter new markets by serving a single segment, and if this proves successful, they add their segments. " Whereas "Market Positioning, companies must decide how to differentiate their market offerings for each target segment and what positions they want to occupy in that segment, product position is a place that the product occupies relative to competitors in the minds of consumers, marketers want to develop market positions unique to their product. If a product is considered to be exactly the same as another product on the market, consumers have no reason to buy it. "

9. Marketing Tactics

According to the Indonesian Ministry of National Education's Large Dictionary (2012), "that tactics are systematic plans or actions to achieve the objectives of implementing the strategy". Meanwhile, according to Palilati in Ahidin (2013), tactics are operational of the overall actions taken by an organization to achieve its goals.

Therefore it can be concluded that marketing tactics are operational of marketing strategies that are still global in nature to be more specific in the context of achieving organizational goals.

10. Components of Marketing Tactics

Marketing strategy is still global, so to achieve an organization needs to be downgraded into marketing tactics. The tactic component in the marketing strategy is also called also the marketing mix consisting:

10.1. Product, according to Kotler and Keller (2013), that "a product is anything that can be offered to the market to satisfy wants or needs. Products marketed include; physical goods, services, experiences, events, people, places, property, organizations and ideas ".

10-2 Price, according to Kotler and Keller (2013), that "price is the sum of all values given by customers tobenefit from owning or using a product or service". While Tjiptono (2008), explains "price is a monetary unit or other measure including other goods and services exchanged in order to obtain ownership rights or users of goods and services".

10.3. Place, according to Keegan (2007) that "place or distribution channel is a channel used by producers to distribute the goods from producers to consumers or industrial users".

10.4. Promotion, according to Kotler and Keller (2013), that "promotion is part and process of marketing strategy as a way to communicate with the market by using the promotional mix" promotional mix. While Boone and Kurtz (2006), that "promotion is the process of informing, persuading, and influencing a buying decision".

E. Research Methodology

This research method with descriptive approach. The object of this research is freshwater fish farmers in Bogor Regency, West Java Province. Method of collecting data; observation, interview and documentation study. Data analysis method with descriptive statistics (percentages, graphs and tables).

F. Research Results

1. Market Opportunities for High Protein Non-Extruding Fermentative Buoyancy Products Based on the results of research through data processing, the author can describe the results of an analysis of market opportunities as follows:

Figure 1.1 Opportunities for Fish Culture Market for Consumption and Catching in Public Waters
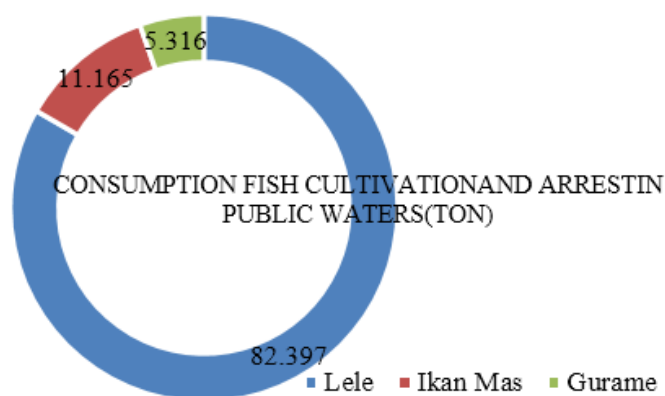
Source: Data processing results (2018)

Information from image data 1.1. above it can be concluded that the consumption and capture of fish farming in public waters consists of; the probability of catfish cultivation is 82.397%, carp cultivation is 11, 165%, and carp farming is 5.316%. This means that High Protein Non-Extruding Fermentative Buoyancy products have a very high market opportunity in the Bogor Regency of Banten Province. Furthermore, if viewed from freshwater fish hatcheries like the image below:

Figure 1.2 Opportunities for Freshwater Fish Hatchery Aquaculture Market

Source: Data processing results (2018)

Information from image data 1.2. above it can be concluded that the cultivation of freshwater fish hatcheries consisting of consumption fish by 94% and the cultivation of ornamental fish hatcheries by 6%. This means that High Protein Non-Extruding Fermentative Buoyancy products have a very high market opportunity in the Bogor Regency of Banten Province for the development of freshwater fish hatcheries. Therefore from Figure 1.1. and figure 1.2. above, that the High Protein Non-Extruding Fermentative Floating Feed product has a very high market opportunity in the Bogor Regency of Banten Province both for the development of hatchery and fish enlargement development especially for consumption, namely Catfis

2. Marketing Strategy of High Protein Non-Extruding Floating Fermentative Feed Products
    Based on the results of research through observation, interviews and documentation studies, the author can describe the results of the marketing strategy analysis as follows:

.
2.1.   Market Segmentation (Market Segmentation) High Protein Non-Extrusion Fermented Floating Products
The results of this study obtained information that the market group (Market Segmentation)
targeted by the High Protein Non-Extruding Fermentative Buoyancy Products are freshwater fish
farmers in Bogor Regency, West Java Province (Source: Observation results, 2018).
2.2.   Determination of the Target Market (Market Target) of High Protein Non-Extruding Fermented Floating Products
The results of this study obtained information that the target market groups that are targeted (Target Market) by High Protein Non-Extruding Fermentative Buoyancy Products are Catfish   Cultivators   in   Bogor Regency, West Java Province (Source: Observation results, 2018).
2.3. Determination of Market Position (Market Positioning) High Protein Non-Extruding Fermented Floating Products
The results of this study obtained information that the positioning of the High Protein Non-Extruding Fermentative Buoyancy Product is "High Protein Buoyancy Feed" with a protein content of 20% - 30%.   and the duration of floating in fresh water for 60 minutes or 1 (one) hour (Source: Observation results, 2018)
2.4. Product Strategy
The results of this study obtained information that in marketing the High Protein Non-Extruding Fermentative Buoyancy Products when viewed from the product strategy, that this product has its own advantages and uniqueness, so it is expected to provide solutions to the problems faced by freshwater fish farmers, especially Fish Catfish. We can see the contents of the Floating Feed product if we compare it with commercial feed on the market today, especially those in the Bogor Regency, West Java Province. The information is as in table 1.1. below this:

Table 1.1. Comparison of Non Extrusion Fermentative Buoyancy with Commercial Feed

Spesifikation	Non-Extrusion Fermentative Buoyancy Feed	Commercial Feed
Size (mm)	3,0	2,2-3,0
Packaging (kg)	25	30
Protein (%)	20-30	14-16
Fat (%)	4-16	4-6
Carbohydrates (%)	25-30	25-30
Water content (%)	7-9	9-10
Feeding Rate (%)	7,0-5,0	7,0-5,0
Feeding Frequency Rate (%)	4-5 kali/hari	5-6 kali/hari
Price (Rp)	7.000-10.000/Kg	10.000-15.000/Kg
Duration of	50-60 menit	< 50 menit

Source: Observation Results (2018)

Information from table data 1.1. above it can be concluded that the Non Extrusion fermentative Floating Feed product has high protein content, lower water content, larger size, smaller Feeding Frequency Rate so that it is more efficient, low water content <12%, and cheaper price compared to commercial feed . So that the Non-Extruding Fermentative Floating Feed product has superiority and uniqueness and has a high chance of being accepted by the market because it can meet the solutions to the problems that have been faced by freshwater fish cultivators, especially Catfish in Bogor Regency, Banten Province.

Furthermore, the writer can describe the stabilization of fermented Floating Feed products as shown in Figure 1.3. below this:

Figure 1.3 : Stabilization of Fermented Buoyancy Products
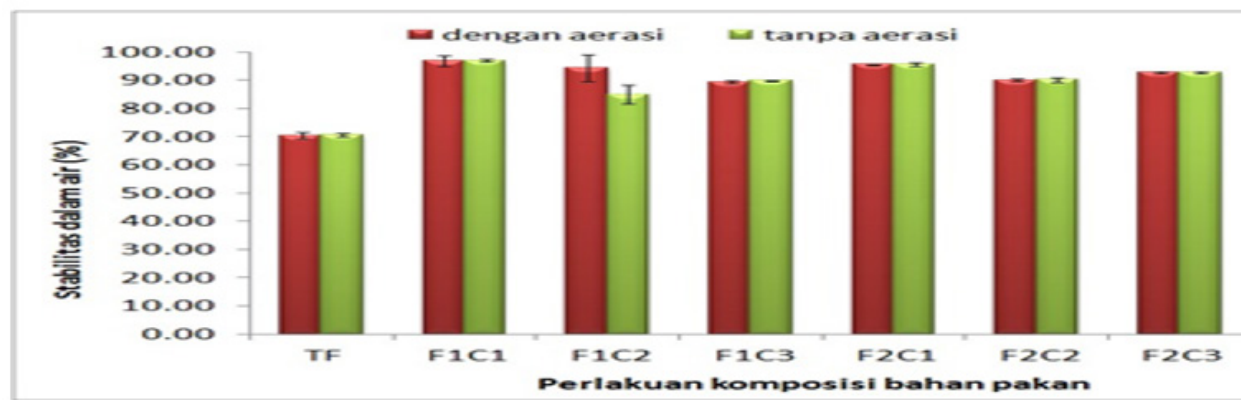
Information from image data 1.3. above can be concluded that the stabilization of Non Extrusion Fermentative Floating Feed products as follows:

1. The stability of floating fermented feeds in water tends to be stable in conditions with aeration and without aeration
2. 2. Feed stability without fermentation decreases which indicates that the fermentation process is very influential on feed stability

2.5. Price Strategy

The results of this study obtained information that in marketing High Protein Non-Extruding Fermentative Buoyancy Products when viewed from the price strategy, that this product has a Production Cost (COGS) of Rp. 6,601, - (Six Thousand Six Hundred One Rupiah), so that if it is sold Rp.10,000, - / Kg (Ten Thousand Rupiah per kilogram) in the market the price of Non Protein High Extruded Fermentative Floating Feed products is very competitive because it is below the competitors but there are still margins profit of Rp. 3,399 / kg (Three Thousand Three Hundred Ninety Nine Rupiah per kilogram). This pricing strategy is very strategic to penetrate the market. More clearly the authors describe as in table 1.2. below this:

Table 1.2 : Cost of Floating Feed Production

No.	Formulation	Cost of goods sold
1.	F1C1	Rp. 6.728,-
2.	F2C1	Rp. 6.906,-
3.	F1C2	Rp. 6.668,-
4.	F2C2	Rp. 6.850,-
5.	F1C3	Rp. 6.601,-
6.	F2C3	Rp. 6.788,-

Source: Data processing results (2018)

Information from table data 1.2. above can be concluded that the price of fermented non-fermented floating feed products is very competitive when compared to the price of commercial feed with high protein content above 20% and able to float on the surface of fresh water for 50-60 minutes.

2.6. Distribution Strategy (Place Strategy)
The results of this study obtained information that in marketing High Protein Non-Extruding Fermentative Buoyancy Products when viewed from the distribution strategy is still centered on the center of floating feed production, namely in Pamulang Barat Village, Pamulang District, South Tangerang City, Banten Province. There is no specific distribution channel to bring the floating feed production closer to the final consumer or cultivator.

2.7   Promotion Strategy
The results of this study obtained information that in marketing the High Protein Non-Extruding Fermentative Buoyancy Products when viewed from the promotion strategy has not been maximized. That promotion is still limited to word of mouth (world of mouth), brochures but even that is still limited. Not yet entered into the media website so that it can be easily accessed by computers and or gadgets by anyone and anywhere.

G. CONCLUSION

1. Market opportunities for High Protein Non-Extruding Fermentative Floating Feed products in Bogor Regency, West Java Province are very high dominated by the Catfish Cultivator market by 82.397%, the remaining 11.165% by Ornamental Fish Cultivators, and 6.438% by Gurame Fish Cultivators.
2. Marketing strategies of High Protein Non-Extruding Fermentative Floating Feed products in Bogor Regency, West Java Province, especially the distribution strategy (place) and promotion strategy (promotion) have not been maximized, while the product strategy and price strategy have advantages and uniqueness separate compared to other catfish feed competitors.

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EXPLORING MALAYSIAN POLYTECHNIC STUDENTS' PERCEPTIONS TOWARDS THE IMAGE OF PREMIER POLYTECHNICS

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Politeknik Sultan Salahuddin Abdul Aziz Shah

ABSTRACT

Polytechnic Transformation Plan aims at strengthening Malaysian polytechnics and envisions that Malaysian Polytechnics will be among the top world institutions. As part of the transformational plan, three polytechnics have been selected as the nation's premier polytechnics. They are Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA), Politeknik Ungku Omar (PUO) and Politeknik Ibrahim Sultan (PIS). This paper examines the determinants of brand image of Premier Polytechnics perceived by polytechnic students. By using the quantitative approach, this study suggested that reputation, teaching quality, program quality, information sources on institutions were potential dimensions of Premier Polytechnics brand image. 306 students from three polytechnics were involved in the study. Results indicated that the highest determinant of brand image was reputation, followed by program quality, teaching quality and information sources on institutions. The results provide insights on how the Premier Polytechnics could improve their brand image. The findings indicated that the new brand image scale is reliable and valid. Based on the results from the samples it can be concluded that all the Premier Polytechnics have to improve on their information sources on institution.

Keywords: Premier Polytechnics, Determinants of brand Image

1. INTRODUCTION

The past decade has seen the aggressive promotion of premier polytechnics by the government, an initiative that was enthusiastically embraced by three polytechnic in Malaysia (PUO, PSA and PIS) after its introduction in 2010 (.Ministry of Higher Education, 2007). This interest parallels the growth of the knowledge economy and subsequently led to the recognition that comparative advantage can be gained from the polytechnic's branding, its technical programmes in niche fields and centres of technology which serve as hubs of reference.

As part of its initiative to improve the quality and image of polytechnics, certificate-level courses would no longer be offered from the July 2010 intake. Polytechnics will now focus on diploma and advanced diploma programmes. Under the transformation plan, there will be a 30% increase in the number of places offered for diploma programmes from 60,840 in 2009 to 87,440 in 2012. The Polytechnic Transformation Plan has set to make polytechnics as the preferred choice for students in the field of TVET and would increase its student enrolment to 119,000 by 2015. Furthermore, this transformation plan is based on strengthening polytechnics development programs, specifically, inserting knowledgeable instructors and staff, then improving the image and promoting an excellent work culture (Department of Polytechnic Education, 2009).

Recently there has been a marked increase in the intake of students in most polytechnics as well as premier polytechnics (Table 1). The figures show that the student intake in premier polytechnics is experiencing a spectacular growth annually. However, the Ministry of Higher Education records on the intake of students reveal a fluctuating trend. The data shows that in 2016, the intake of students decreased to 5066.

This upswing was inconsistent, as only a slight increase (6100) in the students' intake was recorded in 2017 compared to 2015 (6271)

Table 1.1. Comparison of Non Extrusion Fermentative Buoyancy with Commercial Feed

PREMIER POLYTECHNICS	INTAKE				
	2013	**2014**	**2015**	**2016**	**2017**
PUO	1055	1961	2503	2284	2614
PSA	1189	1318	1909	1333	1716
PIS	1139	1492	1859	1449	1770
Total	3383	4771	6271	5066	6100

Source: MOHE (2014-2017)

The fluctuating trend does not resonate well with the aim of increasing student intake to advance the establishment of premier polytechnics as to be 'preferred institutions'. From this perspective, the premier polytechnic efforts to meet the country's needs in embracing global challenges as well market itself in a climate of global competition would have less impact, particularly if this trend continues. Critically, if it is experiencing declining enrolments, a polytechnic cannot afford to be complacent hoping that there will be applications to come in. Thus, further research should be carried out to address this matter. This study responds to the need to gain better understanding of this fluctuating trend by investigating issues using the brand image paradigm. Corresponding to the issues above, several studies (Bennet & Rundle-Thiele, 2005; Nandan, 2005; Schiffman, & Kanuk 2000); Bowen & Chen 2001) have suggested that image may generate more loyal customers. Therefore, it is also pertinent to explore image research (Malhotra & Birks 2000; Che Omar, & Che Mohd Zulkifli. 2013) in the context of HEIs. Studies have agreed that satisfaction can be influenced by reputation or image which eventually leads to loyalty (Helgesen & Nesset 2007). In addition, research into institutions choice has suggested that a number of core variables can influence a student's preference for a particular institution, implying that institution management should in principle incorporate important variables into their perceptions of the contents of an institution brand (Bennett, Ali-Choudhury, & Savani, 2008).

2. METHODOLOGY

The study adopts a quantitative methodology via a cross-sectional survey. For the purpose of this study all scales used were adapted from several studies on brand image which had valid and reliable measures and finalized measurement scale in the study of Abdullah (2016). Each dimension has been developed based on previously tested scales (Abdullah & Sheriff, 2015).

Survey method is used and hence it involves distributing a set of questionnaire. The questionnaire has two sections. For Part A, the demographic variables were measured by using nominal scale. The interval scale of measurement was applied in Part B. The respondents were asked to read and indicate their level of agreement with aspects of image of the institution.. Each of the statements designed for Part B used a 7-point scale. Constructs have been operationalized using 7-point Likert scales, ranging from (1= strongly disagree) to (7 = strongly agree). The seven-point Likert scale's capability exceeds that of the 5point Likert scale and has been used widely in marketing research as it can discriminate and distinguish fine differences between people better (De Vaus, 2002).

To make sure that there was quality in the findings of this study on brand image of premier polytechnics, the pilot study was first conducted before doing the final survey. The pilot test was conducted for the full questionnaire using respondents whose backgrounds were similar to the actual study. In this study, 30 students from Premier Polytechnics were selected to answer the questionnaire besides giving opinions about the questionnaires. Johanson and Brooks, (2009) suggested that 30 representative participants from the population of interest is a reasonable minimum. By using this method, the researcher would get instant response and gained further information related to the questions given. The exercise that was used in pilot test is person administered survey. This method was carried out to test the reliability and validity of the questionnaire and to find out the weaknesses and potential errors of questionnaires (Cooper & Schendler, 2003). Based on the information given, amendments have been made to ensure the questionnaires will be easily understandable.

After finalizing the instrument and conforming that it is appropriate through the pre-test and pilot test, the researcher adopted a number of procedures to conduct the final survey. A sample of 150 respondents was selected randomly from each Premiere Polytechnic to ensure adequate representative.

3. RESULTS AND DISCUSSIONS

Demography

A total of 306 responses were obtained from 450 questionnaires. Out of 450 questionnaires delivered, only 68% respondents answer the questionnaires successfully.

Majority of the respondents were male which comprised of 164 (53.6 %) respondents while female consisted of 142 (46.4%) respondents. For age demography 240 (78.6%) were between 18 to 20 years old, 63 (20.5%) of the respondents were 21 to 25 years old, while those between 26 to 30 years old were the least (1%) respondents.

In the data, the respondents were from different semesters. The reason why semester demography was analysed is because students from different semesters have different thoughts and opinions on their polytechnic especially students from semester one and five. In this research the data were collected from 23 (7.5%) respondents from the first semester, 40 (13.1%) from the second semester, 31(10.1%) from the third semester, 44 (14.4%) from fourth semester, and fifth semester students consisted of 168 (54.9%) respondents.

For department demography, departments were involved in the Polytechnic which were Commerce Department (JPG), Electrical Engineering Department (JKE), Mechanical Engineering Department (JKM), and Civil Engineering Department (JKA). From 306 of the respondents, 61 (19.9%) of the respondents were from JKE, 60 (19.5%) from JKM, 59 (19.3%) from JKA, and 126 (41.4%) from JPG. All of the respondents were also from three different Premier Polytechnics, and the majority of the respondents were students from PSA which was 109 (35.6%), PIS came in second which was 101 (33.2%), while PUO has the least number of respondents which was 96 (31.4%) students.

Based on the question as to which of these students from these three Premiere Polytechnics really applied for the polytechnic that they are currently studying, surprisingly, the majority of the students answered yes to the question. This consisted of 174 (57.2%) respondents, while the rest answered no. For the question, as to whether polytechnic was their first choice of institution that they applied in Bahagian Pengurusan Kemasukan Pelajar (UPU) instead of other higher educational institutions such as UITM, UPM, UM, or UIA, the result showed that 130 (42.8%) of the respondents answered no, while the other answered yes.

The last question was on the resources they gained information regarding premiere polytechnic. There were 9 options which were internet, education fair, embassy, newspaper/magazine, school, television, radio, friends, family, relatives, and the lastly from recruitment agencies. Predominantly, the responses were from internet and newspaper / magazine.

Reliability analysis

The first step of the analysis was the employment of the Cronbach's Alpha reliability test (Table 2). Cronbach's coefficient alpha is the commonly used measure for internal consistency reliability and it is importantly used for measuring multi-point items (Sekaran, 2003). As a result, each factor or component yielded a reliability coefficient (Cronbach's alpha) ranging from 0.8 to 0.9 (Table 2) which is greater than the recommended threshold of 0.70 (Nunnally, 1978) Cronbach's alpha value of .7 and above is considered to be reliable (Nunnally & Bernstein, 1994). An alpha value of .7 and above indicates items are homogenous and measuring the same construct.

Table 2: Cronbach Alpha reliability of the variables

Variables	Number of items	Number of items Discarded	Cronbach's Alpha
Reputation	13		
	-	.840	
Program Quality	4	-	.817
Teaching Quality	6	-	.821
Information Source on Institution	6	-	.776

The findings revealed some interesting results in the perception towards the reputation of Premier Polytechnic. Here are some of the findings. Thirteen items were utilized to measure the degree of perceived Reputation of Premier Polytechnic. Higher scores on the scale suggest that the respondents perceived that the premier polytechnics have a high reputation while lower scores imply that the respondents view premier polytechnics have a low reputation. The results shown in Table 3 reveal a mean value ranging from 4.96 to 5.33. The highest mean value for the construct reputation is that faculty members have many projects. Overall, evidence derived from the results suggests that the respondents' perception on the reputation premier polytechnics was around 5. The respondents were in agreement that the reputation of premier polytechnic is moderate.

Table 3 : Students' perceptions of the Reputation of Premier Polytechnic

	Reputation	Mean	Std
1.	Produces excellent publications	5.04	.877
2.	Produces Marketable Graduate	4.96	.899
3.	Has a strong academic reputation	5.07	.865
4.	Is committed to academic excellence	5.04	.858
5.	Faculty members has many projects	5.33	1.001
6.	Has qualified academicians	5.09	.864
7.	Has a reputation for quality academic staff	5.06	.832
8.	Has a reputation for expertise of its staff	5.01	.816
9.	Has a reputation quality graduate program	5.05	.804
10.	Has a reputation for a higher-ranking institution among Malaysian polytechnics	5.14	.913
11.	Is well known for innovation in research	4.96	.854
12.	Stimulate innovations through competitive funding	5.05	.907
13.	Stimulate innovations through rewarding for the best results	5.06	.787
	Total Mean for Reputation	**5.66**	**.867**

Six items were utilized to measure the degree of perceived teaching quality. The results in Table 4 indicate that all six mean values for teaching quality were between 4.93 and 5.05. The highest mean values for this construct were: the perception of the respondents that lecturer gives student reliable information on course content (M=5.05), lecturer gives an opportunity to questions and answers (M=5.01), lecturer is able to provide students with fundamental research skill (M=5.00) and followed by lecturers have a thorough knowledge of the subject content (M=4.99). The results pointed out on delivery of the knowledge. Teacher quality refers to the quality of those aspects of interactions that can be attributed to the teacher" (Kenedy, Latham, & Jacinto, 2016).

Table 4 : Students' perception of Teaching Quality

	Teaching Quality	Mean	Std
1.	Have a thorough knowledge of the subject content	4.99	1.034
2.	Displays skillful teaching	4.93	1.031
3.	Give an opportunity to questions and answers	5.01	1.010
4.	Give students consistent information on course content	4.94	1.012
5.	Give student reliable information on course content	5.05	1.026
6.	Able to provide students with fundamental research skill	5.00	1.070
	Total Mean for Teaching Quality	**4.99**	**1.030**

Four items were utilized to capture the respondents' thoughts on the program quality of premier polytechnics. Results from Table 5 shows that item 4 "Has recognized program", in the scale recorded the highest score (M =5.07) followed very closely by item 3 "has relevant course" (M =5.06); item 2 "has academic value" (M =5.04) and item 1 "has reputable program" (M =4.92). The overall evidence derived from the results suggests that respondents were in agreement that premier polytechnic portrayed program quality.

Table 5 : Students' Perception of Program Quality

	Program Quality	Mean	Std
1.	Has reputable program	4.92	.860
2.	Has academic value	5.04	.873
3.	Has relevant course	5.06	.874
4.	Has recognized program	5.07	.835
	Total Mean for Program Quality	5.02	.860

Table 6 shows the mean scores for Information Sources on Institutions. The Item rated with highest score are "detailed course information is available on the premier polytechnic website" and "information on premier polytechnic attributes meets student information" (M = 4.90). Next was detailed information is solicited from friends which has a mean of 4.70. Followed by detailed information is obtained from family members with a mean of 4.65. Other than that, detailed information is obtained from my experience as a student has a mean of 4.61. Lastly, with a mean of 3.96, was Premiere polytechnic's material provides detailed information

Table 6 : Students' Perception of Information Sources on Institution

	Information Sources on Institution	Mean	Std
1.	Detailed course information is available on the premiere polytechnic website	4.90	1.106
2.	Premiere polytechnic's material (brochures, pamphlets) provides detailed information	3.96	1.607
3.	Detailed information is obtained from family members	4.65	1.282
4.	Detailed information is solicited from friends	4.70	1.196
5.	Detailed information are obtained from my experience as a student	4.61	1.438
6.	Information on premiere polytechnic attributes meets student information	4.90	.988
	Total Mean for Information Sources on Institution	**4.62**	**1.269**

4. CONCLUSION

In conclusion, Premiere Polytechnic has to emphasis on information source on institution. Information source on institution has a moderate score in contributing to the image of premiere Polytechnic. The researchers found that based on the mean, institution website was ranked highest, as important sources of information, so management institutions should consider websites as key information sources so that students can get much information from the website. Information sources such as brochures or pamphlets about Premiere Polytechnic are also important. These are institution's promotional documents which are beneficial to students and parents in getting information about institutions. Printed materials help in promoting Premiere Polytechnic and also help polytechnic to reach the students so that students know the existence and uniqueness of Premiere Polytechnic and what is these polytechnics are able to offer in. The findings also suggest that the information on source of institution serves as basic and necessary component for attracting new students to enroll in Premier Polytechnics. Researchers believe that technological advancement will improve not only performance or image of business (Levy & Powell 2000) but also higher education institution like polytechnics.

In addition, with increasing competition among various higher education institutions, these premier polytechnics need to cautiously revise their promotional and communication strategies. Higher education institutions are facing environmental challenges that call for the development of new marketing approaches. This is because not only students but also parents seek information from different information channels.

The findings of this study contribute greatly to Malaysian polytechnics considering that corporate image play an important role for them to increase their visibility among more visible students. According to Ivy (2001), student's willingness to enrol in a particular institution or university depends highly on the image of HEIs. Higher educational institutions have to develop a strong brand image or increase emphasis on corporate image to ensure the survival of the organization (Burbules, & Tores 2000; Mok, & Welch, 2003; Kotler & Armstrong, 2018)

Higher standard of the corporate image that a polytechnic represents will attract students to further their study in the polytechnics. This is in turn will place Malaysian Polytechnics to be on a par with other higher educational institutions

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CUSTOMERS' SATISFACTION ON PRODUCT QUALITY, SERVICE QUALITY AND LOCATION OF 'RUMAH SELANGORKU'

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ABSTRACT

The gradual rise of urban estates compared to other geographical domains is becoming a huge trial for the Malaysian government especially for expertise to provide housing establishments. Moreover, the increment in living cost and pressure upon the existing economic situation have inexorably caused high demands for cost-effective housing. Therefore, citizens depriving of affordability and accessibility to own a house is a crucial issue in Malaysia including Selangor. Inclusive of low-income demographics, urban dwellers as well as individuals of middle class are facing this issue as they do not have the eligibility to sign an application for cost-effective housing established by the governments and nevertheless, they do not have the affordability to purchase a home. In 2013, Rumah Selangorku was proposed by the Selangor Government through the Selangor Housing and Property Board for residents in Selangor. Thus, this paper intends to examine the relationship between customers' satisfaction and product quality, service quality and location of their purchases of Rumah Selangorku. Systematic sampling technique was utilized to obtain the answers in par with the research's objectives. Cumulatively, the results of the study presented that location was a prominent and an underlying factor to a customer before purchasing a house. Home developers were generally advised to have awareness regarding the quality of home products. Consequently, product quality was categorized with the lowest mean; specifically, home maintenance facility. Moreover, this research brings expectations in formulating the residents' gratification upon Rumah Selangorku; thus, the significance of the results has the provision of assisting the government in enriching the quality home construction.

Keywords: Customer satisfaction, Product Quality, Service Quality, Location and Rumah Selangorku

1. INTRODUCTION

Possession of property is a societal objective to establish stability and wealth including enhancing quality of life. The housing industry is required to adapt and respond to various demands of all classes as Malaysia attains its status of developed-nation and high-income-nation by 2020. The increment in demand and price of properties have changed the function of housing; this affects the correlation between purchasing a property and affordability level. Public housing programs were implemented by the government to cater affordable residences to all classes especially of low-income citizens. This research emphasizes on Rumah Selangorku; the program was established to advocate, "Satu Keluarga, Satu Kediaman yang Sempurna". This is to ensure every citizen or family is able to own a proper household that is safe and comfortable for living. In state, affordable houses are introduced through two main agencies: Selangor Housing and Property Board (LPHS) and State Economic Development Corporation (SEDC). Various houses were delivered by LPHS until 2010; affordable housing in Selangor was introduced as Rumah Selangorku. In 2014, LPHS also introduced Dasar

Rumah Selangorku with policies as guidance for private developers partaking in building RUmah Selangorku (Lembaga Perumahan dan Hartanah Selangor, 2015). The price range of a single unit of Rumah Selangoorku relies on the category, area, geography and other provided features; the approximate price range of a unit is RM 42,000 – RM 250,000 (Economic Planning Unit, 2015; LPHS, 2015). Rumah Selangorku is a cost-effective public housing under the enterprise of state government that is located in Selangor. The property features its own body of management aligning with Strata Management Act 2013 for implication of proper maintenance and provision of comfortability in living with complete facilities and amenities.

However, due to inadequacy of lands in urban and suburban areas, the type of residence that is apt to the program is high-rise building in comparison to landed estates. This provides numerous units of residences avoiding space consumption within an area (Noor et.al., 2013). High-rise properties are defined as an estate comprising of multiple units constructed within singular lot of land. Basic amenities are interconnected in this type of estate such as garbage loading, security system, elevators and recreational facilities (Abd. Wahab et.al., 2015). Building maintenance is a necessity in maintaining a high-rise building as emphasized by the government. The value of a building proportionally digresses to the quality of maintenance implemented by the system. Preservation of a building's condition requires excellent maintenance rather than procuring high costs of resources into renovation and modification of an existing building (Lateef, Olanrewaju, 2009). Thus, this research aims to evaluate customers' satisfaction of product quality, service quality and location of their purchases of Rumah Selangorku.

In most countries, poor maintenance is commonly affiliated with government's operation of public housing and the administration causes living dissatisfactory in residents of the housing units. This will result in general depletion of living qualities in public properties and the increment in units that are vacant without attentive maintenance (Hegedus, 1994; Salleh et.al, 2011). Infrastructure in Malaysia does not comply to the standard structure or surpassing expectations of consumers due to poor maintenance of buildings and facilities. Federal government is constantly in predicament by facing public repercussion because of management body providing inefficient maintenance in public properties. Maintenance operations are commonly perceived to yield excessive resources spent upon higher maintenance costs (Hashim et.al., 2015). In this modern age, residents are astute in analyzing the performance of building management and accordingly, management body requires improvement of necessary management skills (Chi Chui et.al., 2003).

Meanwhile, based on previous researches, there is a discovery of access to mortgage and finance is one of the calamities agonized by consumers; lower and middle-incomes classes evidently face financial predicament (Yaakob, Yusof and Hamdan, 2012). Moreover, working class citizens with inconsistent income are heavily affected as well (REHDA, 2014) and it does not only deter loan commitments but individuals also struggle in producing savings and payments for deposits (ISIS, 2013). Contrary to previous concerns revolving around only basic caretaking and cleanliness of properties, expectations of whole maintenance of residence are current owners' primary province comprising of other areas from basic cleaning service to comprehensive maintenance (Hashim et.al., 2015). Retaining product quality, service and facilities quality inclusive of proper management with success requires effective building maintenance. According to primary discussion of issues, this study attempts to examine customers' satisfaction of product quality, service quality and location of their purchases of Rumah Selangorku.

2. LITERATURE REVIEW

This section elaborates a synthesis and analysis of previous published researches in relation to the main theoretical concepts of this research revolving around product quality, service quality and location.

2.1 Customer Satisfaction

Customer satisfaction perpetuates positive insights to companies and thus, it contributes to business's prosperity. Therefore, catering to the needs and desires of customers should be considered a company or an organization's main direction to attain customer satisfaction. The objective component in practical and theoretical modern marketing is customer satisfaction and it is a prominent indicator for service and housing industry. Thus, managing customer satisfaction is necessity for firms. Two approaches were suggested to evaluate consumers' satisfaction in analyzing satisfaction in the housing industry (Adriaanse, 2007; Amerigo & Aragones, 1997). The first approach is prediction of customers' behavior when moving into or requesting renovations to purchased property (Mohit, et al., 2010; Adriaanse, 2007) Consideration of property quality factors affecting level of satisfaction is the second approach (Adriaanse, 2007). Torbica (2001) discerned that customer satisfaction is a significant factor in housing industry for propelling growth, economic success and enhancing customer relationships. Therefore, developers are required to periodically evaluate customer satisfaction to be attentive of satisfaction level among customers (Torbica and Stroh, 2000).

2.2 Product Quality

Product quality is the significant paradigm in marketing; thus, perception of own organization or company and customers on product quality are to be accounted by firms (Watson, 1998). Determination of customer satisfaction depends on quality instead of value or price of property Fornell et al. (1996) Product quality also plays an important factor to customer satisfaction (Anderson & Sullivan, 1993; Churchill & Suprenant, 1982; Cronin & Taylor, 1992; Fornell, 1992). This research emphasizes on consumers considering houses as a well-structured physical product with special features endowed by the developer. Progression inclusive of the foundation, structure, electrical, mechanical and roofing system of the house is constituted in the designs. Consumers receive the details of project blueprints after the construction is completed.

2.2.1   Product Quality and Satisfaction

In general, most researches on service marketing emphasizes onn the construction and dimension of service quality related to satisfaction and loyalty of consumers. Above that, tangible and intangible products are provided by these industries. The results of progressing researches, consumers' choice of purchasing is majorly affected by the ascertained quality construct of consumers' durable goods and quality of products (Brucks, Zeithaml, & Naylor's, 2000). Based on these statements, there is a concurrence of product quality and service quality equally affects customers' satisfaction (Parasuraman, Zeithaml & Berry, 1994).

Criticism of cost-effective properties exists due to poor quality and defective results (Elias, 2003; Abdellatif and Othman, 2006). A report based on issues of affordable properties presented that there is deterioration in public housing projects due to improper construction, poorly designed blueprints and inadequate maintenance. Clients of building projects with insufficient funds often digress the discomfort of their accommodation and its design that do not surpass their expectations and requirements Rinker (2008). According to numerous discourses, product quality is considered to be an independent factor and thus, this research aims to study its impact on customer satisfaction (Abdellatif and Othman, 2006). Key factors corroborating to customer satisfaction in the housing market are product quality and service quality; however, there is an inconsistency in residential environments and neighborhoods which affects customers' satisfaction. Customer satisfaction is tremendously difficult to predict as it does not solely depend on product and service quality. Therefore, the expectation is:

H1: There is a significant relationship between product quality and customers' satisfaction of Rumah Selangorku

2.3   Service Quality

Most companies in Malaysia consider service quality to be of primary consideration. Acquisition of insights on market demands and appraisal of customers' satisfaction. In the past decades, practitioners, managers and researchers consider service quality has been proven to be the prominent area of focus that majorly contributes to business performance, lower costs, customer satisfaction, customer loyalty and profitability (Sureshchander et al., 2002; Guru, 2003).

2.3.1   Service Quality and Customer Satisfaction

There is a close relation between customer satisfaction and service quality but they are conceptually distinguished. The relationship between these two factors is empirically evident with proper recognition (Oh and Park, 1997; Zeithaml et al., 1993). Several researchers conducted empirical studies that proved service quality of efficacy contributes to customers' satisfaction (Cronin and Taylor, 1992; Parasuraman et al., 1988).

Property development project triumphs with dependence on the property and service quality. Marketers are required to consider the qualities of their products and services to maintain its technological competition in the market in the eyes of customers by Parasuraman, Zeithaml & Berry, (1985). Dissatisfaction issues rise among customers due to abandonment of property, product quality and service quality [27]. Thus, the focus in this research is the evaluation of customer satisfaction; it provides the relationship between determinants and customer satisfaction inclusive of product quality and service quality, building safety and responsibilities of developer. The acknowledgement of service quality as a significant determinant has proven evident in the success of service providers in this age's competitive environment involving housing industry (Aziam & Maznah, 2012). Based on the discussion, hypothesis may be inferred:

H2: There is a significant relationship between service quality and customers' satisfaction of Rumah Selangorku.

2.4 Location

In any property development project, the priority is location of the property. Location of property despite of its strategical location will affect the whole sales of the property. Acquiring the perception of housing location decisions requires appreciation of context theory on household. First and foremost, customers receive a whole package of products: features of property, access to work and shopping, social networking and community characteristics, local services and various amenities when they purchase properties (Li, 2007; Kim, Horner & Marans, 2005; Turner, 2005). Location is vital in regulating decisions among customers that corroborate to the development and growth of new townships in provision of improved quality of life based on the desires of citizens and propositions in the Ninth Malaysian Plan.

2.4.1 Location and Customer Satisfaction

Maintaining competition in the marketplace requires establishing strategic direction. Developers require guidance in attaining their objectives regardless of time condition. Consumers always consider proximity to work place, traffic condition, healthcare facilities, transportation availability, and quality of residence; image and security regardless of development status of area. Consumers' satisfaction upon amenities of physical products and services provided by service providers are vital factors in considering purchases of properties (Yong, 2006). According to numerous studies, location is considered to be an independent factor on customer satisfaction (Husin, Malek and Gapor, 2011; Yaakob, Yusof and Hamdan, 2012). Discrepancy in supply and high demands in the aspects of location and public transportation are apparent Chi Cui(2003).

Thus, the expectation is that:

H3: There is a significance in the relationship between product quality and customers' satisfaction of Rumah Selangorku

Figure 1 : illustrated the proposed research framework.
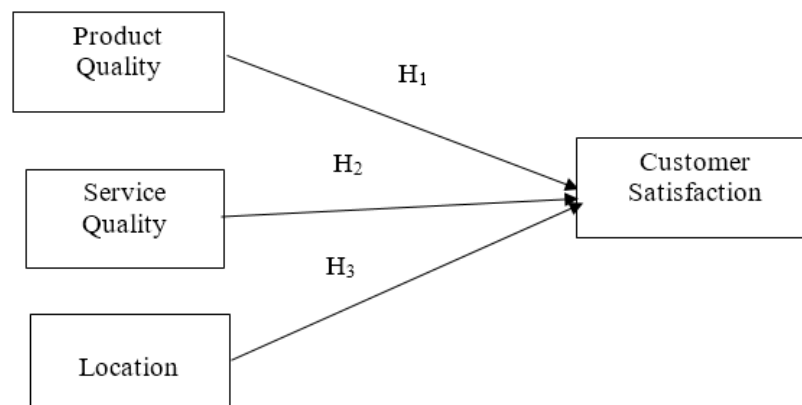
3. METHODOLOGY

This study utilized the quantitative method. The survey yielded 250 responses and after data screening, 200 usable and completed responses were used in the analysis with a valid response rate of 80 percent. Among all available units of houses, there are number of units still vacant. This sample size is reasonable as Roscoe (1975) stated that a sample size of 30–500 is considered satisfactory. Data collection was conducted for a one-month period (from 1 March 2018 till 31 March 2018) utilizing systematic sampling technique. Responses were randomly drawn from the residents from three (3) zones. In order to measure the effect of product quality, service quality and location on buyer's satisfaction in Rumah Selangorku, two criteria have been recognized in selecting the residential areas; (1) the residential areas are built according to Rumah Selangorku; (2) Rumah Selangorku for the residential areas have been occupied within a year. Since Rumah Selangorku is still new, most of the projects still under planning and construction, this study focus on Zone 1 area which located in Klang, Daerah Petaling and Cyberjaya.

They were required to complete the survey, designed in the form of structured close-ended questions, which comprises of four sections. Section A was related on the general questions). Section B was related to consumer satisfaction of Rumah Selangorku. Section C asked the respondent their perception on product quality, service quality and location. Finally, section D gathered demographics of the respondents. In this study,

Section C and D were measured on a seven-point Likert scale (1=strongly disagree to 7= strongly agree). The items were obtained and modified from prior research studies Torbica & stroh,2000; Aziam & Maznah 2015). Statistical Package for Social Sciences (SPSS) computer program 24 version was used to perform data analysis. Correlation analysis was performed to investigate relationship between product quality, service quality, location and customer satisfaction of Rumah Selangorku.

4   RESULTS AND DISCUSSION

Table 2 : presents the descriptive investigation on demographic profile of respondents.

Demographic Profiles	Frequency	Percentage (%)
Age		
<20	7	3.5
21 -30	29	14.5
31 - 40	149	74.5
41 - 50	10	5
>50	5	2.5
Resident Status		
House owner	136	68
Tenant	64	32
Occupancy Period		
<1 year	11	5.5
1 year	30	15
2 years	71	35.5
>3 years	88	44.4

The demographic information shows that the group from the age of 31 until 40 years old was the biggest number among all respondents with 74.5%, followed by the group of 21 until 30 years old with 14.5%. The senior citizens, with 2.5%, were the least number of respondents that completed the questionnaire. Among all 200 respondents, 68% of them were the house owner while the remaining 32% were tenants.
The respondents that reside at Rumah Selangorku for more than three years were the majority with 44.4% and this group was the longest group to stay there since it was ready for occupancy in year 2014. The respondents that live at mentioned residential area for less than one year were the smallest group. Meanwhile for house level in the premise, the result is appeared that respondents were mostly in the age categories 21-30 years old, known as Generation Y. These young people tend to have been more concerned about owning a house.

4.1 Reliability Analysis

Reliability analysis is measured via Cronbach's coefficient alpha to check for internal consistency of the constructs. All constructs had no problems in reliabilities if the Cronbach's Alpha values exceeded the criterion of 0.700 [36]. Table 2 illustrates that the lowest value of Cronbach's Alpha was 0.737 for location factor. Thus, the survey instrument is reliable to measure all constructs consistently and free from random error.

Table 2: Reliability Coefficient Values (Cronbach Alpha)

Dimensions	No. of Items	Reliability (N=30)
Product Quality	**5**	**0.824**
Service Quality	5	0.784
Location	10	0.737
Customer Satisfaction	3	0.886

4.2 Correlation Analysis

The inter-relationships between the four variables were examined using Pearson correlation analysis. The average score of the multi-items for a construct was computed and the score was used in correlation analysis. Lind et al. (2010) stated that the correlations is strong when the value is r = 0.50 to 1.0 or r = –0.50 to –1.0.

Table 3: Correlation Analysis Result

Variables		Customer Satisfaction	Product Quality	Service Quality	Location
Customer Satisfaction	Pearson Correlation	1	0.252**	0.314**	0.264**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	200	200	200	200
Product Quality	Pearson Correlation	0.252**	1	0.686**	0.571
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Service Quality	Pearson Correlation	0.314**	0.686**	1	0.906**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Location	Pearson Correlation	0.264**	0.571**	0.9	1
	Sig. (2-tailed)	1	0.000	0.000	
	N	200	200	200	200

**Correlation is significant at the 0.01 level (2-tailed)

Results in Table 3 revealed that all variables were correlated together at the 0.01 level using the correlation test and the values ranges r = 0.252 to r = 0.314. Hence, there is no multicollinearity problem in this research. The correlation analysis result shows the strength of the relationship between variables. The relationship between product quality, service quality and location of customer satisfaction variable was analyzed using Pearson's correlation coefficient.

Based on the result, there were a moderate relationship between location and customer satisfaction (r = 0.252, p < 0.05), service quality and customer satisfaction (r = 0.314, p < 0.05 and between product quality and customer satisfaction (r = 0.264, p < 0.05). H1, H2 H3 state that there is a positive relationship between buyers' product quality (PQ); service quality (SQ), location and satisfaction (SAT). H1, H2 H3 was not rejected. The findings revealed that there are positive relationship between product quality, service quality, location and customer satisfaction and support such a relationship. It is further evidence that results from empirical testing on the perceived product quality (Nurul Afida Isnaini Janipha, Faridah Ismail, 2016), service quality Perry Forsythe,2015; Mustafa, Adnan and Siti Mohd Nawayai, 2018) and location show a positive relationship with satisfaction in Rumah Selangorku (Mohd Aliff Farhan Musa, Rafizah Musa, 2018).

5. CONCLUSIONS AND RECOMMENDATIONS

The study has investigated the relationship between product quality, service quality and location on customer satisfaction. The results show that customer satisfaction has brought a big influence to the success of an organization. Importantly, this would potentially allow service providers to understand the factors that would increase customer satisfaction especially in the market place. Thus, this particular study would provide a better perspective in defining and exploring future potential research. Hopefully, this study can help the buyer to achieve their need to buy the house especially for those who have low income. Furthermore, the study will provide a guideline to service providers to improve their efforts to balance between demand and supply by determining the relationship between product quality, service quality, location on customer satisfaction.

Customers expect service companies to treat them well and become resentful and mistrustful when they perceive otherwise. Fairness underlies all the customers' expectations. Customers expect service companies to keep their promises (reliability), to offer honest communication materials and clean, comfortable facilities (tangibles), to provide prompt service (responsiveness), to be competent and courteous (assurance), and to provide caring, individualized attention (empathy). Fairness is not a separate dimension of service but, rather, touches the very essence of what customers expect.

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THE STUDY ON ENTREPRENEURSHIP FACTORS AMONG STUDENT IN SELAYANG COMMUNITY COLLEGE

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ABSTRACT

This study aimed to identify the factors that motivate the Selayang Community College (Kolej Komuniti Selayang) students to venture into entrepreneurship as well as the external factors that influence students' interest towards entrepreneurship. A 5-point Likert scale questionnaire was distributed to 245 respondents from the Selayang Community College. The results showed that, in overall, the Selayang Community College students were interested in becoming an entrepreneur. Among the factors that contribute to the choosing of the career in entrepreneurship were government policies and the desire to excel in life. Questionnaires were administered to respondents, consisting of 2 sections, namely Section A-Respondents' Profile, Section B-Factors that influence students' interest towards entrepreneurship. The research data obtained through the questionnaire were analyzed using percentages. The study findings also showed that the overall mean score for entrepreneurship was 3.65 at the moderate level. However, the self factor showed a high mean score of 4.07. In conclusion, this indicates that students in the Selayang Community College will enter the field of entrepreneurship when they graduate from the community college.

Keywords: Entrepreneurship, career, IPTA students, business and entrepreneurial education, higher education

1. INTRODUCTION

*"……..Priority is also given to entrepreneurship programs that play a significant role in leading the changes in national development. Therefore, several programs have been designed to achieve that goal. Among them are culturalization programs and entrepreneurship establishment. Several reinforcement programs and Flagship Programs will be strengthened with various agendas such as entrepreneurial challenges, Community College Entrepreneur Showcase: 1 e-Tech 1 Business, online business challenge and social entrepreneurship. In order to produce pure-hearted entrepreneurs, exposure to social entrepreneurship will also be given priority. This year, the Entrepreneurship Award will be introduced, as an encouragement in producing outstanding students, educators, as well as excellent and committed community colleges with entrepreneurial development efforts…..."[*1].

Malaysia has shown entrepreneurial skills in various different activities since a long time ago. Efforts to modernize the entrepreneurial perspective and motivate them to a more globalized era were only made after Malaysia became independent, especially when Malaysia is committed towards the vision 2020 to become a developed industrial country by the year 2020. An article in the "Journal of International Business & Entrepreneurship "reports that the Government of Malaysia strongly agrees with Neilan's opinion [2] stating that it requires more than just a piece of land, an impressive annual budget and a group of computer engineers to build an entrepreneurial community.

[3] A report from the Malaysian Entrepreneur Development Center (MEDEC) states that the entrepreneurial scenario in Malaysia is constantly changing with time. The country's dynamic economic growth has stimulated the emergence of entrepreneurs and also given challenges to Malaysian entrepreneurial development institutions. Today, the concept of entrepreneurship is relatively different from the past, in line with the changing times.

In the 1960s, Mc Clelland [4] had conducted a study and found that training could improve small business entrepreneurs' performance in sales, profits and the number of workers. Education and training are important because many studies have shown that the level of education in business is positively related to the degree of success of an entrepreneur [5] (Clark et al., 1984). Besides education, experience is also identified as an important factor in producing a success. [6]

According to [7] the perception to join entrepreneurship is driven by several factors. These factors include cultural values, family encouragement, teachers' teaching at school and friends' advice. There is no culture in the world that is against entrepreneurship. The environment helps many individuals to enter the world of entrepreneurship.

To become an entrepreneur, one has to be aware of the characteristics of an effective and efficient entrepreneur before entering the business and entrepreneurship field [6]. A study by Badrul Hisham [8] showed that a large number of successful entrepreneurs became successful because they possessed complete knowledge and education on the aspect of business management. In Malaysia, the government through its agencies Ministry of Entrepreneur Development (KPU), State Agriculture Department, State Economic Planning Unit (UPEN) and Ministry of Rural Development have played a role in developing Bumiputera entrepreneurs..

"Kecenderungan" (tendency) as according to Kamus Dewan Edisi keempat (2005) [9], "kecenderungan" means "kesukaan" (interest) (keinginan (wish), kemahuan (want)). In regard to this study, a tendency is a student's interest in entrepreneurship, or to be interested in opening his own business after being influenced by the extrinsic factors (community), government policy factors, social factors and personal factors.

"Keusahawanan" (entrepreneurship). According to Kamus Dewan Edisi Keempat (2005) [9], "keusahawanan" means (everything) related to entrepreneurship or entrepreneurial activities and skills. According to Schumpeter (1934) [10], entrepreneurship means running new combinations such as new products or services. Husaini and Ahmad (2009) [11] state that entrepreneurial activity is a process of nurturing and producing students with an entrepreneurial culture. According to this study, entrepreneurship is an activity undertaken to inculcate the culture and values of entrepreneurship as well as activities carried out for profit.

Entrepreneurship skills are one of the most important soft skills that students should have either at the lower education level or higher education level (Othman et.al, 2003) [12]

2. METHODOLOGY

This study is a study of the extrinsic and external factors motivating the Selayang Community College students to venture into entrepreneurship.

2.1 STUDY POPULATION AND SAMPLE

The population consisted of 650 people and the sample of this study comprised 245 students of semester 1 to 4 who were doing teaching and learning activities at the Selayang Community College. According to Krejcie & Morgan, (1970) [32] this sample size is usable. All data were analyzed using SPSS 22.0 software (Statistical Package for Social Science) percentage binomial.

2.2 QUESTION ITEM BUILDING

This study is a quantitative study and the questionnaire was distributed to the students of the Selayang Community College that represented various courses. The questionnaire distributed was divided into 2 sections. Section A contained questions about the entrepreneurs' personal profile and family. The items in this section of the questionnaire included demographic information such as gender, age, marital status, education level, business and training experience. The questionnaire was distributed through google Doc online for students to fill out.

Table 1: Likert scale values

Mean Score Range	Interpretation of the Levels of Measurement	Efficiency
1-2.39	Disagree	Low
2.4-3.79	Somewhat Disagree	Moderate
3.8-5.00	Agree	High

Section B contained 26 questions that required respondents to answer the questions using a five-point Likert scale. Respondents were required to mark '/' at the statement, according to their rate of agreement.

To test the items in this section D, a five-point Likert scale was used. Respondents were required to mark '/' according to their rate of agreement.

The meaning of each score of the 5-point Likert scale used is as follows:

Table 2: The 5-point Likert scale used

SCALE	ITEM	
1	Strongly Disagree	STS
2	Disagree	TS
3	Somewhat Disagree	KS
4	Agree	S
5	Strongly Agree	SS

Davies (1971) [33] places the low, medium and high levels on the 5-point Likert scale used. In this study, the researcher placed it in 3 levels, namely low, medium and high as done by the previous researcher, Ahmad Rizal Madar (2008) [34]. The mean analysis obtained was to be based on the Descriptive Statistics Interpretation Table (Mean) and the average mean score which was the guide of the study findings. The determination of these levels was based on the mean score value as shown in Table 3.

Table 3: Interpretation of level size

Mean Score Range	Interpretation of the Levels of Measurement	Efficiency
1-2.39	Disagree	Low
2.4-3.79	Somewhat Disagree	Moderate
3.8-5.00	Agree	High

The items contained in section B of the questionnaire. Five variables were identified to influence the students towards entrepreneurship at the Selayang Community College.

Table 4 : Number of items for each variable

No.	External factor	No. of item
1	Community factor	8
2	Economic factor	7
3	Social factor	5
4	Government policy factor	3
5.	Personal factor	6
	Total	26

3. RESULTS AND DISCUSSIONS

3.1 SECTION A ANALYSIS: RESPONDENTS' DEMOGRAPHIC

This finding was supported by several studies that had been conducted to identify students' tendency to become entrepreneurs by looking at factors such as age, gender, education and family background, as well as past business experience (Kristiansen & Indarti, 2004; Shay & Terjensen, 2005). The questions in this section were analyzed by frequency, percentage. Respondents' profiles in Table 2 indicate that 31.8% are male and 68.2% are female respondents. 77.1% of the respondents were under 19 years old , while those between 20-30 years old were 22.3% and those over 31 were 0.8%. The majority of the respondents, which is 90.2% of them were semester 4 students and 9.8% were students of semester 3. 48.8% of the respondents had taken entrepreneurship courses while 51.2% of the respondents had not taken any entrepreneurship courses. Refer to the table.

Table 5: Profile of the respondents

DEMOGRAPHIC FACTOR	ITEM	TOTAL	FREQUENCY (%)
Gender	Male	78	31.8
	Female	167	68.2
Age	Under 19 years old	189	77.1
	20 - 30	54	22
	Above 31 years old	2	0.8
Marital status	Single	242	98.8
	Married	3	1.2

Table 6: Status of the respondents

DEMOGRAPHIC FACTOR	ITEM	TOTAL	FREQUENCY (%)
Respondents' status	Student	8	99.2
	Retiree	74	0.4
	Moved with family	1	0.4
	Degree holder	1	0.4

Table 7: Areas of study and courses taken

DEMOGRAPHIC FACTOR	ITEM	TOTAL	FREQUENCY (%)
Field of Study	Culinary	10	4.1
	Pastry	116	47.3
	Interior design	15	6.1
	Fashion	13	5.3
	Special Culinary	6	2.4
	Games Art	22	9
	Hotel operation	37	15.1
	Fashion and Clothing	13	5.3
	Other institutions	26	10.6
Have Taken Entrepreneurial Course	Yes	76	31
	No	170	69.4

SECTION B DATA ANALYSIS

3.2 Discussion of the Overall Study

The study findings for objective 1:
i)identify the factors that influence students towards entrepreneurship.

Table 8: Social variables refer to social factors that influence student ratio

No.	Social factors	No. of sample	Ratio
1.	Mass media exposure	206	10:21
2.	Print media exposure	181	10:18
3.	Promotions conducted by relevant ministries	180	10:18
4.	Electronic media exposure	185	10:19
5.	Contests participated	186	10:19

Table 9: Economic variables refer to economic factors that influence the student ratio

No.	Economic Factors	No. of sample	Ratio
1.	Own savings	178	10:18
2.	Use the capital provided by parents	144	10:14
3.	Capital loans from authorized banking institutions/ agencies	129	10:12
4.	Use the capital provided by close relatives	52	5:10
5.	Capital from own investment	154	10:15

Table 10: Community variables refer to community factors that influence student ratio

No.	Extrinsic/community factors	Number	Ration
1.	Family business background	164	10:16
2.	Encouragement from friends	156	6:10
3.	Encouragement and motivation from parents	225	10:22
4.	Encouragement and motivation from lectures to start a business	218	10:16
5.	Encouragement from relatives	172	10:17
6.	Encouragement from a known businessman	152	10:15
7.	Encouragement from a consultancy to start a business	147	10:14
8.	Encouragement from successful icons/models	156	10:15

Table 11: Government Policy variables refer to policy factors that affect student ratio

No.	Government Policy factor	No. of sample	Ratio
1.	Outlining a guide for Entrepreneurship subject to be used at the institution	183	10:18
2.	Educational institutions under the HEP encourage students to venture into entrepreneurship	203	10:20

3.3 Discussion of the Overall Study

The study findings on objective II:
ii) Have students ever taken an entrepreneurial course?

Graph 1: The findings show that students who had never taken entrepreneurship courses is at a high level
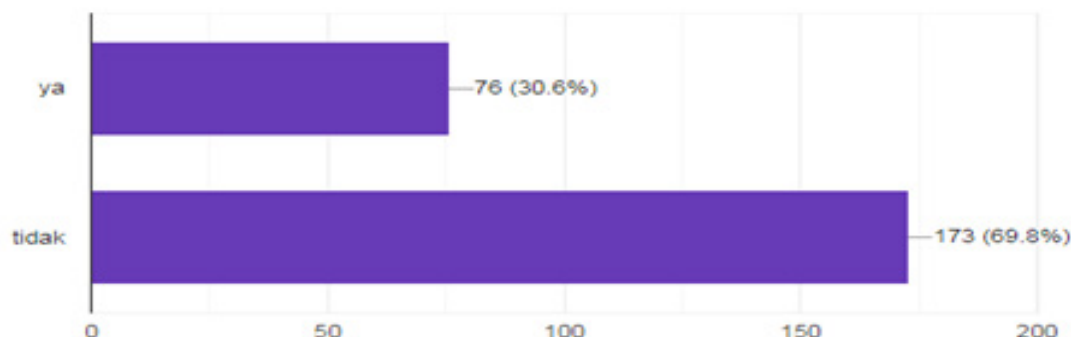
4. CONCLUSIONS

Based on the overall study, it has been found that the objective of the factors that influence students' interest in entrepreneurship at the Selayang Community College was at the moderate level of 3.65. The economic factor, students used their own savings as a starting capital in entrepreneurship where in every 18 students, 10 of them used their own savings as capital. While as for the community factor, parental encouragement and motivation were high for the students to venture into entrepreneurship where the findings showed that in every 22 students, 10 of them received encouragement from their parents. As for government policy, educational institutions under the HEP have encouraged students to venture into entrepreneurship where for every 20 students, 10 of them had benefited from the programs sponsored by the HEP. While the second objective has shown that the number of students who had never taken any entrepreneurial courses was higher than those who had taken the course.

In conclusion, it can be said that the Selayang Community College students wanted to venture into entrepreneurship and make it their career after graduating from the community college. Immersing into entrepreneurship was the passion of the Selayang Community College students as the factors that encouraged them were at high levels.

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A SURVEY ON STUDENTS' ACCEPTANCE TOWARDS INTERNET OF THINGS (IOT) SUBJECT AT COMMUNITY COLLEGE IN PAHANG

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ABSTRACT

Internet of Things (IoT) refer as the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. IoT plays an important position in the context of Information and Communication Technologies (ICT) and the development of society leading to Industrial Revolution (IR 4.0). With the support of IoT, institutions of higher learning can enhance learning outcomes. Therefore, IoT was introduced as one of the Information Technology (IT) subject taught in higher learning such as Community Colleges since July 2017. However the students' acceptance towards this subject is not merely an easy thing. In addition a few responses from head Information Technology (IT) department depicts that the acceptance towards IoT subject is moderate level. Thus, the purpose of the research is to identify the knowledge level of IoT subject among students. Apart from that, the study also is to investigate factors that influence the acceptance towards IoT subject adapt from Technology Acceptance Model (TAM) such as Perceived Ease Of Use (PEOU) and Perceived Of Usefulness (POU) and Individual Behaviour (External Variable). Descriptive analysis with quantitative approach was used to collect data with sample 80 respondents and the collected data was analysed by using SPSS 16.0. The findings indicate that the knowledge level of IoT at high (mean value = 3.771) shows the students has the basic knowledge about IoT. In addition, the findings also showed that the respondents have difficulty completing Internet of Things (IoT) based task assessment, factors influence, Perceived Ease Of Use (mean value= 3.6625) and Perceived Of Usefulness (mean value= 3.6700) at moderate level. However, the results showed Individual Behaviour (mean value= 4.2825) at high level. The subject is in its infancy, therefore future researchers is to empirically investigate on potential of future education usingInternet Of Things (IoT) with entire IT field of the community colleges using different set of samples. or expanding the samples to include a higher number of respondents

Keywords: Internet Of Things (IoT), Acceptance, Model TAM

1. INTRODUCTION

Internet Of Things (IoT) is a giant network of connected "things" which is between people to people, people to things and things to things. Ahmood IoT refers as evolving and changing everything quickly and leading to the emergence of new era of the Industrial Revolution (IR) 4.0 addreses by Ahmood et al. (2019). Furthermore, according to Ahmood et al. (2019) and Veeramanickam & Mohanapriya. (2016), within IR 4.0, IoT plays an important role in the largest digital megatrend that bridges the physical and virtual worlds and IoT uses all devices such as robots, simulations, and tools have sensors and provide data. Cisco IBSG predicted that will be 25 billion devices connected to the Internet by 2015 and 50 billion by 2020.

Figure : 1. Iot Can Be Viewed As A Network Of Networks
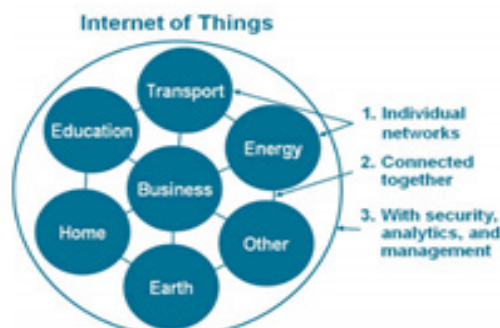
Source: Cisco IBSG, April 2011

Figure 2 : IoT was born between 2008 & 2009

Source: Cisco IBSG, April 2011
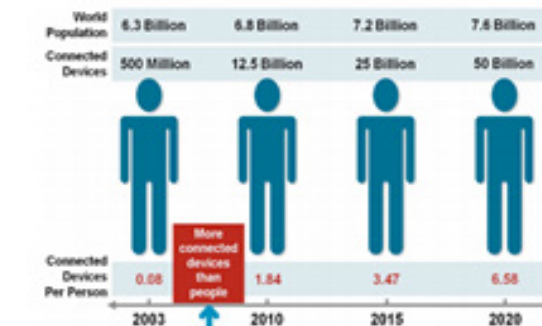
Furthermore, IoT brings tremendous challenges and opportunities to higher education Ahmood et al. (2017) and have the potential to bring significant value to higher education institutions according to Evens. D. (2011). IoT defines as unify in academic environment as new player which help interaction both physically and virtually. In addition according to Ahmood et al. (2019), IoT has been describing as a subject which is highly exciting for students and to teach as ideal for both aspects by Ahmood et al. (2019). Therefore, IoT was introduced in syllabus In Information Technology (IT) Course at Community Colleges as a subject taught to semester 3 students, curriculum with 3 credit hours since July 2017, Information Technology (IT). (2017).

Research Objectives of this study are, first objective is to identify the knowledge level Of IoT among students. In addition, the second objective is to investigate factors that influence the acceptance towards IoT subject. Further more, the third objective is to identify the other factors that influence students' acceptance towards IoT subject.

This research scope emphasized to better evaluate the impact of IoT subject on the educational outcomes of students. Therefore the focuses at Pahang State within three Community Colleges which provided IT Courses is Temerloh Community College, Paya Besar Community College and Bentong Community College. In addition, this study focused on IT Students, taken IoT subject since July 2017 till Dis 2018. The study population was 102 students and, accordingly, the sample was determined according to Krejcie, RV & Morgan Krejcie, R.V. and Morgan, D.W (1970). based on the number attached to 80 students as respondents. The factors influence is define to conduct this research. First, the Perceived Ease Of Use (PEOU) is defined as students perception on IoT subject in this context of research, Perceived Of Usefulness (POU) is defined as perception regarding outcome of the experience learning IoT Subject, in this context of research and Individual Behaviour (External Variable) is defined as how students behaves towards IoT subject influenced by Attitude, personality, emotions, perception in this context of research.

1.1 Background Issue

1.1. IoT In Education at Community Colleges Using Raspberry Pi

Community Colleges is an institution that provides training and skill needs at all levels and provides education opportunities to secondary leavers before the labour market or further education to a higher level. However Higgins .S et al. (2017) emphasized by the technological enhancements have historically driven increases in the quality of and access to education globally. IoT was introduced in syllabus In Information Technology (IT) Course at Community Colleges as a subject taught to semester 3 students, curriculum with 3 credit hours since July 2017 emphasized by Information Technology (IT). (2017). using Raspberry Pi Version 3 to promote smart learning and teaching base computer science among the youthful generation. Pi stands for python interpreter which is a programming language , blending it with IoT technology makes it more resourceful ever. According to Higgins .S et al. (2017) stated that out of this technology that have impacted education, the internet of things has likely had the most profound effect on the way.

Therefore, the study focuses on the extent of student acceptance level of an IoT subject. However the acceptance is not merely an easy thing. In addition a few responses from head IT department depicts that the acceptance towards IoT subject at moderate level through the Feedback Report Head Of Information Technology Pahang Community College, (2019). Besides the feedback shows that IT students have no basis in electronics. It also causes students acceptance of the IoT subject at moderate level.

Figure 1 : Student Acceptance on IoT Subjects

Bill	Student Acceptance on IoT Subject	Level
1	Temerloh Community College	Moderate
2	Paya Besar Community College	Moderate
3	Bentong Community College	Moderate

source: Feedback Report From Program Head of Community College of Pahang, (2019)

Furthermore, it can be seen that student acceptance of the subject of IoT at Pahang Community College, the level of knowledge and factors that need attention are perceived Ease Of Use (PEOU), Perceived Of Usefullness (POU) and Individual Behavior (External Variable). Therefore, research is needed to assist the Innovation & Research Unit (R&D) and the management of colleges and the Department of Polytechnic and Community College (JPPKK) and faculty members as educators to identify the knowledge level of students and factors influential in studying student acceptance level.

1.2 Conceptual Model

From Figure 4, the dependent variables in this research are set to three factors that hinder the students acceptance on IoT subject. Each factor was selected based on previous research done by several researchers

Figure 4. Conceptual Model TAM For IoT Acceptance
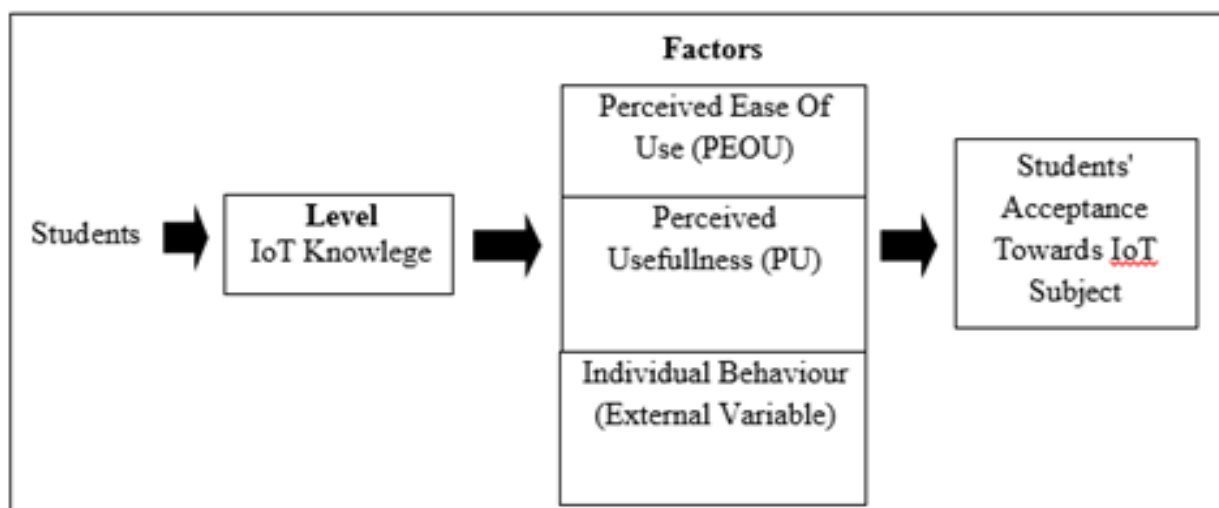
Source : Model TAM (Davis 1989)[10-11] adapted according to the sustainability of the research as a theoretical base.

Among the three factors selected are perceived Ease Of Use (PEOU), Perceived Of Usefulness (POU) and Individual Behavior (External Variable). Furthermore, the independent variables in this study were the students. Overall from the conceptual framework it can be seen that there are three factors that play important role as variables of this study. TAM theory is widely used in research contexts as well as with several types of technology applications. In addition, TAM uses for generating explanations for the factors of technology acceptance by Hussain Mohammad Abu-Dalbouh . (2013).

1.3 Literature Review

Internet of things (IoT) have been given wide attention and had a large number of applications in many fields, including higher education stated by Schlick, J., Ferber, S. and Hupp, J. (2013). In the context of this study, there are three factors that hinder the students acceptance towards IoT subject which forms the backbone of by several authors Mohammad Al-Momani et al. (2018) and Davis, F.D. (1989), as below:-

i. Perceived Ease Of use (PEOU)
ii. Perceived Usefullness (PU)
iii.Individual Behavior (External Variable)

In order to measure the effect of the IoT technology on education, the need to know the students' perception of this technology and their perspective on its future applicability on developing IoT projects emphasized by Amr Elsaadany & Mohamed Soliman. (2017) and Higgins .S et al. (2017). Thus, the level of knowledge of the students regarding this technology need to identify. Therefore, it is worthwhile to conduct a study to determine the extent to which influence factors that hinder students acceptance towards subject IoT.

2. METHODOLOGY

Data Collection

2.1 Research Design

The design of this study is descriptive. Researchers have chosen this design because want to know what is happening and which is the phenomenon of the application of soft skills while participating in co-curricular and classroom activities among college students. In addition, researchers use survey methods to collect data because it is more appropriate and efficient to conduct descriptive studies. Research using survey methods has also been chosen because it is most popular among social by scientists Cooper, R.D dan Schindler, S.P. (2003). The data was obtained from the respondents using the questionnaire as a research instrument. The researcher selected the study design as shown in table.

Table1: Research Design

Research Design	Methodology	Strategies
Descriptive	Survey	Questionaire

2.2   Research Population & Sample

The population of the study consist of 102 IT students who took the IoT subject from July 2017 to Dec 2018. A total of 80 questionnaires were distributed to the students from three Community College which is Temerloh Community College, Paya Besar Community College and Bentong Community College. The sampling procedure used for the study was stratified random sampling. The stratification has been done based on the list of Community Colleges which has IT Course and sample size. The sample is randomly selected within semester July 2017 – Dis 2018. Table 1 shows the sample of students by list of Community Colleges.

Table1: Research Design

List of Community Colleges	Population	Sample
Temerloh Community College	54	43
Paya besar Community College	31	24
Bentong Community College	17	13
Total	102	80

2.3 Instrument of research

This research was conducted through a survey using online questionnaires (google form). In addition, it is wisely used to collect detailed data, structured and standard. Questionaire prepared by the researcher consists of a five point scale based on model TAM dan previous studies [23-24]. The scaled respondent choices were : 1-strongly disagree, 2-disagree, 3=slightly agree, 4=agree 5=Strongly Agree.This survey questionaire has two part, Part A, Part B, Part C & Part D. The instrument was reviewed by Research and Innovation (R&I) officer.
Part A : Demographic of Respondent
Part B: Knowledge level Of IoT
Part C: Factors Influence students perception towards IoT subject
Part D: Suggestion on other factors influence students perception towards IoT subject

2.4 Reliability

A pilot study was conducted through the questionnaire to determine if there were any problems with the questionnaire items. This is to ensure that the reliability of the questionnaire that is constructed is high and more reliable than using a small number of selected samples. A good reliability level is acceptable if the alpha value exceeds 0.6 according to Coakes, J.S dan Steed, G.L. (2001). For this study, the reliability value is 0.726.

Table 3. Reliability Assessment of Alpha Values, a

Cronbach's Alpha, a	Reliability Assessment
1	High, Good and Effective
0.8	Very good
0.6-0.7	Acceptable

Source: George, D., & Mallery, P.;(2003)

2.5   Data Analysis

According to Mohd Najib, A. G. (2003), descriptive test is used to describe the sample with frequency distribution, mean, median and mode and measures variability such as range and standard deviation. Studies conducted in decriptive and the data was analyzed using Statistical Package For Sosial Science (SPSS) version 16.0. The findings are presented in the tables with calculation of mean score. Interpretation of mean score shown in Table 4.

Table 4. Reliability Assessment of Alpha Values, a

Mean Value	Interpretation of mean score
1.00 − 2.33	Low
2.34 − 3.67	Moderate
3.68 − 5.00	High

Source :Adapted from Landell, 1997

3. RESULTS

3.1 Quantitative Study

3.1.1 Demographic respondents

Table 5. Demographic respondent

Item	Frequencies (f)	Percentage (%)
Gender:		
Male	37	46.2
Female	43	53.8
Age:		
Below 20 years	45	5.6
20-24 years	30	69.4
25-29 years	5	25.0
Race:		
Malay	63	78.8
Chinese	10	12.5
Indian	6	7.5
Other	1	1.2
Community Colleges:		
Paya Besar Community College	24	30.0
Bentong Community College	13	16.2
Temerloh Community College	43	53.8

Section A contains the data on the respondents' gender, age, race and list of community colleges. The results of this demographic data have been reviewed to further strengthen the reliability of the data collected and the results presented in Table 5. A total of 80 respondents of the study comprised men with a percentage of 46.2%, while female respondents with a percentage 53.8%. For age, 80 respondents aged below 20 years were 45 and 20-24 years were 30 and 25-29 years were 5. In additon, for race, Malay were 78.8%, ``Community College were 24 (30%), Bentong 13 (16.2%) and 43 (53.8%) were from Temerloh Community College comprised as respondents.

3.1.2 Knowledge level Of IoT among students

Table 6. Mean scores for Knowledge level of IoT

Questions	Mean score	Interpretation
My lecturers always reveal information about the IoT and its importance up to date.	4.29	High
I have some knowledge on how to create IoT related projects.	4.11	High
I was able to find new technology in learning opportunities to enhance my knowledge and skills	3.98	High
I know the use of Raspberry pi as sensors for RFID sessions is IoT	4.22	High
I, gained knowledge of IoT and IoT seminars outside of Community College	3.74	High
I know about IoT from articles, the internet, television or newspapers	3.74	High
Total Mean	**3.7771**	**High**

The mean score of knowledge level of IoT among students was found to be 3.7771 which is at high level (Table 6). The mean score shows that many students like to expand knowledge in their field of study. Besides that, mean score also shows that students have basic understanding, the importance and information about IoT. Most of the students expert in for the information linked detail on how to develop IoT related projects.

3.1.3 Factors that influence the acceptance towards IoT subject.

The factors that influence the acceptance towards IoT subject is Perceived Ease Of Use (mean value= 3. 3.6625, standard deviation =0.49667) and Perceived Of Usefulness (mean value=3.670 and standard deviation=0.55127) at moderate level.

Table 7 : Factors that influence the acceptance towards IoT subject

Factors influence the acceptance towards IoT subject.	Mean	Stardard Deviation	Interpretation Level
Perceived Ease Of Use (PEOU)	3.6625	.49667	**Moderate**
Perceived Of Usefullness (POU)	3.6700	.55127	**Moderate**
Individual Behavior	4.2825	.44516	**High**

3.14 Other factors that influence students' acceptance towards IoT subject.

Table 8.Factors that influence the acceptance towards IoT subject

Others Factors that influence students' acceptance	Frequency(f)	Percent(%)
Electronic Basics	13	16.2
Lecturer	26	32.5
Syllabus	11	13.8
Teaching about the Arduino Basics	8	10
No feedback	22	27.5

Table 8 indicates there are four other factors that influence students' acceptance which is Electronics Basics, Lecturer, Syllabus, and Teaching about Arduino Basics. Lecturer factor influence as highest percentage which is 32.5% and 26 respondents. However, other factors such as electronic basics (13, 16.2%), Syllabus (11, 13.8%) and teaching about Arduino Basics (8, 10%) influence the acceptance level from 32 respondents. The lack of responses shows 22 respondents, 27.5% did not respond.

4.0 DISCUSSION

As the findings indicates that the knowledge level of IoT is at high level on basic understanding about IoT, its importance and usage of IoT to develop a project. Based on findings of Amr Elsaadany and Mohamed Soliman. (2017) emphasized that equally important to measure the level of knowledge of the students when it comes to the new technology from the survey conducted by this author to know the needs as students is key learner in learning. However, the author also emphasized that the role of educator plays important to assure the quality of teaching and learning apart from students ability and knowledge level. Further more, this findings on knowledge level was supported by Abdel-Basset. et al. (2018) also address about students capability on IoT with knowledge and skills. Furthermore, students perceived that they are unable to find new technology in learning opportunities. According to Ana-Maria. et al. (2018), from the survey conducted on topic "A Survey on IoT in Education" , indicates that students and their knowledge with willingness to learn about the topic IoT plays an important key player in education environment.

There are three factors evolving in this research is Perceived Ease of Use (PEOU) and Perceived Of Usefulness (POU) which is at moderate level. Therefore, the researcher came to understanding from the responses that students lack on operational method, perceived ease of use (PEOU), to operate and skilful using IoT technology to build the IoT projects addresses by several authors Pedro M. Reyes, & Patrick Jaska. (2007) and Reyes, P.M., Li, S., & Visich, J.K. (2012.) In this context, these authors emphasized that a lack of understanding about how IoT works and lack of operational as barriers. However, student's PEOU of the knowledge and tools gained from a course depend on interaction and communication characteristics, which motivates the students, in contrast to the suggestion of Barat. et al (2009) . In addition it is authors emphasized that effective communication is at the heart of successful knowledge transfer.

In addition, the students perception regarding experience learning IoT subject, which inculcate as perceived Of Usefulness (POU) was incompetent with developing IoT project using Rasberry Pi 3 with Python programming language. Initialy, python was used to work quickly and integrates system more efficiently and considered as high –level programming language was supported by Benson, C. (2016). Further more, PEOU and POU emphasized as the most appropriate in the measure of students perception.

However, the Individual behaviour indicates at high level. It emphasizes there are mismatch among these three factors among students acceptance level because the skills are out of their intellectual capacity. Based on the findings of Mäenpää. et al . (2017), indicates that when students engage in the problem independently, they are guided to find their own thinking strategies and ways of working which improves their self-directed learning skills. So, therefore individual behaviour at high level with strong individual behaviour supported theses findings. Therefore, the study plays important role to improve students acceptance level and better improvement on continuous assessment on IoT emphasized by Ahmood et al (2017). These findings also recommended by author, Mohammad Al-Momani. et al. (2018). Other factors suggested from the study should be considered as well such as lecturer, should play important role, and electronics basics, teaching Adriano to get students attention to learn.

5. CONCLUSIONS

As a conclusion, Internet of things (IoT) provides many applications to connect the things to things and human to things through the internet with such technologies are mobile computing, RFID, wireless sensors networks, and embedded systems to provide a development in society towards Industrial Revolution (IR 4.0) . In higher learning such as Community Colleges, IoT plays new player and emphasize as a subject taught for students and teachers to became highly exciting. Nevertheless, IoT to create a ideal environment in learning and teaching for both aspects. However, the students acceptance level on IoT subject is merely not a easy things and was the research was study was conducted with Technology Acceptance Model (TAM) factors, emphasized to test acceptance level of students towards IoT subject.

6.0 IMPLICATIONS AND FUTURE RESEARCH

The implications of the study is to give exposure to curriculum developers to develop a syllabus on Electronics Basics earlier before the students learn IoT subject on Semester 3. A few responses from head department of IT emphasized this due to lack of electronics basics students unable to perceived ease of use and perceived of usefulness, according to Technology Acceptance Model (TAM) to indicate acceptance level of IoT among students. Therefore, the lecturers, students, curriculum developers, department of Polytechnics and Community Colleges should cooperate to take drastic steps to help strengthen the learning and teaching strategies within the students intellectual capacity. Further more, this will enhance to blend IoT in Community Colleges leading IR 4.0 in higher learning. Future recommendations of the research is to increase acceptance level of IoT among students and should be integrated to develop a new paradigm in teaching and learning as students as generation of IoT Makers.

7.0 ACKNOWLEDGEMENT

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CRITICAL ENTREPRENEURSHIP COMPETENCIES THAT NEED TO BE APPLIED AMONG BENTONG COMMUNITY COLLEGE STUDENTS TOWARDS INDUSTRIAL REVOLUTION 4.0

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ABSTRACT

The Industrial Revolution 4.0 (4IR) will transform the digital era to the physical system of cyberspace that covers a wide range of life scopes. Among the most affected field is entrepreneurship where the technology that comes so quickly will give a great challenge to businesses. Therefore, entrepreneurs need to be implanted with appropriate competency in order to face the 4IR in style. Bentong Community College Annual Report for 2017 and 2018 shows that entrepreneurship activities implemented by the students are merely focused on operating sales stalls. While, preliminary study with the Entrepreneurship Module's lecturers found that stalls' activities did not help much in inculcate entrepreneurial competencies within the students towards encountering the 4IR. Thus, this study was carried out to identify the most critical characteristics of entrepreneurial competency to be applied among the students so that they could adapt the challenging environment of the 4IR. A set of questionnaire which is based on the thirteen characteristics of entrepreneurial competencies by McClelland and McBer & Co. (1985) has been distributed to the students. The analysis was done using a quantitative design and the findings show that the critical feature of entrepreneurship competencies that should be applied among the students is problem solving, information seeking and initiative. As a conclusion, it is hoped that the result of the study can help the management to structure the entrepreneurship cultivation program which leads to the enhancement of students' entrepreneurship competencies in embracing the 4IR.

Keywords: Industrial Revolution 4.0, Entrepreneurial Competencies, Entrepreneurship.

INTRODUCTION

The Community College, established on July 5 2000, is a Public Education Institution managed by the Ministry of Education Malaysia. Among the mission of Community College establishment is to develop holistic, entrepreneurial and balanced graduates. [1]. In order to accomplish the mission, students are required to complete the entrepreneurship module in each program enrolled [2]. The entrepreneurship module is designed to provide students with an awareness of the importance of entrepreneurship as well as to instill the knowledge, skills, values and characteristics of entrepreneurial as a primary approach for them to become an entrepreneur after completing their studies [3]. In this module students will be theoretically exposed to the characteristics of successful entrepreneurship. Students are also required to perform offline and online business simulations project. In performing the simulation project, students need to come up with a business idea, plan a marketing mix and then run the business [3].

A preliminary study was conducted with the Entrepreneurship modules lecturers to get an initial idea of students' entrepreneurial competence. Through the observation of these lecturers, students are not able to demonstrate some entrepreneurial competencies when conducting the sales simulations project namely problem solving, information seeking and initiative. On the other part, the Bentong Community College (BCC) Annual Report for 2017 and 2018 shows that entrepreneurship activities implemented by the students of BCC are merely focused on operating sales stalls [4-5]. There are none other activities conducted to inculcate entrepreneurial competencies within the students. Therefore, this study was conducted to identify the most important entrepreneurial competencies to be applied to BCC students towards encountering the Forth Industrial Revolution (4IR) as an entrepreneur.

Entrepreneur is someone who organizes, manages and assumes the risks of a business. Entrepreneur can also be defined as a person who exploit market opportunity through technical and organizational innovation or both [6], who habitually creates and innovates something of recognized value around perceived opportunities [7], who demonstrates initiative and creative thinking plus who are ready to accepts risk and dare to fail [8].

The action taken by the entrepreneur in executing ideas is called entrepreneurship [9]. The action of entrepreneur involves the identification, evaluation and exploitation of opportunities [10] as well as managing risk and mobilizing resources [11]. On the other part, entrepreneurship is associated with attitudes, values, knowledge and skills that enable a person to be able and able to find, recognize, seize opportunities and translate it into strategies and business ventures for profit generation [12]. It can be concluded that entrepreneurship involves the process of nurturing the actual or potential entrepreneurs to become effective in running their own organizations [13]. Entrepreneurship process leads to the birth of business ventures in many sectors being it manufacturing, service, wholesale or retail.

Competency is an underlying characteristic of a person [14] or an important skill acquired [15] which results in effective performance of a job. A competency model encompasses all the skills, behavioral examples and proficiency requirements in completing a particular task successfully [16]. Another definition of competency is a bunch of related knowledge, skills and attitudes that reflects on the performance of a job [17]. Competency can be measured with well-accepted standards and can be improved with training and development [17].

Entrepreneurship requires particular ability for profitable functioning. It is called as entrepreneurial competency [18]. For instance, specific knowledge, motives, traits, self-images, social roles and skills that result a new business venture, business survival or business growth [19]. Thus, the term entrepreneurship competency refers to the key features in the style of acting to perform entrepreneurial functions effectively. Entrepreneurial competence can be acquired through behavioral practices as a result of one's life values, attitudes or inner motivation to perform well [19].

There are numerous studies conducted to list and discuss various characteristics of entrepreneurial competencies. Through a study on the successful entrepreneurs in Malawi, India and Ecuador, McClelland and McBer & Co. (1985) have listed 13 characteristics of entrepreneurial competence that possesed by the successful entrepreneurs [20]. The 13 characteristics of entrepreneurial competencies listed by McClelland and McBer & Co. (1985) are as follows [21]:

1. Use of influence strategies : Individuals who can influence others without any trick or deception in achieving a business goal. Entrepreneurs are leaders in their business and are able to influence their employees and stakeholders.
2. Self-confidence : Individuals who believe in their own ability in completing a task to achieve a goal. They are not afraid to try and dare to fail.
3. Persuasion : Individuals who can convince others to follow them or do something for them.
4. Assertiveness : Individuals who are firm in delivering their opinions and ideas to others. They dare to take action despite having to face opposition from others.
5. Problem solving : People who eager to engage in the actions or thoughts necessary to discover possible solutions to problems. They are able to come up with new ideas or innovative solutions.
6. nformation seeking : People who are actively attempting to obtain information in both human and technological contexts. Entrepreneurs are constantly conducting market research and search for information and feedback to meet customers' satisfaction.
7. Systematic planning : People who are concern with the planning process. They will apply a scientific method and includes concepts such as objectivity of approach and acceptability of results during the palnning process.
8. Sees and acts on opportunities : Entrepreneurs seek opportunities and take the initiative to transform them into business situations.
9. Concern for high quality of work : People who are constantly comparing the quality of their work with others. They will take necessary action to improve the task up to the anticipated standard.
10. Commitment to work contract : An entrepreneur always delivers his promise promptly and he values his reputation.
11. Persistence : Person who are keen in continuing an opinion or a course of action in spite of difficulty of the opposition.
12. Efficiency orientation : Person who always finds ways to do things faster or with fewer resources or at a lower cost.
13. Initiative : People who has the power to act or take charge before others do. They will do their job without being pressured or coerced and have a proactive attitude and strives to prosper.

Competencies play an important role in successful entrepreneurship [22] and it is considered as significant factors in determining the success, performance and growth or failure of a business operation amongst competitive enterprise environment [23-28]. Thus, successful entrepreneurship requires the entrepreneur to posses certain skills such as ability to learn new techniques in handling business operation, ability to adopt to change and to handle changes in the environment [22]. Different competencies needed at different stages of the business development [27]. The entrepreneurial competencies are more significant during the start-up phase, while managerial competencies are more important at the growth stage [29].

The instruments used to verify the entrepreneurial competence will determine the respondents' level of interest in entrepreneurship as well as the factor of entrepreneurial performance and organizational success [30-33]. There is a significant relationship between entrepreneurial competencies and business success [34-37]. Studies on entrepreneurial competence by Mc Clelland and Mc Ber & Co. showed a significant relationship between specific entrepreneurial competencies in influencing the success of an entrepreneur [38].

The 4IR has been the world's catchphrase for almost a decade. It commenced in 2011 due to the launched of the new concept on the German's economic policy [39]. The 4IR can be distinguished from the earlier revolution in which the previous revolution saw the technology replacing skilled workers, while the 4IR is where humans meet the cyber world, where the technology and people are closely attached [40]. This technological revolution will fundamentally change the way people live, work and relate to one another [41]. It is said that, nowadays, if we had the technologies (computers, devices, sensors, smart applications, smart phones, smart watches), then we had a life. Ordering a cab, booking a flight, buying a product, making a payment, listening to music, watching a film, playing a game and many others can now be done remotely. This proved that 4IR will have a large impact on means of conducting a business [42] and change the way products and services are sold and provided [43]. The revolution will make it possible to gather and analyze data across machines, enabling faster, more flexible and more efficient processes to produce higher-quality goods at reduced costs which in turn will increase manufacturing productivity, shift economics, foster industrial growth, modify the profile of the workforce and ultimately changing the competitiveness of companies [44]. It is expected that the impact of 4IR will be more profound, irreversible and much more rapid than the previous three generations in which it will affect markets and business processes by paving the way to a new age of digitization, smarter networking of production systems and interlinked business processes [45]. As the 4IR will affect the business process, entrepreneurs must be mindful that competitiveness is no longer depends merely on optimization of own resources, but it also depends on total inter-organizational value chain innovativeness and supportive partner [46]. Therefore, in order to achieve better process efficiency and competitiveness, companies that are moving towards 4IR need to be aware of every aspect that can be affected including products and services, new business models and market, economy, work environment and skills development [47].

During the era of 4IR the success of businesses strongly depends on the ability to innovate and create new knowledge. This is largely based on the knowledge, experience and individual competencies [48]. For instance, under certain conditions, innovation-related competencies can become a critical competency. Thus, companies need to regularly identify competencies at risk and develop suitable methods and measures to develop respective competencies [49]. Moreover, advanced knowledge and skills about exploring and developing business opportunities, devising a business plan and testing the business viability before launching the new venture are needed. These competencies will equip business owners, managers and entrepreneurs to develop appropriate strategies with the purpose of meeting society's needs and satisfying business objectives [46].

Based on the above, innovative, creating new knowledge, proactive and risk-taking can be listed as the critical entrepreneurial competencies needed to uphold the current 4IR. These competencies are also listed in the 13 characteristics of entrepreneurial competencies by McClelland and McBer & Co. (1985). Thus this study will identify the level of entrepreneurship competencies of BCC students based on the 13 characteristics of entrepreneurial competencies by McClelland and McBer & Co. (1985).

It is important to identify the level of entrepreneurship competencies of BCC students in order to support the aim of Ministry of Education Malaysia to strengthen the education and direction of the TVET institutions during the era of 4IR by enhancing graduates' marketability via enhancement of certain competencies that can provide competitive advantage in technical skills as well as soft skills. The result of the study can also be used to measure the achievement of Community College mission of developing holistic, entrepreneurial and balanced graduates. As for Bentong Community College, the study targets to assist the institute in formulating appropriate programs and activities to enhance the level of entrepreneurial competency among students in line with the predetermined mission of the Department of Polytechnic and Community Colleges Education. Last but not least, it is hoped that this study will help BCC students to recognise their level of entrepreneurial competence that they have. Subsequently, they can take appropriate action to improve those features to embrace 4IR successfully.

METHODOLOGY

This research is focusing on the most critical entrepreneurship competencies that need to be applied among BCC students towards 4IR. In order to gather information, a questionnaire was developed and distributed to the respondents in July 2019. Because the study population was 114, the sample size required for this study was 83 as suggested by Krejcie and Morgan [51]. The researcher recruited a total of 105 students to respond to this study.

The questionnaire was divided into 2 sections, Part A and Part B. The questions in Part A contained respondents' demographic information on gender, age, programs and experience in entrepreneurship courses. Meanwhile, the questions in Part B is divided into 3 sections. Section I is about the awareness that 4IR will bring a great impact on entrepreneurship, Section II is regarding the knowledge of entrepreneurial competencies and Section III is the instruments to verify the respondents' entrepreneurial competencies. The instruments used in this study were entrepreneurial competence instruments adapted from the McClelland and McBer & Co. (1985). There are 13 characteristics of entrepreneurial competencies developed by McClelland and McBer & Co. (1985) namely use of influence strategies, self-confidence, persuasion, assertiveness, problem solving, information seeking, systematic planning, sees and acts on opportunities, concern for high quality of work, commitment to work contract, persistence, efficiency orientation and initiative. Each competency has 3 related questions. Respondents are required to complete all 39 questions based on the Likert Scale Score of 1 to 5 as per Table 2. The data obtained from the questionnaire will be analyzed using descriptive analysis to determine the mean value. The mean score are indicated based on Smith and Kendall's (1963) interpretation as per Table 3 [52].

All surveys responses were recorded and used for statistical analysis. Descriptive cross tabulation method was used to conduct the data analysis via Statistical Packages for Social Science Version 21 (SPSS 21.0).

In conducting this study, the researcher has relied on the assumptions made. The accuracy of the study also depends on the honesty and sincerity of the respondents in answering the questionnaire provided. The researcher assumes that all respondents' answers are honest, true and sincere.

Table 1: Questionnaire Section And Related Items

Part of Questionnaires		Item	Objective
Part A		Demographic information.	To identify respondents's background
Part B	Section I	The awareness that 4IR will bring a great impact on entrepreneurship.	To identify the BCC students' level of awareness that 4IR will bring a great impact on entrepreneurship.
	Section II	The knowledge of entrepreneurial competencies.	To identify the BCC students' level of knowledge regarding entrepreneurial competencies
	Section III	Instruments to verify the respondents' entrepreneurial competencies.	To identify the most critical entrepreneurial competency to be applied among BCC students so that they could adapt the challenge of 4IR.

Table 2: Distribution Of Likert Scale Scores

Scale	Mean Score
Strongly agree	5
Agree	4
Fair	3
Disagree	2
Strongly disagree	1

Table 3: Levels Mean Score

Mean Score	Level
1.0 - 2.39	Low
2.4 - 3.79	Moderate
3.8 - 5.0	High

RESULT AND DISCUSSION

The analysis and interpretation of the data was conducted after the study instrument was collected from 105 respondents. The findings on Part A shows the demographic segmentation analysis involves four items namely gender, age, program and experience of entrepreneurship courses. It can be summarised as Table 4.

Table 4: Frequency Distribution Of Respondents By Item

Item		Frequency	Total
Gender	Male	62.9%	100%
	Female	37.1%	
Age	16-20	98.1%	100%
	21-30	1.9%	
Program	Business Operation	21.0%	100%
	Information Technology	26.7%	
	Electrical Engineering	33.3%	
	Building Construction Technology	19.0%	
Have attended entrepreneurship courses	Yes	64.8%	100%
	No	35.2%	

The findings on Part A of the questionaire with regards on the respondents' demographic can be analysed as follows:

- The respondents comprise of 62.9% male and 37.1% female.
- 98.1% respondents aged between 16 to 20 years old and 1.9% aged 21 to 30 years old
- The respondents are the students Business Operation Program, Information Technology Program, Electrical Engineering Program and Building Construction Technology Program which consist of 21%, 26.7%, 33.3% and 19% respectively.

The findings on Part B will answer the three study questions as follows:

First Study Question: What is the BCC students' level of awareness that 4IR will bring a great impact on entrepreneurship.
The first research question is to identify the BCC students' level of awareness that 4IR will bring a great impact on entrepreneurship. To answer the first question, a mean score was performed. Table 5 shows the level of awareness that 4IR will bring to a great impact on entrepreneurship with five items.

Table 5: Mean Level On Awareness That 4IR Will Bring A Great Impact On Entrepreneurship

No.	Item	Mean score	Mean score level
1.	I know about the Industrial Revolution (4IR).	2.97	Moderate
2.	I know the Industrial Revolution (4IR) has an impact on entrepreneurship.	3.39	Moderate
3.	I know that the Industrial Revolution (4IR) presents challenges in entrepreneurship.	3.37	Moderate
4.	I know that the Industrial Revolution (4IR) is going to take full advantage of technology and the internet in the field of entrepreneurship.	3.65	Moderate
5.	I know that the Industrial Revolution (4IR) in entrepreneurship requires online application skills.	3.57	Moderate
	Level of awareness that 4IR will bring a great impact on entrepreneurship	3.39	Moderate

Table 5 shows the mean score for level of awareness that 4IR will bring a great impact on entrepreneurship. According to Smith and Kendall's (1963) interpretation, level of awareness that 4IR will bring a great impact on entrepreneurship is at a moderate level.

Second Study Question: What is the BCC students' level of knowledge regarding entrepreneurial competencies.

The second research question is aimed at BCC students' level of knowledge regarding entrepreneurial competencies. Table 6 shows the mean scores of students' level of knowledge regarding entrepreneurial competencies.

Table 6: Mean Level Of Knowledge Regarding Entrepreneurial Competencies

No.	Item	Score Mean	Level Mean Score
1.	I have knowledge of entrepreneurial competence.	3.27	Moderate
2.	I know successful entrepreneurs need to have the attributes of entrepreneurial competence.	3.83	High
3.	I know that there are 13 types of entrepreneurial competence according to McClelland and McBer & Co. (1985).	3.25	Moderate
4.	I know that solving problems creatively is one of the 13 characteristics of entrepreneurial competence.	3.26	Moderate
	Level of knowledge regarding entrepreneurial competencies.	3.40	Moderate

Table 6 shows the mean score for level of knowledge regarding entrepreneurial competencies. Findings indicate that BCC students' knowledge regarding entrepreneurial competencies was moderate based on the interpretation of Smith and Kendall (1963).

Third Study Question: What is the most critical entrepreneurial competency to be applied among BCC students so that they can adapt the challenge of 4IR.

The third research question was to identify the most critical entrepreneurial competency to be applied among BCC students so that they could adapt the challenge of 4IR. Table 7 shows the mean scores of the most critical entrepreneurial competency to be applied among BCC students.

Table 7: Mean Level Of The Most Critical Entrepreneurial Competency To Be Applied Among Bcc Students So That They Could Adapt The Challenge Of 4IR

No.	Item	Mean Score	Mean Score Level
1.	Use of influence strategies	3.61	Moderate
2.	Self-confidence	3.61	Moderate
3.	Persuasion	3.48	Moderate
4.	Assertiveness	3.77	Moderate
5.	Problem solving	2.32	Low
6.	Information seeking	2.28	Low
7.	Systematic planning	3.67	Moderate
8.	Sees and acts on opportunities	3.62	Moderate
9.	Concern for high quality of work	3.78	Moderate
10.	Commitment to work contract	3.95	High
11.	Persistence	3.77	Moderate
12.	Efficiency orientation	3.63	Moderate
13.	Initiative	2.38	Low

The findings indicate that the most critical entrepreneurial competencies are problem solving with mean score of 2.32, information seeking with mean score of 2.28 and initiative with mean score of 2.38. The three competencies show a low mean score level.

The above findings required researchers to suggest appropriate measures to improve BCC students entrepreneurship competencies. The suggestion will be discussed in the next segment.

CONCLUSIONS

This study has identified the weak features of entrepreneurial competencies among the BCC students. In this regard, it is recommended that students reflect on what aspects of entrepreneurial competencies they need to improve and polish. It is advisable for them to take action and treasure every opportunity that they can grab in order to improve their entrepreneurial competence. Proposals are also channelled to top management of BCC to structure entrepreneurship cultivation program which leads to the enhancement of students' attitudes towards the pursuit of the 4IR and fulfil the whole characteristics of entrepreneurial competencies. Such programs that can be considered are entrepreneurship seminars, entrepreneurship motivation camps, coaching from successfully proficient entrepreneur as well as encouraging entrepreneurship by developing an entrepreneurial culture through organisation policy.

Researchers hope that action to improve the students' level of entrepreneurial competencies is implemented. A future action studies can be conducted to identify appropriate methods taken in enhancing student entrepreneurship competency, especially in the areas that are found to be low in this research namely problem solving, information seeking and initiative.

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THE READINESS OF COMMUNITY COLLEGE STUDENTS AGAINST THE INDUSTRIAL REVOLUTION 4.0 IN THE FIELD OF ENTREPRENEURSHIP

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ABSTRACT

Industrial Revolution 4.0 (IR 4.0) will face new technologies that combines the physical, digital, and biological worlds that will affect all disciplines, economies, and industries. This technology has the potential to directly link the billions of humans into the Web and improve business efficiency and organisation drastically. The presence of IR 4.0 that emphasizes the construction of the virtual reality technology without much use of manpower, affect many aspects of life. The field of entrepreneurship is important enough that it does not miss the impact of this latest development. It's the new colonial if entrepreneurs especially among the younger generation failed to manage the risks. Entrepreneurship education is very significant and a catalyst for the focus of entrepreneur development. Therefore, this study was conducted to determine the readiness of Bentong Community College students against the IR 4.0 in entrepreneurship. The scope of this study involved 100 respondents of student from Business Operations and Information Technology Program in Bentong Community College. Based on the preliminary study, students generally have knowledge about the IR 4.0 but students are less practicable in this field of entrepreneurship. The questionnaires were distributed to obtain information and SPSS 21 for Windows (Statistical Package for the Social Science version 21) used to analyze the data obtained. Quantitative methods have been used to implement the objectives of the study. The importance of this study is to identify the level of readiness of Bentong Community College students to the IR 4.0 in entrepreneurship. The findings show that the level of knowledge of Bentong Community College students on the IR 4.0 in entrepreneurship is moderate. The level of readiness of Bentong Community College students to the IR 4.0 in entrepreneurship is also moderate.

Keywords: Student, Industrial Revolution 4.0, Entrepreneurship

INTRODUCTION

The 4th Industrial Revolution (IR 4.0) will face new technology combining physical, digital and biological worlds. This technology will affect disciplines, economies and, industries.. This technological revolution will fundamentally change the way people live, work and relate to one another [1]. This technology has the potential to directly link the billions of humans into the web and improve business efficiency and organisation drastically [2]. IR 4.0 is characterized by the advent of supercomputers, smart robots, driverless vehicles, genetic modifications and the development of neurotechnology that enables humans to optimize brain function. The presence of IR 4.0 that emphasizes the construction of the virtual reality technology without much use of manpower, affect many aspects of life.

The IR 4.0 has been the world's catchphrase for almost a decade. It commenced in 2011 due to the launched of the new concept on the German's economic policy [3]. It was coined in 2011 by a group of scientists and engineers working on a project promoted by the German government aimed at promoting and implementing the digital system completely. Industrial Revolution 4.0 is the evolution of traditional factories to smart factories where all human resources, materials and resources are interconnected and optimized, adapting each time to the economic market environment and customer needs [4]. In fact, the Fourth Industrial Revolution was an integrated revolution that moved automatically to perform complex tasks. According to Joe Loparco, CoS President of AGS Automotive Systems, Auto Parts Manufacturer, technology ahead of the Industrial Revolution 4.0 became cheaper, user-friendly and powerful.

The world of information technology, mobile communications and robots has led to the growing use of digital technology in factories around the world. This transformation was known as Industry 4.0 or Industrial Revolution 4.0 after it was triggered by steam engine, assembly line and electronic automation [5] . Bedard-Maltais believes that Industry 4.0 refers to the use of digital technology to make customers more agile, flexible and responsive. It can now create smart factories where the Internet, wireless sensors, software and other advanced technologies work together to optimize production processes and increase customer satisfaction. This enables businesses to respond faster to market changes, offer more customized products and improve operational efficiency in a continuous improvement cycle.

The field of entrepreneurship is important enough that it does not miss the impact of this latest development. As such, IR 4.0 discovered a new pattern when technology intervention came about quickly and threatened existing businesses or companies It's the new colonial if entrepreneurs especially among the younger generation failed to manage the risks. In the context of the IR 4.0 millennium, entrepreneurship is not solely about business but the success of businesses strongly depends on the ability to innovate and create new knowledge. This is largely based on the knowledge, experience and individual competencies [6]. While businesses are a great source of income, traders have no assurance that the businesses they run are successful or are poorly trained in using IR 4.0 technology. As such, the advent of IR 4.0 towards the era of the 'Digital Economy' has led the government to work towards developing an ecosystem that can foster an innovative and creative entrepreneurial country culture through new and digital economies.

The IR 4.0 brought a positive light to those who knew to use it. Migration to the technology of virtual trade or e-commerce will open up more economic opportunities for Malaysians. This is a confusing situation because in terms of skills preparation, Malaysia is lagging behind in light of the fact that many elements of economic and industrial development are still being carried out manually [7]. The Fourth Industrial Revolution also saw how the world economy shifted from conventional resource-based to digital economy based on information technology. This reality has caused many large and small companies to fall behind due to delays in responding to changes and not providing their digital strategic plans. These include the Toys r Us Company which had to pay over US $ 5 billion in debt due to failing to compete with new competitors and the explosion of counterfeit goods [8].

Today's technology shows access to the internet can be done anytime and anywhere. These developments have influenced businesses and entrepreneurs to use social media for business and enterprise sustainability. The findings show that the business and enterprise sectors need to be supported by technology or ICT elements. Through technological features such as ease of use, relative advantage and compatibility, it is now seen as more aggressive in conducting online marketing activities that contribute to the growth of the country's business and economy. The characteristics of social media acceptance among merchants no matter how large or small indicate that there is a tendency in their decision-making process to apply technology elements in business marketing. It can therefore be concluded that the people of Malaysia today are increasingly open to accepting technology in their business dealings.

According to [9], the process of internet transformation is constantly evolving until it moves from the medium of transaction to the social medium it offers two-way communication. This new generation of Internet is known as social media. Appearance social media has been found to change consumers' knowledge, needs and expectations in terms of information search, information sharing and decision-making [9-11]. Nowadays, people are beginning to use social media as a platform for shopping, asking questions and getting feedback [9]. From the standpoint of business organization, social media enables 2 activities such as the delivery of information, promotion and the process of getting better customer feedback [12]. Ordering a cab, booking a flight, buying a product, making a payment, listening to music, watching a film, playing a game and many others can now be done remotely. This proved that 4IR will have a large impact on means of conducting a business [13] and change the way products and services are sold and provided [14]. In fact, it has also seen entrepreneurs and small firms innovate and developed of technology. All these developments of interest to the country's regional governments implement various forms of perceived strategy for driving the digital economy sector. However, in these exciting developments, most businesses have not fully embraced digital technology to move ahead with IR 4.0. We are not able to restrict or control the development of IR 4.0 digital technology in the business that exists in this century, but we are able to compete and work hard to prepared ourselves to meet the challenges of IR 4.0.

The Community College, established on July 5 2000, is a Public Education Institution managed by the Ministry of Education Malaysia. Among the mission of Community College establishment is to develop holistic, entrepreneurial and balanced graduates [15]. As an institution of Technical and Vocational Education and Training (TVET), Bentong Community College (BCC) is also no exception in organizing steps to adopt a high-tech strategy that IR 4.0 as one of the must-do programs for students to keep up with the country's demands for new and emerging digital economics in the era of IR 4.0. In order to accomplish the mission, students are required to complete the entrepreneurship module in each program enrolled [16]. To ensure that every objective can be achieved, the purpose of the IR 4.0 needs to be made clear to all BCC students. With the knowledge and understanding available, then the relevant entrepreneurial activities focused on the new economy and digital economy in IR 4.0 can be implemented successfully.

In this regard, this study is a preliminary study of the level of readiness of BCC students to pursue IR 4.0 in entrepreneurship. Availability of knowledge and challenges of pursuing IR 4.0 in the field entrepreneurship enables lecturers to come up with a comprehensive activity or learning strategy to enhance student knowledge and ensure the success of IR 4.0. Therefore, an appropriate framework is needed to further identify students' readiness to understand IR 4.0 technology in the field of entrepreneurship to ensure their readiness for IR 4.0. and use IR 4.0 technology in entrepreneurship activities.

2. METHODOLOGY

This research is a descriptive survey about the readiness of Community College students against the Industrial Revolution 4.0 in the field of entrepreneurship. Descriptive research using survey method was chosen as it is one of the most popular research method used in various fields especially in the field of social sciences in general and in particular aspects of education. This survey method is very popular because of its features, which is a comprehensive application as it can be used to express various types of questions such as issues and problems from multiple perspectives. In addition, fast and straightforward data collection from respondents, enabling analysis in a short time.

The population in this study was made up of students from Bentong Community College (BCC), Pahang. However, not all population data studied can be collected by researchers. So only a portion of the data can be collected and this information is called a sample. The sample refers to the small number of units taken from the population. From this population size, the sample size of the study was taken from a number of students at BCC. Sample selection was made at random. Because the study population was 90, the sample size required for this study was 74 as suggested by [17]. The researcher recruited a total of 90 students to respond to this study. Population refers to the whole person, object or event that attracted the attention of researchers to conduct a study. Population must include the entire object, object or element under study. That several quantitative criteria that might be used to determine when groups of individuals are different enough to be considered as a population [18].

For the purpose of data collection, questionnaires were distributed to respondents for feedback. The questionnaire was divided into 2 sections, Part A and Part B. The questions in Section A contained respondents' demographic information on gender, age, academic qualifications, programs and experience in entrepreneurship courses. Meanwhile, the questions in Part B are about the knowledge and readiness of BCC students regarding the IR 4.0 in entrepreneurship. Respondents are required to complete all 15 questions based on the Likert scale of 1 to 5 as per Table 2. The data obtained from the questionnaire will be analyzed using descriptive analysis to determine the mean value. The mean score are indicated based on [19] as Table 3. Reliability test was conducted to test the internal consistency of the instruments. Results of the test are presented in Table 4. The instrument which was made up of 39 items were found to be reliable as the Cronbach's alpha (.818) is higher than the acceptable level (.70).

All surveys responses were recorded and used for statistical analysis. Descriptive cross tabulation method was used to conduct the data analysis via Statistical Packages for Social Science version 21 (SPSS 21.0) The research instrument is a questionnaire designed specifically to collect research data. Two important criteria to keep in mind in building the instrument are the validity and reliability of the instrument used. A good research instrument contains questionnaire items that are concise, clear, easy to answer and that represent the operational concepts you want to study accurately[20]. In conducting this study, the researcher has relied on the assumptions made. The accuracy of the study also depends on the honesty and sincerity of the respondents in answering the questionnaire provided. The researcher assumes that all respondents' answers are honest, true and sincere. Table 1 shows the sections of the questionnaire and the items involved.

Table 1 : Questionnaire Section and Related Items

Part of Questionnaires	Item
Part A	Demographic Information
Part B	Knowledge and Readiness of Bentong Community College Students Regarding the Industrial Revolution 4.0 in Entrepreneurship

Table 2: Distribution Of Likert Scale Scores

Scale	Mean Score
Strongly agree	5
Agree	4
Fair	3
Disagree	2
Strongly disagree	1

Table 3: Levels Mean Score

Mean Score	Level
1.0 - 2.39	Low
2.4 - 3.79	Moderate
3.8 - 5.0	High

Table 4: Reliability Coefficient Of Study Instruments

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.818	.817	15

These data were analyzed using descriptive and inferential statistics such as percentage and mean as shown in Table 5.

Table 5 : Data Analysis Methods for Each Study Question

No.	Items involved	Analysis
1	First Objective: To identify the knowledge of Bentong Community College students about IR 4.0	Min score
2	Second Objective: To identify the readiness of Bentong Community College students against IR 4.0 in the field of entrepreneurship	Min score

3. RESULTS AND DISCUSSIONS

The analysis and interpretation of the data was conducted after a research instrument gathered from 90 respondents consisting of Information Technology Program students and Business Operations Program, Bentong Community College. Therefore, the researcher distributed the questionnaire to 90 respondents and returned it to the researcher completely. The analysis and interpretation of the data was conducted after the study instrument was collected from 90 respondents.

The findings on Part A of the questionaire with regards on the respondents' demographic can be analysed as follows:

3.1 Distribution of Respondents by Gender

Table 3 shows the number and percentage of respondents by gender. The number of male respondents was 32 and represented 35.6% percent of the total. Whereas the female respondents were 58 and represented 64.4% of the total.

Table 6 : Distribution of Respondents by Gender

	Frequency	Percent	Percentage Accumulated
Male	32	35.6	35.6
Female	58	64.4	100.0
Total	90	100.0	

3.2   Age Distribution of Respondents

Table 4 shows the frequency and percentage of respondents engaged by age. The frequency of respondents aged 16 to 20 was 85 and represented 94.4% of the total. Meanwhile, 3 respondents were 21 to 30 years old and represented 3.3% of the overall percentage. A total of 2 respondents were aged between 31 and 40 and represented 2.2%.

Table 7 : Frequency Distribution of Respondents by Age

Age	Frequency	Percent	Percentage Accumulated
16 - 20	85	94.4	94.4
21 - 30	3	3.3	97.8
31 - 40	2	2.2	100
Total	90	100.0	

3.3   Response Distribution by Program of Study

Table 8 shows the frequency and percentage of respondents involved in the study program at Bentong Community College. The frequency of Business Operations respondents was 40 and represented 44.4% of the overall percentage. The Information Technology Program respondents were 50 and had a similar percentage of 55.6% of the total.

Table 8 : Frequency Distribution of Respondents by Program of Study

Age	Frequency	Percent	Percentage Accumulated
Business Operations	40	44.4	44.4
Information Technology	50	55.6	100.0
Total	90	100.0	

3.4   Distribution of Respondents involve in Entrepreneurship Course

Table 9 shows the frequency and percentage of respondents who have participated in entrepreneurship courses. The total number of respondents who attended the course was 38 and represented 42.2% of the overall percentage. Of the respondents who did not take the course 52 and represented 57.8% of the total. Students who have previously taken entrepreneurship courses are from final semester students where they will study entrepreneurship modules and participate in college activities.

Table 9 : Frequency Distributions of Respondents involve in Entrepreneurship Course

Involve in Entrepreneurship Course	Frequency	Percent	Percentage Accumulated
Yes	38	42.2	42.2
No	52	57.8	100.0
Total	90	100.0	

The findings on the Part B are as follows:

First Study Question: What is the level of knowledge of Bentong Community College students about the Industrial Revolution 4.0?

The first research question was aimed at identifying the level of knowledge of Bentong Community College students regarding the Industrial Revolution 4.0. To answer the first question, a mean score and standard deviation analysis was performed. Table 10 shows the level of knowledge of Bentong Community College students about the Industrial Revolution 4.0 which contains four items.

Table 10 : Bentong Community College Students' Knowledge Level Scores on Industrial Revolution 4.0

No.	Item	Mean Score	Level of Mean Score
1.	I had information about the Industrial Revolution (IR 4.0)	2.7	Moderate
2.	I understand the meaning of the Industrial Revolution (IR 4.0)	2.4	Moderate
3.	I know the Industrial Revolution (IR 4.0) is about technology	3.0	Moderate
4.	I understand the subject of the Industrial Revolution (IR 4.0)	2.7	Moderate
	Knowledge levels of Bentong Community College Students About Industrial Revolution 4.0	2.7	Moderate

Table 10 shows the mean scores for Bentong Community College students' level of knowledge of the Industrial Revolution 4.0. According to [19] interpretation, Bentong Community College students' level of knowledge of Industrial Revolution 4.0 was at a moderate level.

Second Case Study: What is the level of Readiness of BCC students against IR 4.0 in the field of entrepreneurship?

The second research question was aimed at identifying the readiness of BCC students against IR 4.0 in the field of entrepreneurship. Table 11 shows the mean readiness score of BCC students against IR 4.0 in the field of entrepreneurship.

Table 11 : Mean score of readiness of Bentong Community College students against IR 4.0 in the field of entrepreneurship.

No.	Item	Mean	Std. Deviation
1.	I am ready to go through the era of the Industrial Revolution (IR 4.0)	3.3444	1.06170
2.	I have enough skills and knowledge in internet usage	3.6000	1.14950
3.	I have enough skills and knowledge to use the latest technology	3.4889	.97433
4.	I have good web site skills (example: Google / Internet Explorer etc)	3.9000	1.11224
5.	I have skills in using online applications in day-to-day business (Example: Maybank2u.com / CIMBClicks etc)	3.4778	1.21070
6.	I used to do business online.	3.0222	1.40607
7.	I am ready to take on the wave of the Industrial Revolution (IR 4.0) in the field of entrepreneurship.	3.3333	1.09133
8.	I am ready to understand the challenges of the Industrial Revolution (IR 4.0) in the field of entrepreneurship	3.4222	1.08076
9.	I am innovative, proactive and willing to take risks in the face of the Industrial Revolution (IR 4.0)	3.3000	.95341
10.	I am ready to receive information regarding the Industrial Revolution (IR 4.0) in the field of entrepreneurship	3.7778	.92138
11.	I strongly agree that activities are being provided to enhance my knowledge of the Industrial Revolution (IR 4.0) in entrepreneurship.	4.0778	1.04104
	Readiness level of Bentong Community College students against IR 4.0 in the field of entrepreneurship.	3.52	1.09

Table 11 shows the mean readiness score of Bentong Community College students against IR 4.0 in the field of entrepreneurship. The results show the mean score is 3.52 and the Std. Deviation 1.09. According to [19] interpretation, the readiness level of Bentong Community College students against IR 4.0 in the field of entrepreneurship is moderate.The whole chapter discusses the analysis of the data obtained from the research instrument. The findings of the two research questions are summarized in Table 12.

Table 12 : Summary of Knowledge and Readiness of Bentong Community College Students on Industrial Revolution 4.0

Question of Research	Results
What is the level of knowledge of Bentong Community College students about the Industrial Revolution 4.0?	Bentong Community College students' knowledge level of Industrial Revolution 4.0 is moderate.
What is the level of Readiness of Bentong Community College students against IR 4.0 in the field of entrepreneurship?	Bentong Community College students' readiness level of Industrial Revolution 4.0 in the field of entrepreneurship is moderate.

4. CONCLUSIONS

This research has identified the level of knowledge of BCC students about the IR 4.0 is moderate and the readiness level of BCC students against IR 4.0 in the field of entrepreneurship is also moderate. It is hoped that this study will help BCC develop appropriate entrepreneurial programs and activities to ensure BCC students' readiness for IR 4.0 in entrepreneurship to produce competitive students according to the latest digital technology IR 4.0. Business organizations, governments, and society including education providers also need this information to cope with the new trends [1].Indeed, the challenge and impact of dealing with IR 4.0 is not final. Technology and science are instruments but they are the creators and determinants of the effectiveness of the instrument. Therefore, in addressing the challenges that will and will arise in the future, it requires wisdom and across all aspects of mind and soul.

ACKNOWLEDGEMENT

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RESEARCH TREND SELECTION OF PSMZA NON-CREDIT CLUBS AND ASSOCIATIONS ON DIS2018 SESSION

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ABSTRACT

This study was aimed to investigate the trend in the selection of PSMZA non-credit Clubs and Associations on the DIS2018 session. This descriptive study was aimed to determine trends and club selection of non-credit to the student Association Politeknik Sultan Mizan Zainal Abidin. A total of 341 respondents were selected by simple random sampling method using Krejcie and Morgan for four main departments, namely the Department of Civil Engineering, Electrical Engineering, Mechanical Engineering and Information Technology & Computer where the number of PSMZA students is about 2940 people. A pilot study was conducted to see the internal consistency and reliability of the instrument using Cronbach Alpha. Cronbach alpha reliability values for the entire set of questions is more than 0.7. A set of questionnaires which contains a part A (respondent) and Part B (Question-related variables) were used. The data obtained were processed and analyzed using SPSS version 16 (Statistical Package for Social Sciences). Descriptive statistics such as frequency, mean and standard deviation were used to identify factors in selecting clubs and associations are not credited by students PSMZA.

Keywords: Clubs, Associations, Selection, Non-Credit, Trend

1. INTRODUCTION

Leadership and personality development of students is not something to be underestimated in view of their own educational goals is to produce students who are competent and holistic. These skills can only be learned through experience by themselves outside the classroom. Student participation in clubs and societies at the polytechnic should be emphasized to provide an opportunity and a platform for students to show themselves and to participate in various programs organized by the polytechnic or the students themselves. In Politeknik Sultan Mizan Zainal Abidin alone has 65 clubs and societies that students can join and management obliges them to join the non-credit Club and the Association.

1.1 Problem Statement

Clubs and societies are defined as a group entities are structured, constitutional, regulatory and leadership consisting of pupils who have a passion, a hobby, a desire and a similar interest and seeks to cooperate with each other, helping each other and share resources in the implementation of activities and achieve the ideals and goals that have been set and agreed together to develop interests, hobbies, passions and inclinations, respectively. However, the Department of Student Affairs (JHEP) does not know why students choose to join a club and association which they participate in. Abu Bakar (1994) studies someone who is interested in what is learned will typically show sincerity and high achievement.

1.2 Research objective
The objective of this study was to:
   i)   Identify the key factors influencing trends the selection of non-credit clubs and associations in PSMZA
   ii)   Identify clubs and societies with high demand from students session DIS2018
   iii) Identify whether there are significant differences among the factors in choosing clubs and associations with the current semester students.

1.3   Research Questions
This study is to describe some of the issues, namely:
   i)   Determine what the key factors that influence and to justify the Trends of the selection clubs and associations are non-credit among students PSMZA.
   ii)   Determine which clubs and associations are in high demand PSMZA among students.
   iii) Is there a significant difference between the factors in choosing clubs and associations with the current semester students.

2.0 LITERATURE REVIEW

Non- credit clubs and association are one of the initiatives Politeknik Sultan Mizan Zainal Abidin in producing students who are competitive and cultivate leadership qualities in a student, However, student participation is minimal due to no marks provided to student clubs and societies and is choosing which students can choose any - which club they want. Abdullah Sani Yahaya (2007) stated based on behavioral guidance states that one important factor in the concept of freedom is the power to choose. A person will be more responsible for what they choose by themselves. The selection is not an easy thing and a student will normally be influenced by several external and internal factors. Mary (2016) stated that students who have the internal motivation to learn by 'deep' or 'meaning oriented'. Moreover, the trend of research in various disciplines applying content analysis and trend analysis is varied (Fatin Nabilah, 2016). Thus, content analysis and trend analysis will help the study closer look at the diversity of factors dealt to select non-credit clubs and associations. The study took into account a number of factors referring to studies related before. Von Mizener and William (2011) conducted a study on the effects of student's choice on academic performance and the result showed that the academic performance degraded if the student did not have goals in the selection.

i) The interest

The effect of high interest in certain subjects also affects the level of student achievement. In the study Quek (2006) also found that interest has a positive influence on student achievement in Mathematics. This can be seen from the determination and efforts made by the students during the study Mathematics. Students who have a strong interest and diligence will always strive to improve. In other words, their satisfaction will only be achieved when they learn mathematics and understand it. According to Omardin (1996), interest is an important matter as the impetus for the students to participate actively in the learning activities. Ismail (1992) supports this statement by stating an interest in a matter or activity will encourage students to explore further. Howorth (2001) propose, when student choose what they interest in, they will be more learning, more fun and as their bonuses will earn high grades for better understanding of the modules learnt.

Lee (1991) also found that interest and attitude play an important role in influencing the willingness to learn and student achievement. This is because students will be interested in what they have learned will achieve excellent performance. Abu Bakar (1994), stipulates that a person who is interested in what is learned will typically show sincerity and high achievement. Thus, interests have instilled in the students themselves. The excitement of the study will increase interest and it can be further enhanced by the participation and encouragement of parents, teachers, and friends in the learning process. Koceic (2010) found that at least 10 percent of the students have agreed to the following statement, "I choose the elective that I liked the most." According to Rhys Davies (2003), a course of study is chosen based on students' interest in a subject.

ii) Friend @ Peer Factors

As a growing adult, peer pressure is a powerful influence. According to Sharifah (1983), peer influence plays a role in a student's academic achievement. They will always emulate and follow all the actions and behavior of their peers. Understanding yourself as a teenager nowadays regard their peers as role models to themselves (Azizi Yahaya, 2016). Based on the fact Zuraidah (2006) when an adolescent experiencing growth process, they are more dependent on their peers in shaping the personality of each character yourself. Quek (2006) study also found that peers have a positive relationship with student achievement in Mathematics. This gives the impression that improved mathematics achievement should consider the student's peer group. If they are not guided by picking proper peer will affect their achievements in their studies.

iii) Social Media Factor

In the era of modern technology, the information available at our fingertips, almost all people of all age and level of education have access to social media installed on smart devices. All the information and the data can be achieved very fast and easy. Severin and Tankard (2001) stated that social media has provided a space for all people of the world to communicate with each other in the most simple and fast. Social media also provides great benefits in education, including access the information on various topics, make contacts with education and improve communication between teachers and classmates (Mat, 2011). Therefore, social media play a great factor in influence student in every decision they made.

3.0 METHODOLOGY

This study is "exposed facto" in which the design of this study is to find the cause. Number of sampling determined using Table Krejcie and Morgan , a total of 341 respondents were selected from a population of 2940 students of Politeknik Sultan Mizan Zainal Abidin, who have to register non-credit clubs and associations

The instruments used in this study are the questionnaire. The questionnaire survey methods are the most effective method for obtaining information from respondents. The survey divides into two parts: Part A contains questions for the respondent and Part B is a question of choosing elective course factors. Questions in Part A is in the form of multiple-choice and Part B Likert Scale. Table 2 shows the number of items in each section of the questionnaire.

Table 2: Description of the items in the questionnaire

Section	Item	Item Form	Item Number
Section A (Demographics Respondents)	Gender	Multiple choice	1
	Department		1
	Clubs &		
	Associations		1
Part B (Factor selection)	Interest	Likert scale	4
	Friends		3
	Social media		3

Likert scale is the best method used in the study to be able to produce a reaction related to an object, event or person surveyed (Sekaran ,2003). A four-point Likert scale is used as shown in the table below.

Table 3: 4 point Likert Scale

RANKING	ABBREVIATION	SCOR
STRONGLY DISAGREE	STS	1
DO NOT AGREE	TS	2
AGREE	S	3
STRONGLY AGREE	SS	4

A pilot study was conducted with 34 respondents to get the reliability of the questionnaire. Table 4 below shows the Alpha value obtained for the items of choice. The reliability of an instrument identified using the Alpha value. Alpha value as the reference is 0.600 to 1.000.

Table 4: Alpha value by item factor

Section	item	Alpha Value Cronbach
Part B (Factor Selection)	Interest	0.749
	Friends	0.805
	Social media	0.701

The alpha value of all the parts is greater than 0.6 (Siti Rahayah, 2003). Therefore, all items are retained for the actual study.

4.0 RESULTS AND DISCUSSION

Several methods were used to analyze data based on objective research. The data were analyzed and interpreted using SPSS version 16. The percentage used to answer the first objective while to answer objective 2 and objective 3 min analysis is used. For the evaluation of the mean, responses referred to by the Likert Scale split into 2 scale points, scale 1 and 2 which are classified as Disagree / Low and Accept / High as shown in Table 5.

Table 5: The combination of Likert Scale 2 points

RANKING	SCORE
DISAGREE / LOW	1.00 - 2.99
AGREE / HIGH	3:00 to 4:00

4.2 Demographic Profile Data

In this study, a total of 341 respondents answered the questionnaire. Table 6 shows the frequency data were involved. For the distribution of respondents, 189 (55.4%) boys and 152 (44.6%) female students responded to questionnaires that were distributed. The respondents representing every department of the parent in PSMZA with the number of respondents is the highest of the Mechanical Engineering Department (JKM) with 37.2%, followed by the Department of Civil Engineering (JKA) (30.8%), Department of Electrical Engineering (JKE) (23.2%) and the Department of Information Technology and Communications (JTMK) (8.8%). The majority of respondents were students of the first semester a total of 111 patients (32.6%).

Table 6 : Respondents Frequency Data

CRITERIA	Gender		Department				Current semester				
	M	F	JKA	JKE	JKM	JTMK	1	2	3	4	5
NUMBERS	189	152	105	79	127	30	111	82	61	44	43
PERCENTAGE (%)	55.4	44.6	30.8	23.2	37.2	8.8	32.6	24	17.9	12.9	12.6

Table 7 shows a list of clubs and associations with the highest selection. PISPA Club is a club with the highest selection by 10.9%, followed by the Central Committee of Muslims (8.5%). A total of 26 students (7.6%) students choose Relasis Club and 22 (6.5%) students joined the German club. The three clubs with the number of 16 persons (4.7%) students are Mesra Alam Club, Wataniah Club, and Club Advisors Friends Territorial Polytechnic Students (PRSP).

Table 7 : Clubs and Associations With Top Selection

Clubs / Associations	**Amount** of students	Percent election (%)
Club PISPA	37	10.9
Muslim Central Committee	29	8.5
Club Relasis	26	7.6
German Club	22	6.5
Mesra Alam Club	16	4.7
Wataniah Club		
Friends Club Advisor Polytechnic Students (PRSP)		

Min analysis
Researchers have used the analysis to answer min objectives 1 and 2.

Table 8 : Mean values for each Selection Factor Club / Society

SECTION		MIN VALUE
	Interest	3.3548
Selection factors Club / Society	Friends	2.0323
	Social media	2.8309

Based on Table 8, the highest mean value of the interest factor is 3.3548 followed by 2.8309 and a factor of social media is the lowest mean value of 2.0323 for the friend. This finding clearly shows that the selection of clubs and associations among students all semester is based on the students' interest that is a factor that should be given priority because the interest will encourage students to all programs or activities undertaken by advisers club or association. Social media also plays an important role in determining the trend of choosing non-credit clubs and associations among PSMZA students session on December 2018 with a mean value of 2.8309. Social media is the best channel for attracting students to join clubs and associations as student will follow club on Facebook and Instagram.

One-way ANOVA
To answer the third objective, One-way ANOVA was used. The hypothesis of the study are as follows:

H: There is a significant difference between club selection factors and association with the current semester students.

Table 9: Test findings One-way ANOVA

Factor	Sig.		Semester	The Mean Value
Interest	0.008		1	3.4482
			2	3.3628
			3	3.1680
			4	3.5227
			5	3.1919
Friends	0.015	<0.05, hypothesis accepted	1	1.9009
			2	1.9715
			3	2.3333
			4	1.9015
			5	2.1938
Social media	0.011		1	3.0270
			2	2.7927
			3	2.6721
			4	2.8030
			5	2.6512

According to Table 9, the significance of these three factors, the selection is less than 0.05, and the hypothesis is accepted that there are significant differences between club selection factors and association with the current semester students. The highest mean value of the interest is in the fourth semester of 3.5227. The mean value of the interest is more than 3 semesters for all students who showed all the interest is a key factor in the selection of the club or association. This affects the significance of the lowest among the three factors, which is 0.008. In line with previous findings, the social media factor is a second factor in determining the selection of the trends of club or association PSMZA students with the significance of 0.011. From the mean value, the first semester recorded the highest value of 3.0270. For the friend factor, third- semester students recorded the highest mean value of 2.3333 while the first semester was the lowest 1.9009. This finding coincides with the beginning of the scene on campus during admission, students still do not have many friends and student still makes their own choice and if it has been on campus for three semesters, students have certainly had many good friends. This situation encourages students to make friends factors as the main factors in the selection of clubs or associations.

5.0   CONCLUSIONS

The findings showed that the PISPA club is the highest in demand of the students with the percentage of 10.9%, this is because PISPA club is a continuation credit Cocurricular. Students who have obtained the card members will choose to remain in the club PISPA to the end their studies to earn the rank "Staf Tinggi" of the Department of Malaysia Civil Defense Forces (JPAM).

Form the study shows that interest is the most important factor influencing the student selecting the non-credit clubs and associations with mean that 3.3548 compared with other factors. Therefore, the management should create more non-credit clubs and demand by students to encourage them to participate actively in the club and that they get.

Trends influencing the selecting of non-credit clubs and associations is different each semester, for semester 4, the main cause of their selection to join a club or association is according to their interest. For student semester 3, friend influence is main factor student join the club or association, and social media is the main reason for semester 1 choosing the club which they refer to social media of the club by looking the activities carried out.

It can be concluded, the Department of Student Affairs should play a role in setting up non-credit clubs and associations interest by many students to encourage students to join clubs and societies as well as create a better platform to deliver information to students about the activities carried out by a club and association.

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THE EMPLOYMENT MOCK INTERVIEW: FEEDBACK AND SUGGESTIONS

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ABSTRACT

Based on the observation, community college students have problems communicating in front of the public. This includes when they have to present themselves in an interview session. Theoretically, they have learned about the skills of the interview in the classroom, however, they do not have enough exposure with the future employer. The aim of this research is to review the process of the employment mock interview that has been conducted. The objectives of this research are to (1) gain some feedback from the industry; (2) gain some feedback from the students; and (3) provide some suggestions from the industry towards the whole employment mock interview session. Both methods are used in this study which are qualitative and quantitative. The mock interview session was conducted to 16 selected students based on random sampling which covers various courses; Certificate of Information Technology, Certificate of Fashion and Apparel, Certificate of Furniture Design, and Certificate of Building Maintenance. Data analysis is conducted by using the Statistical Package of Social Sciences (SPSS). Findings showed that students need to communicate properly, be well prepared for the interview session, and be able to 'show off' their talents. Some of the implications of this research are to give insights to the students, researchers, employers, lecturers, and curriculum developers about handling the career programs appropriately. Future research may focus on how intrinsic and extrinsic factors may affect the students' performances in the interview session and resume writing.

Keywords:
Community College, interview, employer, communicate

1. INTRODUCTION

The employment interview is still relevant to most companies in order to select the most suitable employee for the organization [6]. Indeed, there are other methods to screen a potential employee, but the interview is still the priority [8], [9]. There are obviously many kinds of employment interview; not only face-to-face interview, but also telephone interview [10] and video chat interview [2]. After all, the interview is one of the employees' evaluation process to ascertain the qualification for the intended position [9] and is considered as a valid and reliable method to assess the candidates' ability in certain position [5], [6], [13]. This is due to its ability to provide opportunities and experience for the future candidates as well as the understanding towards the whole interview process [3].

There are some crucial aspects that need to be considered in employment. As in Lowden et.al. (2011, p. 5), employability is defined as having "positive attitude, self-management, team work, business and customer awareness, problem-solving, communication and literacy, application of numeracy and application of information technology." These aspects are revealed through the interview process, in which the employer will have the opportunity to interact with the potential employee about their qualifications. Through the interview, the candidate is able to portray whatever they have and give their best.

As a student, the skills to face the interview session are needed to be learned. Undoubtedly they still have a long journey to confront the employer but they need to know the real situation and the questions that will be asked by the employer. This is where the students need to undergo a mock interview for them to get exposed to the real situation when they finished their study soon. Through mock interview as well, they will learn about interview techniques and build up their self-confidence [11].

There are a few circumstances that spark this study. It is paramount that the employment mock interview needs to be conducted among the students. The problem is that students are having lack of exposure on how to deal with the real interview because they normally have insufficient skills and drive to 'sell themselves' [10]. They will normally feel embarrassed when they meet 'strangers', hence affecting their confidence level. They will also act in weird like inappropriate gestures, unable to maintain eye contact, and unable to use strong words to prove that they are better than other candidates.

The second problem is that the students lack communication skills to help them communicate effectively with the employer. Harlak et al. (2008) suggested that institutions should conduct more activities to enhance students' communication skills. This is to prepare them to face the challenging world afterwards. Zanaton Haji Eksan et al. (2012, p.72) also recommended that communication activities will be more significant if it involves the students' "physical, spiritual, and social factors". These statements are parallel with the intention of the mock interview, which is to improve students' communication abilities as well as to build students' interpersonal and intrapersonal skills.

The third problem is that the students lack social skills, such as "negotiating, language, culture, and politeness" [14]. Through mock interview session, the students will learn how to engage in two-way, realistic interaction with the interviewer, learn to use the appropriate language during the interview session, respect one's culture and be polite in terms of using the language as well as one's behaviour. Indeed, these skills will produce a mature and balanced individual that will be able to overcome any kinds of situations. This is also important in order to ensure that the students are able to communicate effectively with the employer and their working colleagues later on.

To relate with the problems that take place among students in mock interview, the general objectives of this study are to review the process of the employment mock interview that has been conducted. The objectives of this research are to:

1. Gain some feedback from the industry
2. Gain some feedback from the students
3. From the industry towards the whole employment mock interview session

2. METHODOLOGY

Data collection

Research design

This study employed survey research design, which is open-ended to gain transparent responses from the students related to the research questions, particularly in evaluating and analyzing the students' response towards the mock interview that they have attended. The data will be analyzed based on the frequency, percentage, mean and standard deviation. This method is suitable for this study as the aim is to reveal the percentage and frequency of the samples only. It is also used to collect the data formally and systematically.

This research used quantitative and qualitative method. For quantitative data, the researcher used a set of questionnaire that contained 24 items with Likert scale 1 to 4. Meanwhile, qualitative method was based on semi- structured interview with four (4) questions.

Research population

The students are selected randomly to represent all the programs in Temerloh Community College, which are Certificate of Information Technology, Certificate of Furniture Design, Certificate of Building Maintenance, and Certificate of Fashion and Apparel. The total number of students involved are 16 students. The location of the research is Temerloh Community College.

Research sample

The samples used in this study are selected students who took MPU 1231 (Soft Skills). The sampling method used is cluster sampling, where the samples are chosen according to the classes, which are SPB 2, SFP 2A and SFP 2B, SRP 2, STM 2A and STM 2B. There are a total of 16 respondents chosen in this study. The reason for choosing the particular students is to let them have ample exposure to the skills and are exposed to the real, demanding situation that requires them to demonstrate their knowledge [1].

Research instrument

In this study, the research instrument used is open-ended interview. Each of the students will be asked 4 questions related to the students' feedback on their preparation, process and their feelings towards the mock interview. The questions also consist of pre-, while, and post- mock interview in which the students need to respond to the questions as honest as possible. The responses are analysed by using NVivo. The interview questions have been verified by the Research and Innovation Officer. For clarity purposes, the interview questions will be prepared in bilingual so that it will help the students who are less proficient in English.

Data analysis procedure

To analyze the marks given by the interviewer, the researcher will use Statistical Package for Social Sciences (SPSS) version 16.0 and NVivo to analyze the data obtained from interview session.

3. RESULTS AND DISCUSSIONS

The findings of the study are conducted in accordance with the research questions presented earlier by using quantitative and qualitative methods. The discussions are based on the arguments presented by referring to the previous studies and theories related to the employment mock interview.

3.1 Quantitative study

3.1.1 Gain some feedback from the industry

The quantitative data were gained from the close- ended questionnaires (scoring rubric) and they are analyzed descriptively by using Statistical Package for Social Sciences (SPSS) version 16.0. The data were analyzed in terms of the frequency, percentage, mean and standard deviation. The mean interpretation is as follows:

Table 1: Mean value interpretation

Mean value	Mean interpretation
1.00 – 1.80	Very low
1.81 – 2.60	Low
2.61 – 3.40	Average
3.41 – 4.20	High
4.21 – 5.00	Very high

(Adopted from [7])

The demographic details are shown in Table 2:

Table 2: Respondent demographic distribution

No.	Item(s)	Explanation
1	Gender	Male: 9 students (37.5%)
		Female: 15 students (62.5%)
2	Program	STM: 6 students (25%)
		SFP: 10 students (41.7%)
		SPB: 4 students (16.7%)
		SRP: 4 students (16.7%)

In order to respond to the research questions, the elaboration of the data gained from the respondents are as follows:

i) Resume writing

Table 3: Resume writing from the respondents

No.	Sub criteria/ aspect(s)	Very good	Good	Average	Weak	Very weak	Mean	Std. Dev.
1	Clarity of the writing	0	5	17	2	0	3.13	0.54
		(0 %)	(20.8%)	(70.8%)	(8.3%)	(0%)		
2	Continuity of the writing	0	3	16	5	0	2.92	0.58
		(0 %)	(12.5%)	(66.7%)	(20.8%)	(0 %)		
3	Systematic writing	1	2	18	3	0	3.04	0.62
		(4.2 %)	(8.3 %)	(75%)	(12.5%)	(0 %)		
							3.02	0.47

Table 3 shows the interviewers' responses towards the respondents' resume writing. The mean value proves that the interviewers are quite satisfied with the resume writing where the mean value is at the average level, which is 3.02.

ii) Interview

Table 4: Respondents' interview session

No.	Sub criteria/ aspect(s)	Very good	Good	Average	Weak	Very weak	Mean	Std. Dev.
1	Appearances	1	13	5	5	0	3.42	0.88
		(4.2 %)	(54.2%)	(20.8%)	(20.8%)	(0%)		
2	Comprehend the question	0	13	5	5	0	3.33	0.87
		(0 %)	(58.3%)	(16.7%)	(25%)	(0 %)		
3	Self-Expression	3	10	7	3	1	3.46	1.02
		(12.5 %)	(41.7 %)	(75%)	(12.5%)	(0 %)		
							3.02	0.47

Table 4 shows the interviewers' responses towards the students' interview session. The mean value proves that the interviewers are quite satisfied with the interview session where the mean value is at the average level, which is 3.40.

The result on resume writing and interview in this study is at an average level and it is parallel with Zanaton Haji Iksan et al. where the study shows that about 27% of the students have problems with writing and presentation skills.

3.2 Qualitative study

3.2.1 Gain some feedback from the students

● The feeling of the students before attending the mock interview session
From the interview session, the findings showed that most of the students felt very nervous, scared, hesitant and lack of confidence before attending the mock interview session. However, some of them are excited despite the fear that they have.

● The feeling of the students while attending the mock interview session
The researchers found that the students are worried, fluttering, scared and nervous while answering questions because they are not familiar with the interviewer. They are also afraid that they will suddenly be unable to talk and speak appropriately. However, one of the students felt more confident in interacting and was able to communicate better than ever before. She replied in a quiet manner so she could speak easily without feeling nervous.

● The feeling of the students after attending the mock interview session
The researchers found that the students feel confident, relieved and not afraid anymore. With the guidance of the industry, the students were able to overcome the shortcomings and get the most valuable experience.

● Suggestions from the students
From the interview session, there are several suggestions from the students that should be taken for the next interview session in terms of the students themselves, resume and their personal file.

i)   Students themselves

The researcher found that the students need to improve their appearance by dressing well and appropriately, improve the way they answer the questions, speak in more confident tone, make full preparations and come early. In addition, they have to bring many of the clothes designs and examples of clothing have been created either in the form of drawings or in gadgets to be given to the interviewer for clearer evidence.

ii)   Resume

The researcher found that the students need to complete and enhance their resumes such as providing a neat, organized resume, having interesting resume content, focusing on the best achievements and colorful presentations presented. Resumes also need to be limited to one page and up to date format.

iii)   Personal file

The researcher found that the students have to provide personal files that are more interesting, concise and compact. Students also need to prepare sufficient certificates, systematically arranged according to the annual order and select the highest certificates to place on file and include photocopies.

3.2 Qualitative study

3.2.2 Suggestions from the industry

Apart from interviewing the students, the suggestions from the industry are also taken into consideration. This step is crucial in order to understand the needs of the industry. Below are some of the suggestions given by the interviewer:

i)   Show the design/ work/ portfolio

The interviewer suggested that the students that related with Certificate in Fashion and Apparel as well as students from Certificate of Information Technology to bring their work/ portfolio to show to the interviewer as an evidence of their work. This is important to impress the employer about their ability and their mastery in their field.

ii)   Be confident

The interviewer mentioned that the students need to be more confident to show their stand, regardless of their fear and unfamiliarity with the interviewer. They have to speak clearly, maintain eye contact, speak in a firm and confident manner. They also have to sit confidently by maintaining a body posture to show that they are very serious about the interview and their eagerness towards the position that they are applying for.

iii)   Answer the question in an appropriate manner

The interviewer claims that the students need to answer the questions by using appropriate and formal language. They should do some research on how to answer the questions professionally especially related to previous company. They should not badmouth about previous company and learn the appropriate way to respond to the interviewer.

iv)   Present yourself appropriately

Students need to dress as professional as they can because they are representing their institution and the image that they bring will create an impression to the interviewer. They also need to walk inside the interview room with confidence with smile and present themselves appropriately.

v)   Use interesting/ latest resume design

Another point that was highlighted by the interviewer is that the students need to use interesting and latest resume design to represent themselves and their qualifications. The most outstanding resume will attract the interviewer's attention and will create a distinctive impression towards the candidate.

4. CONCLUSIONS

Undoubtedly, knowledge in resume writing and the preparation for the interview are paramount as they will reflect the students' skills and capability in their particular field. In conclusion, there are a few suggestions to help the students to develop their interview skills and to enhance the quality of resume writing:

i)   Students should be equipped with verbal and non- verbal communication skills to help them deliver their points effectively.
ii)   Lecturers should remind the students during teaching and learning about the preparation for their interview session as well as providing comments and feedback related to the students' performance.
iii)   The suggestions and the need from the employer as well as the accurate format should be taken into account in order to produce a high quality resume.
iv)   It is suggested that the collaboration with the industry should be enhanced to benefit the students.
v)   Lecturers need to have numbers of mock interview practices to expose the students with the real interview situation.
vi)   Lecturers should stress on career skills topic for the students to get more information about important things involved in an interview session.

Some of the implications of this research are to give insights to the students, researchers, employers, lecturers, and curriculum developers about handling the career programs appropriately. Future research may focus on how intrinsic and extrinsic factors may affect the students' performances in the interview session and resume writing.

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INTELLECTUAL CAPITAL IN TVET INSTITUTION:
ROLE OF POLYTECHNICS IN MALAYSIA

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ABSTRACT

Moving forward with Eleven Malaysia Plan 2016-2020, Malaysia projected to generate approximately 1.5 million new jobs by 2020, of which 60% require Technical and Vocational Education and Training (TVET) skills. In order to accomplish the call and aspiration of the nation, intellectual capital of TVET institution has been regarded as one of the key elements to provide more value to the students. Therefore, this study aims to analyse the performance of Malaysian Polytechnics from intellectual capital perspective, using three dimensions namely human capital, structural capital and relational capital. A total of 119 respondents from various polytechnics in Malaysia participated in the quantitative survey. The analysis and results of this study shows that the academicians in Malaysian Polytechnics have a valuable intellectual capital, which reflecting polytechnics as having a valuable human capital and sufficient relationship of relational capital. On the other hand, most of the attributes surveyed under the component of structural capital scored lower mean values which indicates the need for Polytechnics to be attentive towards the vulnerability of structural capital. Thus, this study highlights the needs to scrutinize the related aspects of structural capital such as the management of internal relations among technological components, research, and organizational culture which may strengthen the research, education, and the governance processes and directly enhances the performance of TVET institution.

Keywords:
Intellectual Capital, Human Capital, Structural Capital, Relational Capital, Polytechnics' Performance

1. INTRODUCTION

According to UNESCO, Technical and Vocational Education and Training (TVET) has been articulated as a wide range of skill development which comprises education and training relating to occupational fields, production, services and livelihood. There are several aspects can be considered as an integral part of TVET such as the literacy, numeracy skill, transversal skills and citizen skills [1]. In the recent era of industrialization and digitalization, Malaysia conceived TVET as a major pillar to enhance the human capital of the country. In this bandwagon, the Department of Polytechnic and Colleague Community Malaysia, as one of the main TVET provider in Malaysia, has been playing a vital role in supporting and empowering the key efforts strategized in Malaysia Education Blueprint 2015–2025, especially in training and developing technical and vocational skilled and semi-skilled workers to meet the industry demand.

While, intellectual capital (IC) has recently emerged as the dominant resource in creating economic wealth in the era of knowledge-based economy, serving as the core asset underpinning the organisation performance. The collective value of people, organizational structure, and relationship is the element that allocates an organization its competitive edge. Thus, IC has been defined as the sum of knowledge possessed by members of an organisation and the practical translation of such knowledge into output, with an added value [2]. In addition, Iqbal et al. [3] assert that IC is a major source of competitive advantage for university. IC encompasses the necessary skills, know-hows, know-whats, experiences, and relationships; it is set of "brainpower" and packed knowledge that creates wealth when they are put together [4]. Furthermore, scholars generally apply three main components of IC, which are: human capital, structural capital, and relational capital [5].

Recently, there are few studies shows the significant of IC and the performance in higher learning education [3, 6, 7, 8, 9]. However, there are limited studies which explore the relationship between IC and performance in TVET institution. Therefore, this study is responding to the importance of intellectual capital of TVET institution is seen as it is one of the key elements to provide more value to the students. This research is offering empirical evidence regarding the role of IC in increasing the performance of Polytechnics in Malaysia. Four research objectives have been outlined for this research:

i.   To analyse the relationship between intellectual capital (IC) and performance of Polytechnics
ii.   To analyse the relationship between human capital (HC) and performance of Polytechnics
iii.   To analyse the relationship between structural human (SC) and performance of Polytechnics
iv.   To analyse the relationship between relational capital (RC) and performance of Polytechnics

2. METHODOLOGY

Data were collected using structured questionnaires and the instrument is adapted from Sharabati et al. [10]. This study has adapted for questionnaires utilising the five-point Likert-scale on the measurement scales which ranged from one (1) strongly disagree and seven (5) strongly agree. The questionnaires were distributed to all the academic staffs in 36 Polytechnic in Malaysia. The sample are 123, obtained using power analysis-power test approach and the sample size was determined by proportional probability sampling. Data obtained from respondents were analyzed using Statistical Package for Social Science (SPSS) 23.0 statistical program. The variable used in this study are as following:

2.1 Intellectual Capital (IC)

IC is the intellectual material that has been formalized, captured, and leveraged to create wealth by the production of a higher-valued asset [4]. It is also known as a set of knowledge in an organization in achieving competitive advantage [11]. Thus, IC is define in this study as a package of useful knowledge and intangible assets in an organization that aid the firms in attaining competitive advantage and driving for a superior performance. This study has classified IC into three components, namely human capital, structural capital, and relational capital.

2.2 Human Capital (HC)

Human capital is defined as the accumulated value of investments in employee's training and competence [12], and employees' knowledge, skills, experience, expertise and abilities in an organization [13]. HC is also inclusive of the collective knowledge, creativity, and innovativeness of people within an organization [14]. Therefore, the HC adapted by this study is referring to the competence of the academicians and management in Polytechnic, whereby the dimensions have been adapted from Sharabati et al. [10], which included these elements: (i) learning and education, (ii) experience and expertise, and (iii) innovation and creation.

2.3 Structural Capital (SC)

Structural capital consists of the knowledge accumulated and distributed through firms' structures and processes, such as information systems, cultural traits, and management systems [4]. It includes both infrastructural assets that forms the context for activities and codified knowledge like documents, databases, and intellectual property rights [15]. Thus, SC is defined as the infrastructure assets and codified knowledge that are distributed in the Polytechnics, whereby the dimensions have been adapted as per Sharabati et al. [10], includes: (i) system and process, (ii) research and development (R&D), and (iii) intellectual property rights (IPR).

2.4 Relational Capital (RC)

Relational capital is the knowledge and resources related to a firm's external relationships, such as its connection with customers, suppliers, partners, and the local community [16]. It can also be referred to as the relationship between the organization and its reference groups [17]. Thus, formal alliances, licensing, and partner agreements are employed as evidences of these external relationships [14]. Therefore, RC is defined as the knowledge and resources related to the institutions' relationships, whereby the dimensions have been adapted as per Sharabati et al. [10]. It is inclusive of: (i) strategic alliances, licensing, and agreements, (ii) external relations (i.e. with customers, suppliers, government agencies, universities, and professional service organization), and (iii) customer knowledge.

2.5   Performance

Performance measurement is the process of evaluating and comparing the current achievement with specific goal achievement [18]. In this study, performance of Polytechnics is referring to firm performance. Performance of Polytechnics is reflective of their success over a period of time, whereby it includes non-financial firm performance as adapted from Sharabati et al. [10].

3. RESULTS AND DISCUSSIONS

3.1 Respondents' Demographic Profile

The demographic profile of the respondents contains their personal information and questions related to their behaviour. The questions that are related to the respondents' behaviour are intended to assess their ability to recall the information [19]. Table 1 shows the profile of respondents. From the table, there are total number of 91 (76.5%) male respondents meanwhile there about 28 (23.5%) female respondents. According to age group, most of the respondents are from the age group of between 41 - 50 years old with a total number of 93 (78.2%) respondents. This is followed by the respondent which are the age group of 31 – 40 years old with a total number of 52 (43.7%) respondents. There are a total number of 12 (10.1%) respondents for both between the age group of 51 years old and above. According to academic qualification, there are a total number of 93 (78.2%) respondents who are Lecturers. This is followed by 12 (10.1) respondents who are Heads of Department. The remaining 10 (8.4%) respondents are Heads of Unit meanwhile 4 (3.4%) respondent are Heads of Programme. As for year of working in Polytechnic, 91 (76.5%) respondents working for more than 10 years. This is followed by respondents working for 7 – 9 years with a total number of 24 (20.2%) respondents.

Table 1: Profile of Respondents (N=119)

Demography		Frequency	Percentage (%)
Gender	**Male**	**91**	**76.5**
	Female	**28**	**23.5**
Age group	**31 – 40**	**52**	**43.7**
	41 – 50	**55**	**46.2**
	≥ 51 years	**12**	**10.1**
Current positions	**Head of Department**	**12**	**10.1**
	Head of Programme	**4**	**3.4**
	Head of Unit	**10**	**8.4**
	Lecturer	**93**	**78.2**
Highest Academic qualification	**Bachelors Degree**	**26**	**21.8**
	Masters	**63**	**52.9**
	PhD		**25.2**
Working in Polytechnic (Years)	**1 – 3 years**	**4**	**3.4**
	7 – 9 years	**24**	**20.2**
	More than 10 years	**91**	**76.5**

3.2 Reliability Coefficients

As rules of thumb, values which were above 0.6 were considered acceptable and 0.8 is the most appropriate and acceptable stated by Pallant [20]. Based on the table appended all variable that addressed in the questionnaire achieved reliability above 0.8, which indicates that all the variables are reliable.

Table 2: Reliability Coefficients for Each Variable (N=119)

Variables	No. of Items	Item Deleted	Cronbach's Alpha
Human Capital	12	-	0.828
Structural Capital	19	-	0.970
Relational Capital	14	-	0.967
Performance of Polytechnics	5	-	0.909

3.3 Descriptive Statistics for Variable and Sub Variables

The descriptive statistics were also calculated for each construct to investigate their level among the respondents. The three levels of categories according to the mean consist of low (1.00 – 2.33), medium (2.34 -3.67) and high (3.68 – 5.00) [21]. Table 3 shows the descriptive statistics for the variables. Overall all the variables and sub variables indicate a medium level of agreement except for sub variable Experience and Expertise which indicates a high level agreement. Among the three independent variables, Human Capital has highest mean (Mean=3.57), followed by Relational Capital (Mean=3.50) and Structural Capital (Mean=3.13). Among the sub-variables, Experience and Expertise under Human Capital has the highest mean (Mean=3.94) and Intellectual Property Right under Structural Capital has the lowest mean (Mean=2.81).

Table 3 : Descriptive Statistics for Variable and Sub Variables

Variables	Mean	SD	Level
Human Capital (HC)	3.57	0.527	Medium
- Learning and Education	3.38	0.634	Medium
- Experience and Expertise	3.94	0.635	High
- nnovation and Creation	3.41	0.673	Medium
Structural Capital (SC)	3.13	0.894	Medium
- System and Program	3.25	0.860	Medium
- Research and Development	3.25	0.977	Medium
- Intellectual Property Right	2.81	1.057	Medium
Relational Capital (RC)	3.50	0.779	Medium
- Strategic Alliances	3.47	0.907	Medium
- External Relation	3.49	0.712	Medium
- Customer Knowledge	3.59	0.886	Medium
Performance of Polytechnics	3.49	0.742	Medium

Figure 1 shows the correlation between the independent and dependant variables. Overall all the variables indicate a significant positive relationship with performance of Polytechnics. The level of relationship between the variables also indicate at s strong level [22].

Figure 1: Correlation between Variables
**Significant at p=0.01
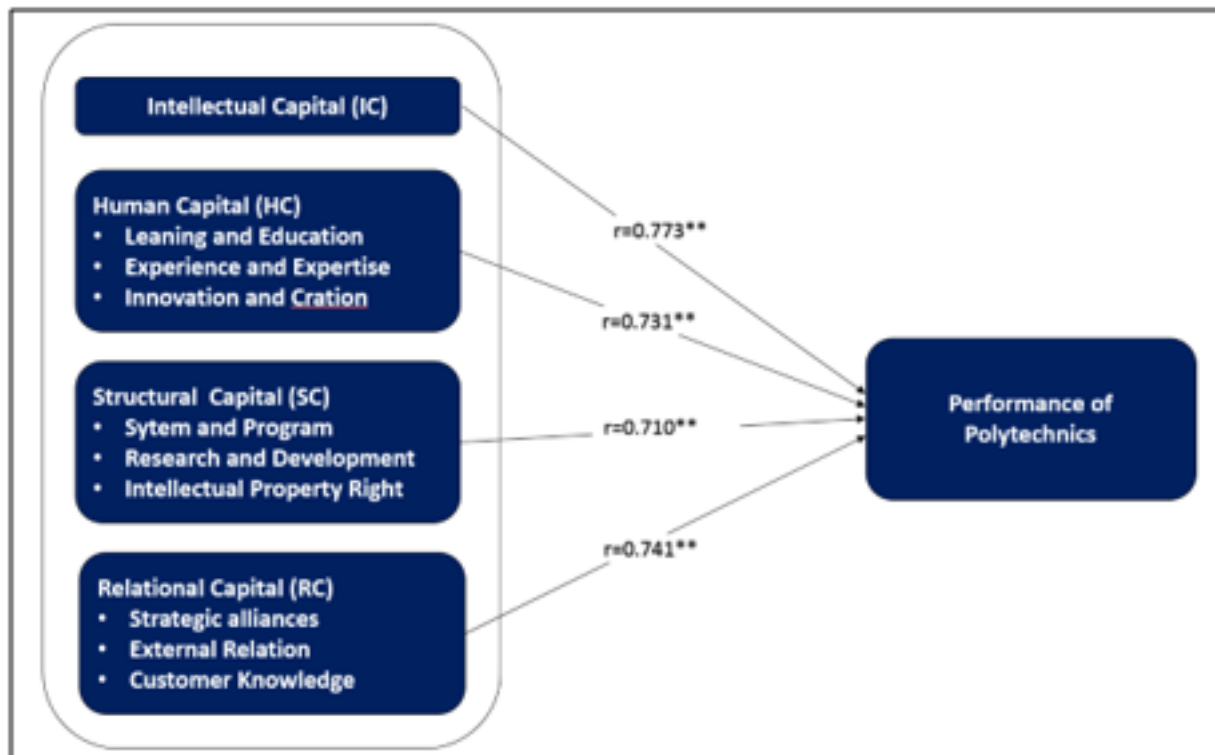
3.4 Recommendation

In short, few recommendation were outlined for the Polytechnics to improve:

1) The management should enable leadership, culture, and incentives to facilitate knowledge-related activities in Polytechnics to boost the processes of knowledge acquisition, utilization, and sharing. Furthermore, the management has to foster staffs' skills and knowledge through various training based on the need analysis to support their commitment and transform them into valuable resources, as the human capital of the Polytechnic is vital in imparting the knowledge to the students, who are the foundation of society's future. Besides, a better reward system should be formulated in order to increase the motivation of the academicians.

2) The Polytechnics have to provide a complete ICT & R&D infrastructure, funding, and support in various field to achieve the efficiency of the system. Few centre of research should be developed in strategic areas (example: near research universities) in order to enhance the skills of the lectures on R&D, as well as writing research proposal and publications. Besides, both academicians and students should be encouraged through appropriate funding to participate in international mobility projects.

3) Optimise the strategic alliances with the government, industry, and professional associations to attract resources (human resources, financial resources, and technological resources). Besides, alumni contribution to the institution as advisor in committees, guest lecturer, , industry experts and cooperative partners in projects, can be one the significant alliance which provide great impact on the Polytechnic reputation. Besides, this helps the students to build competencies that are particularly
appreciated by firms, favouring their employability.

4. CONCLUSION

This study has successfully generated new insight regarding IC and its components in predicting the overall performance of Polytechnics in Malaysia. Findings of the study supported the theory that IC has the potential to become the new source of wealth in TVET institution, Polytechnic practically, as IC has a direct and positive effect on polytechnic performance. These results are promising, because they revealed the possibility of investments in IC at a given point in time, it might have an influence on Polytechnics' prosperity. In conclusion, the various stakeholders, includes policy makers, Polytechnics' management team, and academics should play a critical and instrumental role in order to pipeline the intellectual capital towards the growth of Polytechnic specifically and TVET institution generally. Thus, mapping the intellectual capital, which comprise of the human capital, structural capital, and relational, has its foundation in building a robust strategy in long term.

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DETERMINANTS OF ENTREPRENEURIAL INTENTION AMONG BUSINESS STUDENTS IN MALAYSIA

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ABSTRACT

The fundamental aspect that needs to be embedded in every business graduate is an entrepreneurial intention. Entrepreneurial intention is very much required in Malaysia as the number of entrepreneur in Malaysia are small. This is due to the fact that entrepreneurial career is not considered as an important career in Malaysia. Despite several entrepreneurial programs initiated to nurture a business mentality and awareness for the business student, it does not make significant change in their entrepreneurial behaviour. The main purpose of this study is to investigate the determinants of entrepreneurial intention among business students in higher education institutes in Malaysia. This quantitative study used structured questionnaires to collect the data from the identified samples. A total of 381 questionnaires were successfully distributed and were used in analysis. Structural Equation Modelling (SEM) using PLS program was employed in analysis. The analysis revealed that five predictors were significant with respect to entrepreneurial intention. There were entrepreneurial orientation, social support, entrepreneurial self-efficacy, entrepreneurial internship and business incubation program.

Keywords: Entrepreneurial intention, entrepreneurial orientation, social support, entrepreneurial self-efficacy, entrepreneurial internship program and business incubation program.

1. INTRODUCTION

Entrepreneurship is a worldwide phenomenon closely associated with economic growth. Entrepreneurs are the "engines" that can accelerate economic growth [1]. They have brought about enormous positive contributions to a country's economic growth and social development. As mentioned by Morrison, Breen and Ali [2], entrepreneurs play a pivotal role in creating jobs, innovating, creating wealth, improving health and even in economic advancement. Since entrepreneurship is synonymous with self-employment, it is believed to be an effective strategy for handling the issue of employability, particularly among the youth [3].

Entrepreneurship entities enable reduction in the unemployment rate or what has been termed as the Schumpeter Effect [4]. Davidsson [5] and Kirzner [6] asserted that entrepreneurship is a competitive behavior that not only drives the new market and employment creation but also the creation of new innovation in the market than can contribute to economic growth. According to Katua [7], the role of Small and Medium Enterprises (SMEs) is highly needed as the engine of economic growth and job creators as well as drivers of innovation in a country.

Malaysia also relies heavily on SMEs since the biggest contribution to GDP is derived from SMEs. SMEs in Malaysia contribute to around 38.3% of the GDP in 2018 compared to 37.8 percent in 2017 [8]. Currently, more than 98.5 percent of business in Malaysia are SMEs or 907,065 SMEs spread across Malaysia and they have successfully created jobs for 65.3 percent of employment in Malaysia [8]. Therefore, Malaysia needs to accelerate entrepreneurship activities in an effort to increase economic growth.

Linking education and entrepreneurship with academic institutions clearly points out that universities have become strategic places to nurture entrepreneurial spirit among students. Universities have a crucial role in enhancing entrepreneurial education in order to encourage the students to become self-employed once they graduate from university. Therefore, the purpose of higher education institutions is not only to produce graduates to become job seekers, but also job creators. The small number of entrepreneurs in Malaysia indicates the lack of entrepreneurship among the academic community, including their activities in the university environment.

Empirical research into the field of entrepreneurship has grown enormously in the last two decades especially in the western cultures. The nature of work, connected with self-employment such as self-actualization, independence and greater satisfaction has become more desirable among graduates [9]. These have been supported by several empirical studies. Hart and Harrison (1992) for example, investigated the tendency of university students to involve in business in Northern Ireland and found that 47% of the students expressed the intention to run their own business. Similarly, a study by Karr (1985) explains that 46% of colleges students consider own business as a career.

Hence, this article attempts to examine the factors determinants of business students' entrepreneurial intention. The main objectives of this study are to identify the relationship between entrepreneurial orientation, social support, entrepreneurial self-efficacy entrepreneurial internship program and business incubation program and entrepreneurial intention among business students in Malaysia. The specific objectives are described below:

1.   To examine the direct effect of entrepreneurial orientation (EO) on entrepreneurial intentions (EI) among business students in Malaysia;
2.   To examine the direct effect of social support (SS) on entrepreneurial intentions (EI) among business students in Malaysia;
3.   To examine the direct effect of entrepreneurial self-efficacy (ESE) on entrepreneurial intentions (EI) among business students in Malaysia;
4.   To examine the direct effect of business incubation program (BIP) on entrepreneurial intentions (EI) among business students in Malaysia;
5.   To examine the direct effect of entrepreneurial internship program (EIP) on entrepreneurial intentions (EI) among business students in Malaysia;

2. LITERATURE REVIEW

Psychological research claims that intentions are a critical predictor of consequent planned behaviour [11]. Consequently entrepreneurial intention is an important phenomenon, and has involved substantial cognitive research. Krueger, Reilly & Carsrud [12] instigate with the presumption that any decision to form a new business venture is planned rather than being a conditioned response.

Bandura [13] predicts the instigation of a new venture, with Shapero's [14] model of the "entrepreneurial event" in which an event, such as job loss, "displaces" the inertia that dominates human behaviour and choice. Nevertheless in both models a contrast was made between potential for entrepreneurial activity and intention. An individual may have a potential but not make any transition into entrepreneurship because of lack of intention. On a different tack, Birley and Westhead [15] find evidence to support a range of motivations, which cover instrumental motivations (wealth), the desire for personal development and the need for approval and esteem.

2.1 Entrepreneurial Intention

The term 'entrepreneurial intention' can be conceptualized as the initial step in the process for establishing a business that is generally long-term [16]. Krueger [17] said that entrepreneurial intention refers to one's commitment to start a new business and is a central issue that needs to be considered to understand the process of establishing a new business. Entrepreneurial intention has recently started to receive attention because it is believed that a behavioral intention is a reflection of the actual behavior.

Mustikawati and Bachtiar [18] defined intention as the intrinsic force that is able to inspire and motivate the individual to pay attention. It can also be defined as she/he is consciously interested in something outside himself with pleasure feeling. There are several ways by which one can recognize interest based on intention classification according to Mustikawati & Bachtiar [18], such as asking about the most favoured activities and least favoured activities (expressed interest); observe a hobby or other activity that is mostly done by the subjects (manifest interest); and asking the subject, whether or not he or she is happy in the number of activities or something (inventoried interest).

Therefore, entrepreneurial intention can be interpreted as the procedure for finding information that can be used to achieve the purpose of establishing a business [19]. An individual with the propensity start a business will have the willingness compared to one who does not have the desire to commence a new venture. Krueger, Reilly and Casrud [12] posited that intention is found to be a strong predictor of entrepreneurship behavior. Desirability can also be used as a fundamental approach to understand anyone who is in entrepreneurship [20]. The study by Lee and Wong [16] emphasizes that entrepreneurial desires or intentions are the initial steps in the long-term process of establishing and running a new venture. A person who has an interest in entrepreneurship will be more prepared and aggressive in efforts to set up a business than others who do not have the interest in entrepreneurship [21]. Gurbuz and Aykol [22] defined entrepreneurial intention as one's desire to engage in entrepreneurial activities, or in other words, to be self-employed.

Entrepreneurial orientation attitude should be owned by an entrepreneur, whether it is student or otherwise. Considering the Malaysian scenario, such varied features of entrepreneurial orientation among the Malaysian students have yet to be extensively researched. Apart from that, the social support system is considered as a vital aspect for developing entrepreneurial intention. Some related aspects, like environmental support and parental support, play an important role in influencing a person's desire for entrepreneurship [23].

2.2 Orientation

Entrepreneurial orientation at the organization level is defined by Rauch, Wiklund, Lumpkin & Frese [24] as the process of strategy-making which provides a basis for organizations to make decisions and take action. Furthermore, this construct is explained by three to five aspects that have been built [25]. Lumpkin and Dess [26] stated that entrepreneurial behaviour comprises autonomy, innovativeness, risktaking, proactiveness and competitive aggressiveness. According to them, most of the research in the area of entrepreneurial orientation has utilized three of these variables, i.e., innovativeness, proactiveness and risk-taking, while autonomy and competitive aggressiveness have been studied less often [27]. Researchers have discovered that the EO construct in general incorporating these all the five elements can be studied jointly [28], depending on the context.

This study discusses the issues related to entrepreneurial orientation among students. Generally, entrepreneurial orientation can be defined as a tendency to explore new business opportunities. The expression of this inclination has led to the creation of attributes, such as innovativeness, risk-taking, pro-activeness, competitive aggressiveness and autonomy [21]. They also acknowledged that the dimensions or attributes are exceptional to explicate entrepreneurial orientation across the sectors. Kumar [29] pointed out that the young entrepreneurs with better entrepreneurial orientation will have better productivity and performance in business operations. According to Covin & Slevin [30], various dimensions of entrepreneurial orientation can be derived from a review and integration of the available literature.

2.3 Social Support

Social support is a concept which is widely deliberated and discussed and has been described in the available literature as one of the determinants of an individual's behaviour. A number of research studies [31] have explained the role of social support systems in influencing young graduates to become entrepreneurs. In the context of Malaysia, however, there are only few studies that have identified and explained the determinants of entrepreneurship or entrepreneurial intentions of young graduates [32].

Social support in the context of entrepreneurship means a group or network of people in the society who help and care for individuals. The resources that are given to individuals by the group can include financial resources, adequate business information and guidance. The phenomenon of social support thus involves the business-friendly social relationship among people and their readiness to give business advice and guidance [32].

Much of the literature on entrepreneurship refers to social support as a potential entrepreneur's beliefs and expectations about the assistance and advice that he/she may receive from his/her social groups. These social groups include primary groups, such as parents, siblings,and spouse; and secondary groups, such as reference groups, comprising friends, colleagues and teachers. Social support is supposed to help and assist the potential entrepreneur in setting up a business or running its activities [33].

2.4 Entrepreneurial Self-efficacy

Bandura [34] defined self-efficacy as one's conviction or belief in his/her ability to complete a job. In other words, the condition of one's motivation is built more on what one believes as against what is objectively true. Such individual insight plays a crucial function in the construction of one's intentions. The study by Chen et al. [35] describes entrepreneurial self-efficacy as the extent of a person's belief in his or her capability to successfully perform various roles and functions of entrepreneurship. In addition, according to Boyd and Vozikis [36], entrepreneurial self-efficacy is the extent of one's belief in himself/herself to accomplish entrepreneurial tasks and roles.

According to Chen et al. [35], entrepreneurial self-efficacy refers to students' confidence in their competencies to successfully develop new business ventures and perform related entrepreneurial activities. In the entrepreneurship field, entrepreneurial self-efficacy refers to the degree of belief of a person that he/she is capable to successfully initiate new business venture [37]. Chen et al. [35] argued that entrepreneurial self-efficacy refers to the young graduates' self-judgment about their capacity and capability to create a new venture and perform the tasks and roles related to entrepreneurship. As such, it can be concluded that self-efficacy is a feeling, belief, perception and confidence toward the ability to address a particular situation that in turn will lead to the way the individual copes with the situation.

Because of the significant influence that self-efficacy exerts on young graduates' self-motivation and learning to become entrepreneur [38], many studies have utilized the concept of self-efficacy to examine entrepreneurial intentions, competence and behaviour of students [39,40,41]. Hence, students with high levels of self-efficacy tend to be more likely to find entrepreneurial opportunity and deal with uncertainties to achieve their business vision [42, 43]. Those students with low entrepreneurial self-efficacy, on the other hand, tend to disbelieve themselves, feel they lack entrepreneurial ability, and therefore, prefer avoiding going into business or find it easy withdraw when faced with difficulties or problems [35].

2.5 Entrepreneurial Internship Program

An analysis and review of the relevant literature regarding employment-based learning programs in higher education identify three types of such programs, namely internship, cooperative education and cooperative extension. Internship has a number of meanings. Internship could be refers to an experiential learning where students take the opportunity to apply learned theories from schools in the real world situation, and it provides an opportunity for students to integrate and consolidate thinking and action [44]. Pauze et al. [45] articulated that internship is equivalent to fieldwork, field experience, practicum, coop or experimental learning with some variations. According to Chiang [46] internship refers to a 'supervised work experience' (SWE) and that students are under special guidance and attention during their internship instead of working alone by themselves in the industry.

The internship programs, refer to the part-time field experiences. The internship programs are common among a wider variety of academic disciplines and organizations. Students take internships during their enrolment in academic studies to gain practical experience in their field of study [47]. The role played by the entrepreneurial internship program to encourage students to become entrepreneurs cannot be neglected, especially in the Malaysian context. Internship refers to part-time field experiences that include multiple academic disciplines and organizational settings with its primary goal to eventually make students to become entrepreneurs [48].

Internships refer to on-the–job training programs which provide students with field knowledge related to their academic field of study in a supervised learning environment [49] claimed that four features characterize an internship program, i.e., specific work hours, work can be both paid and unpaid, award of certificate and supervision provided by a faculty member along with a business personnel. More recently, internship program is defined as field experience in business or government organizations which amplifies the classroom learning of students [50]. According to Coco [51], internship programs are a valuable part of higher education programs and are said to create a mutually beneficial situation for students, business organizations and universities/colleges.

2.6 Business Incubation Program

A business incubator is a modern business assistance program with the goal of nurturing new and small-scale enterprises. According to Hamdani [52] a business incubator refers to a real life simulative organizational unit which provides space and support services to help initiate new businesses and support the existing businesses to achieve growth and become more profitable. Business incubators are normally micro and small businesses; yet, these may be found in several government organizations and universities aimed at promoting entrepreneurial activities. A business incubation center may be referred to as key business support organizations which enable entrepreneurs to create new ventures by combining their entrepreneurial drive with necessary resources and technical advice which is normally not available to micro and small firms. Thus, business incubators enable nurturing of young and small firms, especially over the initial formative period during which their vulnerability and chances of mortality are higher, thus enabling them to become profitable commercial ventures [52].

The incubation program could be defined as an economic and social program which provides support intensively to individuals seeking to start up a business and coach them to accelerate their business development through business assistance programs, such as management training, financial aid, networking access, providing facilities and consultation relating to business development [53]. Business incubation centers provide entrepreneurs with expert advice and network support they require to make their ventures commercially viable [54]. There are many definitions of business incubator. However, there no accepted definition to interpret the business incubator in general. It depends on the objective of the incubation centers and the condition in which they are applied [52].

In essence, the business incubator constitutes a standard facility owned by the office which is further supported by the business resource development services. The services provided may vary. A developed business incubator generally has advanced facilities, such as conference rooms, canteen, security, office supplies, telephone, internet, library, rental vehicles, cleanliness and maintenance and lodging.

3. METHODOLOGY

The sample of this study comprised of 381 business undergraduates enrolled in courses in the campus of an institution of higher learning in Malaysia. The study used a self-administered questionnaire to obtain information related to the study. This study aims to examine the impact of entrepreneurial orientation, social support, entrepreneurial self-efficacy, entrepreneurial internship and business incubation program on entrepreneurial intention of the students. Hence, the variables under investigation in this study were entrepreneurial orientation, social support, entrepreneurial self-efficacy, entrepreneurial internship, business incubation program and entrepreneurial intention as the dependent variable. Items to measure these concepts were adapted from the literature on entrepreneurial intention at the individual level [55]. The instrument was refined after pre-testing with a small sample.

After the collection of sufficient data that matches the minimum sample size requirements, researcher coded, summarized and analysed the data with SPSS, structural equation modelling (PLS). Both descriptive and inferential statistics were employed as a method of data analysis. Descriptive statistics was employed to explain the features of data quantitatively. It aims to summarize a sample rather than taking the whole population [56]. It gives a summary about the sample and the observation made. Therefore, PLS-SEM was employed in the data analysis.

4. RESULTS

Table 1 explain the classification of the respondents based on gender and the study program. As stated earlier, the data were collected from students in each selected university. Table 4.1 shows that 56.9 % of the respondents were male, while 43.1% were are female. Table 1 also shows the distribution of the respondents based on program of study; 63% of the respondents are studying economics, while the rest of the respondents are studying management and accountancy with the proportion of 26% and 21%, respectively.

Table 1: Background of the Respondents

	Frequency	**Percentage**
Gender		
Male	217	56.9
Female	164	43.1
Program		
Management	107	28.1
Economic	201	52.8
Accountancy	73	19.1

4.1 Assessment of a Measurement Model

To assess the measurement model, the following activities were undertaken in this study: examining internal consistency reliability, ascertaining indicator reliability and determining convergent and discriminant validity [57]. These activities were undertaken in order to identify the relationship between the observed variables and the underlying latent constructs. The first stage hierarchical construct model was first assessed as seen in Tables 2 and Table 3.

The Cronbach's alpha coefficient and composite reliability coefficient were used to measure the internal consistency reliability for this study. Using composite reliability coefficient to interpret internal consistency reliability is based on the rule of thumb that composite reliability coefficient should be at least 0.70 [57]. Thus, as can be seen in Table 2, the Cronbach's Alpha values are between .810 and .911, while values of composite reliability are between 0.860 and 0.925. Thus, internal consistency reliability is not an issue for this study. The indicator reliability was assessed by examining the outer loadings of each constructs' measure [57]. To ensure unidimensionality of a measurement model, items should be 0.50 or higher. Since most of the items in Figure 1 have relatively good loadings, 0.60 was taken as the minimum for the first stage model of this study; hence, 56 items which had loadings below 0.60 were deleted from the model. Hereafter, 5 indicators with factor loadings greater than 0.60 were retained in the model.

Convergent validity is the extent to which items truly represent the intended latent construct and correlate with other measures of the same latent construct [58]. The convergent validity of this study was examined by the AVE of each latent construct, as suggested as suggested by Fornell and Larcker [59]. The AVE of each latent construct should be at least 0.50. The AVEs for this study as shown in Table 2 are all above 0.50, suggesting adequate convergent validity.

TABLE 2. Loadings, Average Variance Extracted (AVE) and Reliabilities for First Stage Hierarchical Construct Model

Latent Construct & Indicators	Standardised Loading	Composite Reliability	Cronbach's Alpha	Average Variance Extracted (AVE)
Entrepreneurial Intention	0.605-0.841	0.903	0.878	0.511
Entrepreneurial Orientation	0.642-0.858	0.860	0.810	0.577
Social Support	0.631-0.857	0.925	0.908	0.565
Entrepreneurial Self-Efficacy	0.547-0.870	0.920	0.901	0.564
Entrepreneurial Internship	0.604-0.846	0.903	0.878	0.511
Business Incubation Program	0.589-0.826	0.922	0.911	0.543

Similar to convergent validity, AVE was also used to determine the discriminant validity of this study [59]. Accordingly, based on Fornell and Larcker's [59] suggestion, discriminant validity was evaluated with the use of the AVE with a score of 0.50 or more. Also the square root of the AVE should be greater. Thus, as seen in Table 2, the values of AVE for this study are between 0.639 and 0.680, indicating acceptable values. In Table 3, the correlations among the latent constructs are compared with the square root of AVE (in bold face). The AVEs are all greater than the correlations among latent constructs, indicating sufficient discriminant validity [59].

TABLE 3. Latent Variable Correlation and Square Roots of Average Variance Extracted

	Business Incubation Program	Entrepreneurial Internship	Entrepreneurial Orientation	Entrepreneurial Self-Efficacy	Entrepreneurial Intention	Social Support
Business Incubation Program	0.737					
Entrepreneurial Internship	0.615	0.795				
Entrepreneurial Orientation	0.639	0.730	0.747			
Entrepreneurial Self-Efficacy	0.510	0.520	0.551	0.751		
Entrepreneurial Intention	0.582	0.583	0.435	0.567	0.715	
Social Support	0.572	0.741	0.564	0.48	0.574	0.752

4.2 Assessment of Significance of the Structural Model

The current study assessed the structural model. This study also applied bootstrapping method with 5000 bootstrap samples to assess the significance of the path coefficients [57]. Figure 1 and Table 2 therefore show the estimates for the full structural model.

FIGURE 1. PLS Algorithm Model
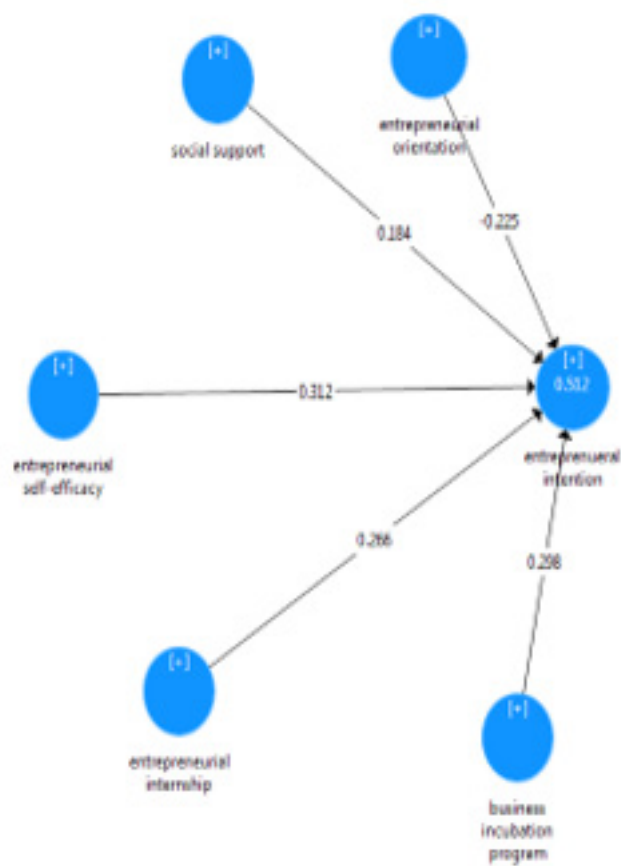
FIGURE 2. PLS Bootstrapping Model
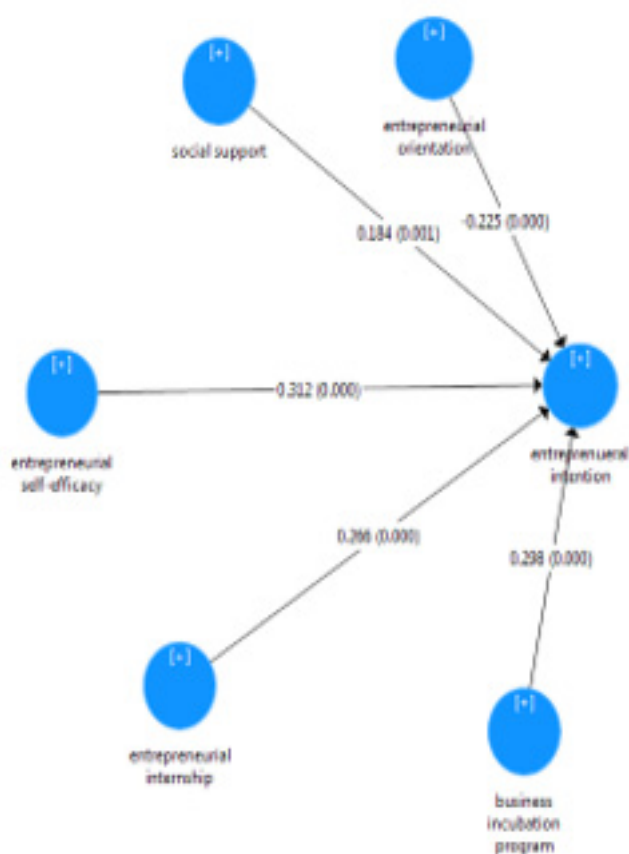
4.2 Assessment of Variance Explained in the Endogenous Latent Variables

As presented in the above Figure 1, the research model explains 51.2 percent of the total variance in entrepreneurial intention. This advocates that the sets of exogenous latent variables collectively explain 51.2 percent of the variance of the entrepreneurial intention. Therefore, the endogenous latent variables showed acceptable levels of R-squared values, which were considered as substantial.

4.3 Hypotheses Testing

At the beginning, Hypothesis 1 to Hypothesis 5 predicted that independent variables (ie. entrepreneurial orientation, social support, entrepreneurial self-efficacy, entrepreneurial internship and business incubation program) is positively related to employee entrepreneurial intention. Result in Table 4 and Figure 2 revealed a significant positive relationship between business incubation program and entrepreneurial intention (B = 0.298, t = 5.965, p< 0.01), supporting Hypothesis H1. Similarly, Hypothesis 2 anticipated that entrepreneurial internship is positively associated to entrepreneurial intention. As shown in Table 4 and Figure 2, result also show the significant association between entrepreneurial internship and entrepreneurial intention (B= 0.266, t = 4.213, p > 0.01), also support Hypothesis 2. Entrepreneurial orientation (B = 0.225, t = 4.909, p<0.01), self-efficacy (B = 0.312, t = 5.456, p<0.01) and social support (B = 0.184, t= 3.503, p<0.01) were also showed the significant effect to employee commitment, supporting H3, H4 and H5.

TABLE 4. Structural Model Assessment Path Coefficient

Hypothesis	Relationship	Beta	T	Sig.	Summary
H1	business incubation program -> entrepreneurial intention	0.298	5.965	0.000	Supported
H2	entrepreneurial internship -> entrepreneurial intention	0.266	4.213	0.000	Supported
H3	entrepreneurial orientation -> entrepreneurial intention	-0.225	4.909	0.000	Supported
H4	entrepreneurial self-efficacy -> entrepreneurial intention	0.312	5.456	0.000	Supported
H5	social support -> entrepreneurial intention	0.184	3.503	0.001	Supported

5. DISCUSSION AND CONCLUSION

Overall, this study found the substantial effect of determinants factors on entrepreneurial intention among business student in Malaysia. The model has successfully explained 51.2 percent of total variance in entrepreneurial intention. This advocates that the sets of exogenous latent variables collectively explain 51.2 percent of the variance of the entrepreneurial intention.

In this study, it is predicted that business incubation program is positively related to entrepreneurial intention of the students. It is found to have a positive significant relationship Thus, the hypothesis is supported and also supported by [60]. Numerous other studies have understood clearly that the business incubation program has a significant influence on entrepreneurial intention which indicates that the more favorable the students' attitude to participate in the business incubation program, the more they feel confident in their intention to start a business [61].

The results indicate that entrepreneurial orientation is positively related to entrepreneurial intention among business students. Past studies support this relationship [62] that the higher the entrepreneurial orientation, the higher the entrepreneurial intention of students to become entrepreneurs.

The results of the analysis reveal that entrepreneurial self-efficacy is positively related to entrepreneurial intention among students. This finding is in line with several previous studies [36,35]. The findings of the current study imply that the higher the ESE, the higher the EI of the students to start-up a business. Accordingly, clear patterns emerge: individuals with higher entrepreneurial self-efficacy have higher entrepreneurial intentions [35,63].

Empirical evidence from this study shows a significant and positive direct relationship between SS and EI. It is similar to several past findings [64,65]. The findings of this study imply that the higher the social support, the higher the entrepreneurial intention of the students to start-up a business. Several studies [66,67,68] have reported similar findings, showing strong positive correlation between family support system and entrepreneurial intention. According to Rani, family support has a strong correlation with the occurrence of a new venture, opportunity recognition, decision-making as well as resource mobilization.

The overall results indicate that there is a number of factors that may influence young graduates to be entrepreneurs as well as the process that leads to entrepreneurial intention. The results of the study can be used by researchers, the government and university authorities, including faculty members interested to further the theory and practice of entrepreneurship among university students. Finally, in addition to the above, the government should have more effective entrepreneurship programs and policies to increase awareness of entrepreneurial career possibilities and increase the number of entrepreneurs among university graduates.

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TECHNICAL VOCATIONAL EDUCATION AND TRAINING (TVET) IN MALAYSIA: THE NEEDS FOR IN TRAINING AND RETRAINING TEACHERS IN VOCATIONAL COLLEGE.

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ABSTRACT

Technical Vocational Education and Training (TVET) become an important and main route in providing highly-skilled human resources to achieve the developed nation status by 2020. In 2018, Ministry of Education become a largest recipient of funds whereas RM206 million were allocated to develop and prepare training programmed at polytechnics, community colleges and vocational colleges. It's show that Malaysia are committed to produce highly-skilled human resources to fulfill the demand-supply gap in various industries. However, in order to achieve the highly human resources the developing highly effective instructors also should be consider. Currently, teachers and instructors are still pressing issue due to a lack of quality and quantity where most of TVET teachers are recruited from fresh graduates of vocational and technical colleges and universities, thus lacking in industrial experiences. To produce the good quality of Technical Vocational Education (TVE) teachers must be specialized in their field. However, this study has not been exploring yet especially in vocational collage where many of them were employed with the necessary technical skills but no had more opportunity to undertake professional training. At the same time qualified personnel with work experience are not willing to become teachers due to the unattractive salary scheme. This paper is a review of the structure and performance of the TVE teachers in Malaysia focusing on development of curriculum, program design, the nature of learning material and stakeholder's involvement in vocational college. Improving the quality of teachers in TVET is related to raising the quality of technica and vocational education.

Keywords: Premier Polytechnics, Determinants of brand Image

1. INTRODUCTION

The important of being competent and well-performing teacher in any educational institution are undoubted. The teacher is considered the professional agent and the most directly responsible person in the process of learning. According to (C.G, 2005), preparing teachers for the teaching profession is conceived as being a higher priority in any country since this profession is considered as being challenging and critical, and may lead to nations' rising and progress in the different domains. A lot of attention has been given to the teacher quality through media, policymakers and researchers on this also high and debates about teachers have been intense, creating numerous policy decisions at local, state and national levels. However, improving teacher quality and teacher preparation is no simple task. In Malaysia teachers was trained in universities and teacher's training institutions. For Teaching Vocational Education (TVE) teachers a few universities and teacher's training institutions provided the courses which can fulfil the school's needs.

Concerns regarding the competence and the importance of training and retraining of Technical and Vocational Education and Training (TVET) teachers should not be taken lightly as problems are pervasive in TVET institutions across the country. The report by SEAMEO VOCTECH (2012) states that '…most of the TVET teachers are graduates from different levels but still lacking in industrial practice and exposure ….'. Education Statistics Indicator 2012/2013 reported that teachers in Cambodia have low academic qualifications and teachers did not receive training in pedagogy (Essential competences for TVET Teachers in ASEAN., 2017). According to (Schleicher, 2012) due to the problems related to TVET trainers in countries such as Bangladesh, Cambodia, Sri Lanka, Lao PDR, Vietnam, and Indonesia, where they are facing a shortage of TVET trainers qualified and proficient in pedagogy and technology. Furthermore, expert workers in the industry have lost interest in working as teachers in TVET institutions and prefer to work in other sectors due to the low salaries in the teaching profession (Pang, 2011).

In Malaysia TVET education began at the end of 1806 to train local young people to work as mechanics and fitters on the national railways (Grollman, 2007). The educational reform in Malaysia began in the early 1980s, as mentioned in the Cabinet Committee Report in 1979. TVET as part of the development of Malaysia, promoted a broad range of participation in business and trade. As such, technical and vocational education were expanded and further developed in line with national development (Leong, 2016). In Malaysia, TVET is led by eight ministries: the Ministry of Human Resources, the Ministry of Works, the Ministry of Youth and Sports, the Ministry of Higher Institution, the Ministry of Education, the Ministry of Regional and Rural Development, the Ministry of Agriculture and Agro-Based Industry, and the Ministry of Defense. The ministries have the common objective and goal to produce a generation of Malaysians with knowledge and skills in their respective fields (E., 2005). The Malaysian Qualifications Agency (MQA) under the Ministry of Higher Education is a government body which gives accreditation to TVET institutions and accredits the training programs implemented in the universities, polytechnics, community colleges, and training institutions under MARA, while the Department of Skills Development under the Ministry of Human Resources is the accrediting body for both public and private institutions for skills development. At present, there are 1369 TVET institutions in Malaysia, including universities, polytechnics, community colleges, vocational colleges, technical schools, and public and private institutions, for skills development (Rasul, 2015).

Education Minister Maszlee Malik (2019) says the cabinet has approved a proposal for a single qualifying body for Technical and Vocational Education and Training (TVET) courses. It's means process of integration will begin for vocational colleges, polytechnics, community colleges, and technical universities in the country. However, programs at vocational colleges were often criticized for being unrecognized or unaccepted. The competence of teachers in vocational colleges always issued. Thus, the discussion on this study will try to answer the questions is that the training that teachers have will provide the best performance for TVE in vocational college? Is that the Curriculum development, program design, the nature of learning materials and stakeholders' involvement are the another factors should teachers know and improve. For teachers who had five, ten or more experience in teaching, Does the retraining is needed to make their knowledge relevance in General or vocational education? Issues on training and retraining of teachers is a "tough choice" in many developing countries (EPU, 2015). In the human capital framework, general education creates 'general human capital' and vocational and technical education generally creates 'specific human capital' (Young-Saing, 2010). The former is portable across one's life and from job to job, while the later one is not and hence many advocate general education, as more suitable to the flexible labor force that can change task and even the type of work; but the later one has an advantage, imbibing specific job-relevant skills, that can make the worker more readily suitable for a given job and would make them more productive. Hence both are important, and education systems in many countries therefore include both general and vocational streams in order to provide a varying proportions of education.

2 LITERATURE REVIEW

2.1 Training for Vocational College Teachers

In Malaysia, teachers training and professional development are seen as central mechanisms for the improvement of teachers' content knowledge and their teaching skills and practices in order to meet high educational standards. According to (Campion, 2011), teacher training in TVE can be defined as the main role in providing the skill. Training is concerned with the development of knowledge and skills to be used immediately or in the very near future and deals with developing people who already have or who are just about to enter a job. This statement agreed by (Harun, 2008) where they said in a nutshell, vocational education and training is learning activity which can contributes to successful economic performance and tangible economic and social gains. It is this focus on tangible outcomes an accountability which broadly distinguishes them from general vocational and education system and services.

As stated, in Malaysia teachers training was conducted by a few universities and teacher's training institutions. In 1980s and 1990s Technical Teacher's Training College was one of the training centres provide the vocational courses for vocational schools in Malaysia. At first the training centres offered courses such as Automotive, Building Constructions, Welding and Electric & Electronics. Each of the trainees should complete their training within one and half years to three years depends on their basic qualification. Within the training duration they should attend the industrial training for 6 months to have knowledge and skills in their fields. The strength of this experience or is called a situated learning in a particular setting such as the workplace is that learning occurs where the problems to be solved are real or live. They were located in selected industries and will supervise by the person in charge there. Lecturers will come to observe two or three time to make sure trainees will follow the college and industries rules. Trainees learned a lot in this training. They will have extra knowledge and skills for the preparation when they will be a teacher soon. After they finished their training in colleges they will be awarded the certificate and diploma as a teaching license.

The government policy had changed and a few improvements have been done to the syllabus in order to increased high quality of teachers especially in TVE. The focus to produce teachers are more to technical field which is not skill oriented. Universities provide the degree course for TVE teachers. When they complete their study they will graduate as another student in other courses but they will teach technical & vocational subject in technical or academic schools. The different of two types of training, teachers graduated from training colleges are more focus in their skills. Teachers from universities are more knowledge in terms of science & technology. What all the teachers needs in retraining which can improve their quality, curriculum content, approach of teaching & learning to make TVE is the main choice of parents to send their children to technical & vocational education system in Malaysia.

2.2   Curriculum Development of Training

Every time there are changes or developments happening around the world and due to this the school curriculum also were affected. A curriculum is considered as the "heart" of any learning institution which means that schools or universities cannot exist without a curriculum. With its importance in formal education, the curriculum has become a dynamic process due to the changes that occur in our society. Therefore, in its broadest sense, curriculum refers to the "total learning experiences of individuals not only in school but society as well" (Razzaly, July 2011). According to (Ahmad, 2015), Curriculum development defined as planned, a purposeful, progressive, and systematic process to create positive improvements in the educational system. Whereas Curriculum development of training is a training that must be given especially to teachers including TVET educators to ensure they are able to provides answers or solutions to the students regarding world's pressing conditions and problems, such as environment, politics, socio-economics, and other issues of poverty, climate change, and sustainable development.

For the reason of TVET as a catalyst for economic growth and is expected to fill the gap of skilled workers of 7% (5,352) by 2020 with 60% of the 1.5 million jobs that will be created during the Eleventh Plan will require TVET-related skills (11th Malaysia Plan, 2016) the TVET educator quality becomes a focus of many TVET stakeholders in recent years. As for Malaysia, under the 4th shift of Malaysia Education Blueprint 2015-2025 (Higher Education), an initiative to produce quality TVET educators has been outset with purpose of preparing quality graduates. TVET educator curriculum were suggested to revise in order to ensure TVET educators have deep and broad understanding of the learning processes of students and the various factors that shape this process. This includes the demand of the industry and the current transformation in ICT and Industrial Revolution.

2.3   Retraining for TVE Teachers

According to (Aina, 2008), retraining defined as vocational rehabilitation or process of learning a new skill or trade, often in response to a change in the economic environment. Generally, retraining it reflects changes in profession rather than an "upward" movement in the same field. The need to retrain workers is often thought to apply to older members of the workforce, many of whom saw their occupations disappear and their skills lose value as technology, outsourcing and a weak economy combined to erode their ability to make a living. Retraining on the order hand, according to (System, 2002) is an on-the job training used by organizations to bring about development and improved competency in the workers. This is essential especially with the frequent policy changes in education and also in the evolving new knowledge and technology based society. In TVET education retraining teachers can help to reduce mistakes and improve innovations in the teaching profession. Training and retraining of teachers can be done in the following ways: in service training, conferences, workshops, seminars and demonstrations.

Teachers should attend retraining to improve their performance and knowledge especially to make students more interested in teaching and learning session. They can have short or long term of retraining depends on the needs. Figure 1 show why retraining become important to TVE teachers including Vocational college teachers.

Figure 1: Short-term focus of training
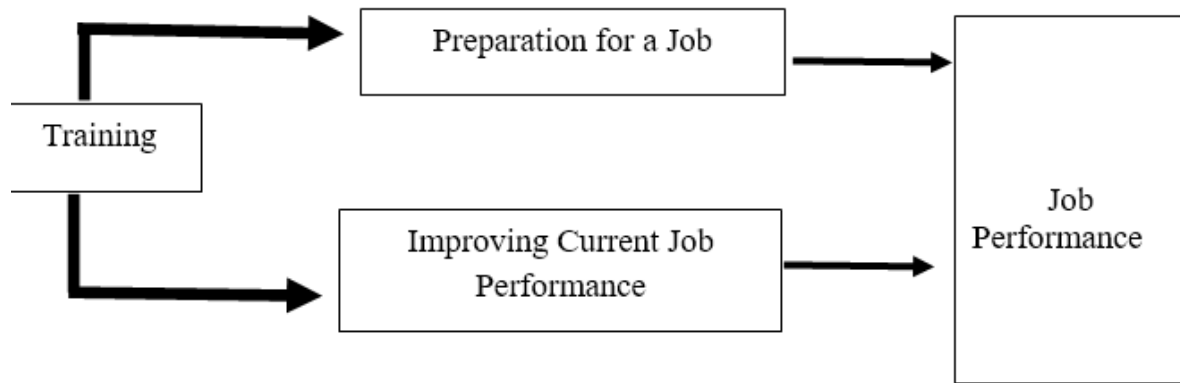
The need of retraining for TVE teachers in Malaysia begun when the new of assessment introduced for vocational students in 2006. The new approach of assessment for vocational students is competency-based education and modular system was implemented. Back to the basis objectives of vocational education to prepare students gain job-oriented education, clear career pathways and opportunities to gain access to higher education. The challenges of TVET are Skill, Technical and Innovation Component which focuses on the specifics occupational area of the TVET Educator. As educators experience theoretical and practical sessions in diverse ways, the emphasis on technical aspect is vital. The subject-didactics have to reflect this competency and thus support the educator's personality development. Industry experience, research and innovation and workshop management are the important elements in this component (Okoye, 2013). Besides that, the present challenge is the preparation of high-quality TVET educators to execute Malaysia's policies and agenda and this concern brought about new challenges and demands, which require new capacities and knowledge on the part of educator. Different aspects of teacher quality are likely to be emphasized in different countries over different periods of time (Razzaly, The Development of Competency of Vocational teachers in Malaysia : Curriculum Development Perspective, 2010). Today, the emphasis is less on quantity but more on quality.

According to (Umar, 2011), retraining of teachers will enable them to teach any vocational subjects, getting industries to be mentors to enable the department to train students who are suitably skilled for the work place, developing multi-skill students and gaining international accreditation for the courses offered. However, this situation was not occurred and still become the problem especially in vocational college. Due to literature review discussed this paper is to discuss and analyze the element of retraining needs for TVE teachers in terms of development of curriculum, program design, the nature of learning materials and stakeholder's involvement.

2.3.1   Retraining Program Design

Retraining program should be design towards adult learning characteristic. The characteristic of training is similar of characteristic of learning which will prepare how people learn and develop competency and expertise in the subject. Vocational college teachers will involve in this program will adapt lifelong learning experience in their carrier. The program should be designed with corporation in companies and industries involved. In designing training program, the specific outcomes are requiring to prove the competencies. Competences are defined as a combination of knowledge, skills and attitudes appropriate to the context. Key competences are those which all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment (Volmari, 2009). The European Trade Union Committee for Education (ETUCE) describes quality teachers as equipped with the ability to integrate knowledge, handle complexity, and adapt to the needs of individual learners as well as groups. Competency is one ability to perform tasks based on specific criteria; knowledge, skills, behaviors and attitudes. It is observable, measurable and practicable. Each individual can acquire competency if given the appropriate instructions, guidance, teachings, opportunities and time.

2.3.2   Learning methods and materials

Nowadays, the changing of pedagogy is important in order to fulfill the requirement of TVET education. In classroom or workshop teachers should plan and implement new approach of teaching and learning. Currently, most of the TVET teachers and educators still use the traditional method because they did not expose with the new trend of teaching especially for experienced teachers. There are various types of method and materials can be used in teaching to increase student's attentions. The suitable method in vocational education that can be use by the teachers are problem based learning (PBL), work- based learning, project -based learning and blended learning. Students can use the various source of materials from internet or discussion besides the text books provided. Furthermore, Problem-Based Learning (PBL) can be used (Guthrie, 2010) to help students become better at problem-solving. The process of solving problems encourages students working together; learn critical thing skills and they will become self-directed learners.

The other methods that can be used are Work-Based Learning. The approach of work-based learning generally used in industrial work setting where schools and colleges are placing students to learn skills in workplace environment. This strategy is an alternative to classroom training; action learning has been adopted by business schools and corporation as work-based experimental. Teachers should be able to know how to implement this method to prepare students in work-based experience. The characteristics of the method are knowledge and skills relevant for an occupation that contain essential elements of work identified by actual work.

Project-based learning also can be used to offers quite a different take on the relationship between working and learning and between being a worker and learner. Teachers will give students the task integrate previous learning to using their experience in 'real' workplace and try to solve the 'real' work problem. It will help students more expose to real world of work and can be understood as the kind of thing that real worker.

Blended learning (BL) is a last learning methods and materials suggested whereby globalization and technology are altering our views on education and educational offerings. Technology has given to many new avenues for learning. To name a few, online learning, teleconferencing, the Internet, computer assisted learning (CAL), web-based distance learning (WBDL) and other technologies currently exist. In turn, these methods will help to coin the term "blended learning" (BL), and although the term is still ill-defined, BL has entered into the training and education scene and is gaining popularity. BL is no longer a fad but is now expanding and getting established, although rapidly changing.

2.3.3   Stakeholders Involvement

To achieve the level of vocational education to higher level the participation of other stakeholders is needed. Parents and industries should know their role to more upgrading the vocational schools. The program for teachers training with industries attachment will contribute the new standard of TVE teachers (Majumdar, 2011). In TVET education the participants considered industry an essential component in ensuring the effectiveness of TVET institutions in generating qualified and skilled workers. Linkages between TVET institutes and employers empower TVET teacher education through the acquisition of practical skills, positive professional attitudes, and the gradual development of teachers' understanding of working within industry. TVET institutes depend upon industry as a means of accessing the latest technology and practices, as well as indicating the level and types of skills currently required. An effective relationship between TVET teachers and industries will thus ensure that TVET curricula and teaching methodologies are relevant and up-to-date. The participants believed that the close collaboration between TVET teacher education and industry would significantly improve the quality and relevance of TVET. The success of TVET teacher education (and therefore indirectly, TVET education) is highly dependent on the quality of linkages, emphasized by one participant's characterization as the "backbone" of TVET teacher education.

The benefits of TVET teachers gets from the collaboration with the industries are TVET teachers will experience a strong background of industrial working experience. Those who are less familiar with new technologies and required skills were typified as lacking enthusiasm to collaborate with industry (Yunos, 2010). Moreover, many participants emphasized industry as the primary source of information for TVET teachers to establish their teaching modules. Close collaboration provides TVET teachers with the opportunity to access information concerning the latest technologies used within industry, which can form the basis of suitable teaching modules. Theoretical modules are developed based on modern sciences, while hands-on modules focus on skills and working processes in practice within industries. Such modules need to be adapted with 'soft skills' to understand working competencies and standards in the industry (Phin, 2014). This includes an awareness of the practical purpose of a theory, its linkage with modern technology, associated skills and competencies, and whether it is currently practiced or alternatively outdated.

3 CONCLUSIONS AND RECOMMENDATION

Training and retraining become an important element to all teachers and TVE educators where there is a prevailing belief that education has entered a new environment in which quality plays an increasingly important role (Paryono, 2015). Therefore, all the TVET institutions including government need to be aware of the technology changes and provide effective support to the students (Sulaiman, 2014). TVET educator training and responsibilities in Malaysian context has evolved beyond its normal historical evolution. Due to this the implementation of a coherent but flexible structure of teacher training programs on different level based on the high standard of teachers are required. Malaysia should have the new National TVET-Teacher Qualification Standards as criteria against which somebody will be assessed for entering or exiting a specific teacher-training program as an element of lifelong professional development. These standards should be developing as a first step when modernizing the existing teacher training system. Skills accreditation programs for vocational teachers should be more which can collaborate with Skills Development Department in Ministry of Human Resource. To overcome the lack of skills among teachers, they are required to attend to short-term courses to improve their skills.

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THEME 6 :

POLICY, PLANNING AND PRACTICES

AUTHORITY OF THE FINANCIAL SERVICE AUTHORITY (OJK) IN HANDLING DISPUTE IN INDONESIA

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ABSTRACT

The power of financial services is given such extensive authority that one is in the field of supervision. The authority is also given the authority to resolve disputes over banking disputes. The role of financial services in handling banking disputes is expected to contribute well to the development of banks that can be solved the best solution. Research through a normative approach with strengthen various case data that has been resolved by the financial services authority, the analysis by is done by qualitative normative. The purpose of this study provides an overview of the settlement of disputes by the financial services authority on bank disputes and constrains. The problem in this study shall be how the form of authority for the settlement of banking disputes is resolved by the financial services authority; second how the obstacles that occur in an effort to resolve disputes by the financial services authority. The result of the study show that banking dispute resolution carried out by financial services authorities through non litigation has not been optimally carried out due to various things, namely the understanding of customers who do not know the regulation when a banking dispute occurs. The second obstacle that occurs in the settlement of banking disputes is that the customers understanding is contrary to what is the laws and regulations even though the customers is in the wrong position.

Keywords: CAuthority, Financial services, Dispute, Indonesia

1. INTRODUCTION

Law of Financial Service Authority (FSA) in the explanation stated that FSA was with the goal of keeping the overall activities of financial services in the financial services.

sector held regulary, fair, tranparent and accountable. as well as the financial system able to reliaze sustainable grownt and stable and capable of protecting the interest of consumers and society. Article 28 of Law Number 21 Year 2011 concerning the Financial Services Authority explains in efforts to protect consumers and the public, Service Authority (FSA) has the authority to take consumer loss prevention measures which include information and education on the financial services sector, stop activities if there is potential loss and other actions deemed necessary in the financial services sector. Sufmi explained further in the results of her research that the FSA has the authority to protect the law for the community based on Article 28, 29 and 30 of Law No. 21 of 2011 concerning the Financial Services Authority.

The Financial Services Authority is the institution holding the highest authority and is called extraordinary, where this institution gets the transfer of regulatory and supervisory functions to financial institutions such as banks, capital articles and non-bank financial institutions. Financial industry supervision models in various countries in the world are classified as multi supervisory models, twin peak supervisory models and unified supervisory models. In Indonesia, of the three models, the unified supervisory model is given with full authority given to the FSA.

The presence of the OJK in the development of the financial sector in Indonesia is faced with being able to help smooth the activities of financial service institutions, so that it can be well covered and have a positive impact as an OJK function in overseeing national banking activities. In the banking world, many disputes occur between customers and banks, with the OJK it is expected that these disputes can be resolved non-litigation by considering aspects of consumer protection.

In the context of das sollen Article 30 of Law Number 21 Concerning the Financial Services Authority Stating "For the protection of consumers and the public, OJK has the authority to conduct legal defense, which includes: ordering or taking certain actions to financial service institutions to resolve complaints from consumers who are disadvantaged by financial service institutions intended and submit a claim to obtain the property of the injured party and to obtain compensation. "

This article gives OJK authority in an effort to protect the rights of consumers who have suffered losses by taking certain actions and litigation claims. The fact is that many disputes between financial institutions and consumers are resolved through litigation without going through the financial services authority, besides that many consumers who experience losses on investment products of financial institutions do not get reimbursed.

2. METHODOLOGY

The method of research is a qualitative with normative juridical approach. The research data were used primary data and secondary data. Secondary data were in textbooks, scientific journals, statuta, the form of legislation. The data collection method uses library research with content analysis. The data analysis by interpreting data bases on norm and legal theories especially related law of authority financial services as law in action or a social science studies.

3. RESULTS AND DISCUSSIONS

3.1 Financial Service Authority Handling Banking Dispute In Indonesia

In Indonesia, banking has a strategic role and is not solely eonomically oriented, but also oriented towards non-economic matters such as issues involving national stability such as political stability and social stability. The banking supervisory body that was previously taken over and carried out by Bank Indonesia has been transferred the function dated December 31, 2013 to OJK which automatically indicates that the OJK can and must play an active role in supervision in the banking world.. OJK Authority in regulation and supervision of financial services includes banking and non banking financial services. Therefore it is necessary to strengthen the implemetation of regulation and supervision of market conduct of the OJK. In an effort to maximize OJK's function in handling disputes, OJK issues OJK circular No. 54 / SEOJK.07 / 2016 concerning Monitoring of alternative dispute resolution institutions in the financial services sector. In this circular provision, the dispute resolution agency must regularly report the performance of dispute resolution in an effort to maximize the alternative functions of dispute resolution in a measurable effective and efficient manner.

Concerning regulation, Indonesian banks have a set of rules used as a strong legal foundation for sustainable finance implementation. In addition, the banking sector is an especially strictly regulated sector based on the prudential banking principle as the main principle. This means that banks must comply with all applicable legal provisions, including guidelines or standards made by internal banks. Regarding the obligation to implement sustainable finance principles, banks are required to prepare a sustainability report as the implementation of transparency principle. Integration of social, environmental and governance aspects in banking practices has encouraged countries to establish bank management principles to harmonize banks with sustainable development goals.

In an effort to bank sustainability, the success of non-litigation dispute resolution is not only focused on the authority of the OJK in dispute resolution, banks in this case also have a central role for the success of dispute resolution. Optimization of dispute resolution can be done by the FSA and banks to make synergistic efforts on an ongoing basis. Banks must make OJK a partner in dispute resolution and OJK must also optimize alternative dispute resolution institutions.

Banking disputes are part of the area of private law which is basically civil law resolved by consensus agreement. Disputes that enter the litigation area will degrade public trust in financial institutions. This certainly needs to be realized jointly with non-litigation settlement efforts involving the Financial Services Authority is very important to do, not only because the implementation of Article 30 of Law Number 21 About the Financial Services Authority that gives authority to the FSA as an institution that has a function in make legal defense to the community.

The interpretation of the legal defense contained in the article is part of the function in the effort to resolve disputes in a position of protection to consumers. In the practical order of defense conducted by OJK can be in the form of litigation or non-litigation, but the emphasis on the practice of resolving OJK disputes functions as a consumer protector from losses suffered. Of course the defense carried out by the FSA must be based on facts that reinforce the defense.

The weak position of consumers from various aspects of regulations that have been established by banks, requires the existence of rules for the protection of consumers. The protection to the intended consumers can be proven both materially and materially. The rules that have been determined by the bank are an effort to mitigate the risk of bank losses, however, there are times when the rules also cause losses suffered by consumers. Utilization of the OJK in carrying out its legal defense function to the public has not been carried

out optimally, it is based on the fact from various previous studies that many banking disputes are resolved litigatively by the parties without involving the function of the Financial Services Authority.

The role of the FSA in an effort to resolve banking disputes can be done well if done jointly with related parties, namely banks, customers, alternative institutions for dispute resolution in the financial services sector. For alternative dispute institutions, it is a breakthrough that should be developed in an effort to maximize the functions and authority of the OJK in resolving legal defense efforts to consumers.

3.1.1 The Obstacles to Resolve Dispute by The Financial Services Authority

OJK in carrying out its tasks and functions cannot be separated from the problems and obstacles faced. These obstacles can be in the form of rules or regulations that hinder legal protection efforts. These obstacles can also occur in a technical form due to the lack of public literacy in OJK's duties and functions.

Law right and obligations should also be implemented. If there are deviations in the implementation, then it needs to be enforced and evaluated the faktors why there are deviations so the objektive of the law to echieve justice/protection for the parties can be achieved. Current regulations have essentially accommodated the creation of justice for the parties in the event of a banking dispute. However, in the practical order of consumers if without the defense of an institution that has the authority will be on the injured party.

Several laws and regulations governing consumer protection as POJK 1 / POJK.07 / 2013 concerning the consumer protection financial services sector. However, POJK 1 / POJK.07 / 2013 does not include the notion of consumer protection form the perpetrators of the MFI's financial services, so it is important for regulating complaints mechanisms MFI depositors for their sharia legal vacuums regarding consumer complaints mechanism arrangements are harmonized by the MFI.

The factors supporting rule of law, society faktors, are the invironment in where they may apply or aplied. Cultural faktors, namely as a work of authorship, and the flavor is based on human initiative in social life. These five fakctors are closely interrelated and contitute the essense of the rule of law, also is a measure of the effectiveness of law enforcment. These faktors have the neatral meaning, so that a positive or negative impact lies in the content of these factors. Sustainable development focuses on three solution-oriented pillars, including technology and innovation, law and government, economy and financial incentives. Almost all sustainable projects are supported by the three pillars simultaneously. Regarding sustainable development goals, the function of the banking system is closely related to the 8th goal of 17 SDGs that is encouraging economic growth that is sustainable, inclusive, full and productive employment and decent work for all. In line with the responsibility principles of the bank mentioned, one of the principles that must be applied in implementing sustainable finance is the principle of governance.

In a practical setting the principles of prudence implemented by banks in an effort to mitigate the risk of loss often results in losses. It even caused disputes between customers and banks. Among the obstacles in resolving disputes are rigid regulations from banks so that the bank will maintain its position if it is in accordance with procedures established by the bank's internal memorandum. public literacy is important to be given extensive knowledge about the duties and functions of OJK as an institution that has authority in dispute resolution. Academic socialization efforts can be sought early by introducing OJK to the public.

The most crucial obstacle faced by the OJK is the limited human resources within OJK so that it cannot optimize its authority in making legal defense to consumers or settling disputes in a non-litigation manner. Because in fact it is not an easy matter to resolve bank disputes in the position of the parties feeling materially disadvantaged, so it takes qualified skills and insight capable mediators to conduct banking dispute resolution. We can verify this from the data of dispute resolution that has been carried out by the OJK which ended in a court decision.

It takes time and effort and the costs are not cheap to resolve a bank dispute if done in litigation. Of course all of that must be observed by the parties in an effort to resolve disputes. In resolving banking disputes, moral hazard must be prioritized based on the awareness of contractual relationships that have been made so that the parties can resolve disputes in a non-litigation manner without even involving the FSA or alternative dispute resolution institutions. OJK's obstacle in resolving disputes will be lighter if it synergizes with related parties and can optimize its authority effectively and efficiently.

4. CONCLUSIONS

Based on the discussion above, it can be concluded that this research shows that the authority of the financial services authority in handling banking disputes conducted outside the court or non-litigation has not been carried out optimally. Optimization of the handling of disputes has not been achieved due to several things, namely the lack of optimal financial services authority in conducting socialization to the public, especially bank customers, the public does not understand the procedures for handling disputes conducted by the financial services authority and the weak function of mediators in disputes.

SUGGESTIONS

The Financial Services Authority must optimize the handling of banking disputes by taking proactive socialization measures to bank customers and the general public. Procedures for handling disputes with the Financial Services Authority must be simplified and socialized to provide convenience to the public.

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E-COURT EFFECTIVENESS TO REDUCE THE POTENTIAL FOR CORRUPTION IN COURT

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ABSTRACT

This study aims to determine the effectiveness of the use of E-Court to Reduce the Potential of Corruption in court. Corruption in court is closely related to the corrupt relationship between justice seekers and individuals from the court. The problem raised in this study is how the effectiveness of the E-Court system in suppressing the potential for corruption in the court and what kind of positive side is gained in using the E-Court system.

Keywords: E-Court, Court, Potential for Corruption

1. INTRODUCTION

E-Court means a new court bureaucratic service management system. The system is claimed to be very important in addition to streamlining the process of managing justice cases, and to minimize the interaction of Administrative Officers with Justice Seekers to avoid potential corruption in the court that will occur. Enforcement through the judicial process will continue to pay attention to the public, because this instrument will test the law for consistency and continuity. Those who have problems and break the rules must be legally tried. In addition to the principle of "judicial independence" and "impartiality" that are not less important, there are several other principles, including the principle "courts are held in a simple, fast and inexpensive way". It is necessary that the above principles will make this process easier, more affordable and more affordable. "Simple" means that the legal process is simple, not too complicated, easy to understand, so recipients can follow, mostly if they do not know the law and legal process. Even those who are blind in rules do not lose access to the regulatory process and demand rights and obligations. "Fast" means that the claim is effective, efficient, not long-term, protracted, according to the specified time phase, so that it can be predicted or confirmed when it ends, as a result justice seekers can immediately know the status of their rules. Make every court decision. "Low cost" means that the litigation process is burdened by using the obligation to bear the costs available and in accordance with legitimate capabilities, most of which are biologically based on relevant economic standards.

This turned out not because there was a rule dilemma but later changed as a non-rule problem that could obscure real cases, namely legal issues, law enforcement and justice. Non-rule problems which are factors that cause irregularities in the judicial process, one of which is the widespread practice of corruption in the judiciary. Or better known as the practice of judicial corruption. This resulted in a blurring of the portrait of law enforcement and justice in Indonesia. The emergence of corrupt practices in the

courts has caused a decline in public confidence in the judiciary itself [1]. people who lose their religion to forums and judicial processes tend to solve every legal problem that occurs between them in a way that they will choose and determine themselves, among them the worst as a recent phenomenon is ways of violence through judicial acts alone vigilante or Eigenrichting. Skepticism and frustration with poor judicial practices will cause a distortion of law enforcement, which results in the fact that street justice has the potential to cause social anarchy.

Efforts to eradicate corruption in court are not easy. The difficulty seems to be increasingly complicated, because corruption seems to have truly become a culture at various levels of society [2]. However, various efforts are still being made, so that corruption can at least be reduced, therefore Law Number 30 of 2002 concerning the Corruption Eradication Commission places the establishment of the KOMISI PEMBERANTASAN KORUPSI (KPK) and the Special Corruption Court. The formation of these two institutions is one of the efforts made by the government and the legislature in the eradication of criminal acts of corruption. However, in its implementation it turned out that it was not as easy as written in law. The E-Court system will face challenges in the court services sector for people seeking justice. Culture of Bribery and Gratuity and Gratification and Gratuity are striking colors of the segmentation of bureaucratic services, especially in court. Culture of Bribery and Gratification and Gratification and Gratuity is a culture of bureaucratic service that has existed for a long time, for residents of justice seekers is not a foreign matter when it does not tip bureaucratic servants for services that have been given custom as known as Gratification and to accelerate and shorten waiting times in bureaucratic services often unofficial rewards appear identical to bribery and gratification and gratification as to whether the E-Court system decides on culture or habits in testing this effectiveness.

2. METHODOLOGY

This research was conducted in the court areas of the cities of Jakarta, Bogor, Tangerang and Bekasi (JABODETABEK). The selection of locations in JABODETABEK is based on the consideration that the E-court system will be first published in the court area and the court area is notoriously populous in terms of civil cases that are targeted by the E-Court system. Types and sources of data used in this study are secondary data and primary data. Secondary data is data obtained by researchers from library research and documents, which are the results of research and processing of others, which are already available in the form of books or documents that are usually provided in libraries, or private property. Whereas what is meant by primary data is data obtained directly from research subjects, namely court administration staff or E-Court System operators and Advocates. In legal research, secondary data includes primary legal materials, secondary legal materials, and tertiary legal materials. Secondary data used in this study, which consists of laws, regulations that are still valid and related. Data collection methods and techniques used include literature; observation, interview. In accordance with the data source as described above, in this research the data collection was carried out by: Literature Study, secondary data was collected by conducting a literature study, namely by searching and collecting and reviewing the laws and regulations, the draft law, the results research, scientific journals, scientific articles, and seminar papers relating to technology-based court administration management systems that will be linked to the E-Court system.

3. RESULTS AND DISCUSSIONS

1. E-Court system effectiveness in suppressing the potential for corruption in court.

The Supreme Court as a government institution that has a very strategic role in terms of legal and justice services. as a service institution, the Supreme Court and four environments where justice is de jure including in public service forums or forums about public services based on MENPAN Decree No. 63 of 2003 was then developed based on public service discourse decisions which were basically the simplicity of services, clarity of certainty, appointed to get public complaints, openness, efficiency, economics, fairness, and the right time. The concept of public services must be well understood using judicial apparatus, because until now there were still complaints about judicial services from the justice seeker community. In this regard, the Supreme Court began organizing events and strategic steps to respond to community complaints.

There are at least two crucial and strategic issues that must be immediately responded by the Supreme Court and judicial citizens. 2 of these problems are related to each other. The first is to increase public trust and the second is independence of the judiciary, although various attempts have been made to radically change legal reform since the reform era and the one-stop system in 2004, public trust in the Supreme Court has not been too satisfying. This can be observed from the results of the public sector integrity survey issued by the corruption eradication commission that took place last September. When the Supreme Court evaluated it, its integrity was still below the homogeneous average. The low level of public religion is dangerous for the process of law enforcement and certainty in Indonesia because court decisions will not be respected by the wider community. With this condition, the Supreme Court must immediately take a stand and formulate various strategic steps or policies to restore public confidence.

The implementation of Bureaucratic Reform at the Supreme Court can be used as a strategy. Bureaucratic reform requires a restructuring of the bureaucracy of the Supreme Court and subordinate Courts both in terms of organizational structure and human resource management for employees, and excellent service improvement for justice seekers. The need for such needs is one of the priorities of judicial reform by the Supreme Court Coordinator [3]. Evidence of this commitment can be seen from the Supreme Court as a pilot project to restructure the organizational structure or commonly known as restructuring within the framework of Bureaucratic Reform. Organizational restructuring is required by the Supreme Court and the judicial body below. Therefore the development of the organization of the Supreme Court and the judicial bodies below leads to 2 organizational designs, namely: Performance-based organizations targeted to be achieved and established in 2019 and targeted knowledge-based organizations are achieved and established. In 2035 (as stated in the blueprint). If the achievement of these 2 designs is better, then gradually they will bring the organization of the Supreme Court and the judicial body below, to become a perfect function and size organization which means that it is wrong for one purpose of Bureaucratic Reform. Bureaucratic reform in which there is also a reform of bureaucratic service cases requires a concurrent integrated process of bureaucratic case service reform, saying simultaneously because this reform process cannot be carried out directly as easily as turning the palm of the hand.

The rule of law principle that synergizes using the principle of "good governance" has the characteristics of legal certainty and a sense of community justice towards public policies that are made and implemented. Therefore, every public policy and regulation must always be formulated, defined, and implemented based on standard procedures that have been institutionalized and known by the general public, and have opportunities for assessment. Citizens need and must be convinced about the availability of problem solving processes regarding conflict resolution, and there are general procedures for cancelling certain rules or laws [4]. The importance of technical reform of court bureaucratic services is also in line with the demands to improve judicial performance, because the technical application of the judiciary is not supported by the use of technological tools, services of the judicial bureaucracy and adequate human resources. Inadequate technological devices such as personal computers in court will result in the preparation of slow court decisions. Conditions similar to scarcity of work equipment and other supporting facilities also occur in Jakarta, not only in small cities outside Java. the impact of inadequate work tools has led to high costs in the judicial process, which of course contradicts simple, fast and inexpensive judicial principles as mandated by Law No. 14 of 1970 [5].

The principle of simple, fast and cheap justice is identical to the principle of effectiveness and efficiency in the concept of organization / good governance. As stated that one of the important pillars in implementing good governance is the existence of a justice system that is free from executive interference, not corrupt and professional. To achieve this goal a check and balancing mechanism is needed as a monitoring mechanism between one forum and another. One aspect of error needs to be considered to oversee the judiciary, especially the Supreme Court coordinator to apply the principle of transparency and ease of access to problems [6]. Transparency in a clear decision that does not prohibit even during the perspective of legal reform to increase the authority of the judicial forum is very important because the easier access to gossip (decisions), the better the people's control. no less important is the urgency of decisions as a reference for the community including law enforcement, about developing new rules for resolving legal issues, as well as academic interests for legal research, design law, design laws and regulations. In court or judicial corruption has occurred during each period of the judicial process. Transparency and public access to decisions began to get the attention of the Supreme Court by using information technology and regular publications. Use the issuance of Law No. 14/2008 concerning Openness of Public Gossip, the Supreme Court of the Republic of Indonesia then refined the Supreme Court Coordinator Decree: 144 / KMA / VII / 2007 concerning the discourse of gossip open to the Court through the Supreme Court. Decision number: 1-144 / KMA / SK / I / 2011 concerning information service guidelines at the Court.

The result of this regulation is that optimizing the use of gossip technology means that the problem is very important. Therefore, in an effort to improve organizational performance, the Supreme Court of the Republic of Indonesia has used technological issues, both to support operations in the workplace in general, to support the process of working at the Republic of Indonesia Supreme Court and judicial institutions, and to support information services for society. Throughout 2011 seven activities have been carried out to provide news technology infrastructure aimed at meeting needs such as Open First information about problems for the wider community, Provision of a second storage area for software owned by the Indonesian Supreme Court, thirdly Provision of facilities for complaints of public dissatisfaction with problems was decided , Provision of the fourth storage media for damaged decision data, fifth Provision of a backup system for websites and systems containing the Indonesian Supreme Court, sixth Providing e-mail facilities, seventh providing facilities for transferring data via SMS or Short Message Service, providing eight facilities for uploading verdict data for courts countries throughout Indonesia, providing nine gossip auctions for procurement of goods / services in the Supreme Court environment, construction of tenth capacity for internet channels, eleventh search and exchange of data and info online, twelfth Central provision or available for the Supreme Court of the Republic of Indonesia, including electricity, refrigeration and security facilities, thirteen Provision of integrated monitoring and management facilities to overcome obstacles in terms of technical problems, Provider of the fourteenth speed communication channel in the Republic of Indonesia Supreme Court building, as well as capacity and coverage additional local computer network.

Before the implementation of the electronic court, at least there were various gossip technology initiatives that took place in various work units at the Indonesian Supreme Court and court forums, similar to the maintenance and development of personnel software, correspondence, and reporting of problems in the General Directorate of General Judicial Bodies. Development of an email system and utilization of Google Apps at the Directorate General of Military Courts and Administrative Courts. Improvement of the staffing system and development of the laboratory system problems in the case of bureaucratic services at the Directorate General of Religious Courts in an effort to encourage the independence of the management system and gossip technology. The Supervisory Board of the Supreme Court of the Republic of Indonesia also distributes many applications such as SMS Complaint software, Mail software, archive software, personnel database software. and permanent Asset Database investigation software. Ad interim The Agency for Research and Development, Education and Training, Regulation and Justice has made improvements in the Local Area Network to support

the learning process of Education and Training for Judges, Registrars, and Employees at the Supreme Court of the Republic of Indonesia. In addition, various other work units such as their respective courts also continue to improve hardware infrastructure according to their individual needs.

The making of the E-Court system by the Supreme Court is basically a reform effort directed at renewing technical functions and updating problem management. The focus of reforming technical functions is directed at efforts to revitalize the function of the Indonesian Supreme Court as the highest court to maintain unity of the rules and revitalize the functions of the court to increase public access to justice. Whereas case management reform is directed at realizing two (2) missions of the Supreme Court of the Republic of Indonesia, namely: first, providing legal services that have certainty and justice for justice seekers; and second, increasing the credibility and transparency of the judiciary [7]. Strategic steps that become the realm of renewal of technical functions are: restrictions on cassation and review, consistent application of spatial systems, simplification of the litigation process, and strengthening access to justice. While making the renewal agenda in the problem management domain include: modernizing problem management, rearranging case management organizations, and reorganizing the case management process.

Another study conducted by Mardjono Reksodiputro also revealed the existence of the practice of the judicial mafia. Even from the research, he mapped the mode of corruption committed by police, prosecutors and judges in the Court [8]. To the police, Mardjono cited the term developed in the community "to report missing chickens, even missing goats." is, if the victims of crime report to the police, they will spend more money to "bear" the operational costs of the police [9]. In addition, it provides more poly facilities for in detainees, especially the rich, accompanied by a number of special benefits, they have long been the origin of gossip in the community. While at the workplace the prosecutor, Mardjono Reskodiputro said that, in addition to extorting suspects, prosecutors could also free suspects on the grounds of lack of evidence. Playing articles about accusations, playing with high and low porto criminals is a mode that is quite often encountered in practice. Playing needs to use authority to delay suspects or defendants, which also means abuse of authority, both during police investigations and prosecution at the prosecutor's workplace. These reasons must be supported by objective information but have turned into mere subjective considerations. In addition, Mardjono also stated his practice in court.

Completion of the case includes the entire process consisting of review, registration, team determination by the Chief Justice of the Supreme Court / Deputy Chair of the Judicial Sector Court, distribution, determination of the Assembly by Team Leader, delegation of Young Reporting registrar, delegation reporting to the Registrar, delegation of case files to the Assembly to examination of case files, deliberation and termination, transfer and transfer of files back from the Young Registrar Team / Askor to the Young Registrar, sending the file back by the Registrar to the appellate court. In addition to setting the duration of case resolution as a strategy to eradicate the pile of cases, the Supreme Court has also succeeded in modernizing case management, namely E-Court by integrating information technology in providing information desks. This service is based on online information technology so that it can be accessed anywhere and anytime. Provision of information desks in each court has a positive impact in several ways, among others, First Minimizing opportunities for parties in litigation to meet with judges and clerks so as to minimize the potential for Corruption in court [10]. Second: Facilitating parties who are litigators and court users to find and obtain copies of decisions. Third Press Cost because the Supreme Court website can be accessed from anywhere.

Corruption in the courts always rises at every stage of the trial process. Based on his experience as a lawyer, Kamal Firdaus mapped corruption practices in courts at the first level and appellate courts in civil courts. In registering the case, Kamal noted that the parties, it was said, could choose who members of the panel of judges would adjudicate their case, of course, colluding with the Chairperson or Deputy Chairperson of the Court, to arrange the composition of the panel of judges and substitute clerks. Furthermore, in the trial process, it is said, a victory also in a decision can be arranged. Or conversely, it is regulated how the judge rejects the opposition's claim. Then in the execution, Kamal also saw a magic letter or an official telephone call to the Chief Justice of the Supreme Court for the first level to be executed, the decision was immediately made, suspended or even canceled. Then in the trial stage at the High Court (PT), will file an appeal to strengthen or cancel the judge's decision in the first court to be arranged. Also mapped are actors involved in corrupt practices in civil court proceedings.

It must be admitted that to prove the truth of the alleged occurrence of corrupt practices in the court is not too easy, because transactions tend to be closed and among the perpetrators tend to protect or cover each other, to avoid findings, either by the Corruption Eradication Commission, Judicial Commission, Supervisory Board, or other parties, generally the sale and purchase transaction of justice is carried out through a cash and carry mechanism, rarely using a banking service mechanism, because if it is done through a banking service

mechanism, it will be easily detected by Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK). PPATK will find financial transactions that are considered suspicious. In general, the occurrence of a sale and purchase transaction of justice was revealed when the perpetrator was caught off guard, after a number of previous interceptions were carried out on communication between the perpetrators. Like some current phenomenon.

The E-Court system is designed to create a court that is fast, simple and inexpensive and free of corruption. In this system, there are several instruments that are considered capable of suppressing corruption in courts, such as when handling civil cases, advocates do not need to come to court to register, but simply use e-filling. This narrowed the direct interaction between advocates and court employees. Certainly it will suppress corruption in the courts in the type of bribery and gratuity and gratuity between them. In the case of the down payment in the E-Court system, the E-Skum feature has been embedded. In the case of case registration, registered users will immediately get SKUM generated electronically by the E-Court application. In the generate process, it will be calculated based on any Cost Component that has been determined and configured by the Court, and the Radius Fee amount is also determined by the Chief of Court so that the estimated down-payment costs have been calculated in such a way as to produce electronic SKUM or e-SKUM. Of course this will make it easier for the supervisory team to control the transactions that appear in the management of the case. So that the potential for corruption in court that is identical to the manual system will be overcome by the E-Court system.

2.   Improving Management of Court Bureaucracy Services.

Basically the formulation of definitions or definitions of case bureaucratic service reform as explained earlier, characterizes the purpose of reforming bureaucratic service cases, who will or will be achieved. So if experts who have defined case bureaucratic service reforms differ, it can be assumed that the objectives to be achieved from the reform of bureaucratic service cases in each expert are also different. So it can be concluded that the objectives of the case bureaucratic service reform from these experts are as narrow as what they have defined and match the subjectivity of their interpretations.

In this case there are a number of things which are the objectives of the urgency of case bureaucratic service reform namely, First Order Improvement: Order or order is an inherent virtue in government. If what is intended to be addressed is the improvement of the order, inevitably the reform must be oriented towards structuring procedures and controls. Much needed by administrators in this new era is to confront agents of reform. As a logical consequence, a strong and strong bureaucracy needs to be built immediately[11]. The type of reform carried out by improving order is called procedural reform (procedural reform), both methods are improved: Enhanced is done in technical and work methods. These new techniques and methods can be said to be useful if you can achieve broader goals. If the purpose of case bureaucratic service reform is articulated to be translated well and effectively into various concrete action programs, improving the method will improve program implementation, which in turn will increase the realization of the achievement of goals. This type of reform is done by improving methods called technical reform (technical reform). Improved performance: Improved performance is more nuanced intentionally in the substance of the work program than in increasing the regularity and improvement of administrative technical methods. The main focus is on shifting from form to substance, shifting from efficiency and economy to work effectiveness, shifting from bureaucratic skills to public welfare. Typing reforms carried out with improved performance is referred to as program reform (program reform)

Reforming case bureaucracy services or reforming bureaucratic service cases that are closely related to Justice will emerge, one of which is the ease in court case bureaucratic service services, and in this case access to formal and substantive justice is not debated, but both can complement each other[12]. The substantive concept will seek additional access to formal legal processes with more comprehensive steps with the aim that the legal system is more responsive to the needs of state law. Included in these steps are substantive legal reforms and forming alternative dispute resolution [9]. the law will be respected insofar as the law is interpreted and applied according to the context of justice as can be accepted by the people. one of the fundamental principles and principles derived from efforts to uphold the supremacy of justice, is the enforcement of the rule of law principle. Conceptually the character of rule of law in Santoso's view, is to be the following, the rule of law (the supremacy of law), ie every State action must be based on the law and not based on discretion (unilateral action in accordance with the power it has), certainty of rules (legal certainity), namely legal certainty on the side closely related to the one above, also requires collateral that a problem is clearly regulated, firm and not duplicative, and contrary to other legislation, responsive rules (mandatory rules can absorb broad people's aspirations and able to accommodate the needs of the community and not designed for the benefit of a handful of elites), law enforcers who are consistent and non-discriminatory towards society the existence of judicial independence (judicial independence becomes an important condition in realizing rule of law because the key to law enforcement lies in the effectiveness of the judiciary).

The four characters of the rule of law above can be functionalized through a judicial system that is transparent, accountable and authoritative. Meanwhile, the judicial system certainly must be supported by a good judicial administration system. Because basically the good and bad of a judicial case bureaucratic service system is very influential on the implementation of the rule of law. There are opinions that say that the weaknesses / gaps that exist in the court bureaucracy service system will be a trigger for creating the practice of Judicial Corruption.

It is very useful to realize people's sovereignty in all joints of the life of society, nation and state through the expansion and improvement of people's political participation in an orderly manner to create national stability [13]. J.S. Edralin believes that neat management means the word dilemma used to replace the term government, which provides the use of political, economic, and bureaucratic problems, internal problems in managing state dilemmas, this term specifically explains changes in the role of government from the possibility of providers or facilitators, and changes ownership originating from the property of the state. the main emphasis of governance is to improve performance or quality restoration[14]. Whereas in the view of Bintoro Tjokromidjojo, in the Indonesian context, the most important agenda for managing the public sector is hygienic governance. Clean government plans include: first, eradicating corruption, collusion, cronyism and nepotism or Indonesian term known as (KKN), second, disciplinary rules and the elimination of public funds outside the budget, thirdly, strengthening the supervisory function. Bintoro's view is related to the use of a judicial system model in Indonesia Indonesia, the three mandatory plans are philosophical and juridical in producing laws that form an integrated justice system system. Sociological foundations that refer politically to J.S. Edralin.

The Supreme Court in the legal system in almost every country is the highest executor of the judicial power with the judicial functions and court supervision functions below. The Supreme Court's strong role in law enforcement is also seen in the following comments [15]:

> "Whatever is normal is the most important experience. You will find the weight and volume of responsibility. The most important growth experience is the growth of our country. It has opened up new vitas ... every day for resolution and many decision rules are designed for time others and conditions for statues are not always clear ... "

From 2005 to current use, the Supreme Court has carried out various events using achievements, including: (1) Bureaucratic Reform (RB) events that focus on organizational structuring, restoration of work procedures, development of human origins, improvement of remuneration and management systems technology support and problems; (2) the establishment of a special Judicial Reform Working Group (Pokja) to increase the speed of implementation of priority plans for judicial reform; (3) erosion of piles of cases; (4) efforts to improve the quality of judges and judicial apparatus, through the construction of education centers in Megamendung, West Java and curriculum reform and the development of teaching qualifications; (five) improving the system for recruiting prospective judges and restoring the selection of court coordinators; (6) encourage openness of problems; and (7) strengthen the internal supervision system and strengthen its correlation with the KOMISI YUDISIAL (KY). The Supreme Court's decision played a very central role in law enforcement and development, as stated by Mochtar Kusumaatmadja, that:

> "At the implementation stage, these principles are determined by court decisions. Here the Supreme Court's decision as the highest court body has their own meaning and position. Because they are guidelines or guidelines for lower courts, it is important that the Supreme Court is a good decision and is not blameworthy, the Supreme Court's decision must be truly solid and not confusing "[16].

The decision of the Supreme Court which has the position and function of legal services and strategic justice must be made by the Chief Judge who is competent in his field and has good ethics and integrity. In other words, the actor who produces the highest court decision is a wise, smart, intelligent person both intellectually, emotionally and spiritually. As Jimly Asshiddiqie said. If the judge is smart and smart, then the quality of the decision reflects the power of logic. If the judge is honest, then the decision is to reflect honesty that currently feels very rare in our morality. Thus, the judicial process in our homeland is very [17] dependent on the judge. This explains that the law in our country has not been institutionalized rationally, objectively, and impersonally. Law and various legal problems are still strongly influenced by various perceptions of irrationality and patterns of subjective behavior of the legal subjects of individuals involved in. Indeed, in the case of unfair decisions, it is not true that it must be spilled as a mistake on certain individuals or groups of people, but must be seen as a lack of interest, lack of attention and lack of knowledge about the judicial process itself.

However, in response to the controversy, the court must maintain objectivity, impartiality, independence and make decisions. The court does not have to obey the will, let alone pressure, from the responsible party. The court does not always have to give a claim submitted by a litigant, if according to the law or according to the judge's conviction that the claim is indeed acceptable, because it is considered not based on law or contrary to justice. As good as the court can not immediately reject the claim submitted, even though the request is based on law and justice. The court made a decision not to submit to the pressure of party litigation, both physical and psychological pressure, including pressure from third parties or the pressure of opinion made by the mass media. Ethics, integrity, morality, objectivity of judges determine the quality of decisions handed down by judges [18]. Indeed, to realize this is not easy, in fact it is very difficult, but it must remain a commitment of the judge to realize the principle that the judge has the freedom and independence to carry out his judicial role.

A sense of injustice and dissatisfaction from justice seekers can also go away during the judicial process. The judicial process can cause a person to be found guilty, because the trial only saw what the defendant had done without considering or what conditions prompted the crime to bring the court to the conclusion that the defendant was helpless not to bring out the defendant's actions or actions into self-defense . the simplifying behavior of facts in the trial process has brought injustice to court decisions. Whereas the judges must be better able to consider information problems as a result of where fair judgments will be born [19]. The accuracy of the judge in seeing, digging, and analyzing the news and evidence of the trial will determine the judge's understanding comprehensively about the case that will determine the quality of the decision. from the law, the judge is obliged to explore, follow and know the legal values and sense of justice that lives in them. Therefore in addition to the need for a system to correct court decisions, oversight mechanisms for judges are also needed as a form of good judicial management.

Improving the quality of the concept of bureaucratic service cases is categorized by 5 tools for measuring bureaucratic case service reform (increase). Five measuring devices are [20]. a) New emphasis on the program, b) Changes in the attitudes and behavior of the community and members of the bureaucracy, c) Changes in leadership styles that lead to open communication and participatory management, d) More efficient use of resources and, e) Reduction in the use of legalistic approaches. The five measurement criteria can be used as a reflective guide to the success of efforts to improve bureaucratic case services[21]. according to the measurement, conclusions will be made about the factors that become obstacles to the implementation of improved bureaucratic case services. not a few factors influence the success of the case bureaucratic service reform comprehensively. In theory, the success of bureaucratic service case reforms is highly dependent on (1) the support and commitment of political leaders; (2) the presence of a reform agent (core); (3) the existence of a safe socio-economic and political environment; and (4) the right time. using four influential factors, the evolving arts of management using the nature and scope of administrative reform must be designed through harmonious cooperation between political leaders and reformers, where they both must pay attention to the environment.

4. CONCLUSIONS

E-Court effectiveness refers to people's trust in using the system. Surely what the community has been waiting for is a system that can serve with the ability to simplify bureaucratic services which was originally a manual system, where the system can guarantee certainty, transparency and provide good efficiency from time segmentation. The issue of low public trust and the independence of the court is at an alarming point, the reality requires a bureaucratic reform at the Supreme Court where bureaucratic service reform is a package that must be present in this effort. Corruption in bureaucratic service is one of the scourges that lowers the level of public trust in the judiciary, because the potential for meetings between justice seekers and bureaucratic apparatus is wide open so as to create the potential for corruption is also greater. The E-court system seeks to resolve the potential for corruption by using the principle of a fast, simple and low cost court, the E-Court system makes the stakeholders in the court do not need to meet in person to handle cases such as meeting with advocates, here the E-Court system tries break the chain of bribery with e-filling and related to payment of the E-Curt system also try to break the chain of gratification with e-payment so that there is no form of service that is a manual for justice seekers either advocates or the public will automatically get the SKUM in order to facilitate the control process is related to the implementation of the E-Court system in an effort to reform the bureaucracy. By providing the E-Court system, it has actually been able to realize the strengthening of the latest technology-based bureaucratic service program, change the attitudes and behavior of the people and bureaucratic members in knowing the correlation of professionalism, changes in leadership style that leads to open communication and participatory management in which each correlation and services can be monitored privately by superiors including litigation transactions, the use of more efficient origin of power and, reducing the use of a legalistic approach. This had automatically led to the E-Court as a system that could correct the shortcomings of the previous manual system.

5. ACKNOWLEDGEMENT

In order to increase the sense of trust in the court institution by using the E-Court system, the Court As the system operator and the Supreme Court as a supervisor, must cooperate with other institutions in order to obtain evaluation and monitoring material related to the effectiveness of the E-Court system. In this case the Supreme Court as the supervisor of the E-Court system must publish together the effectiveness of the E-Court system with other state institutions such as the Police, Corruption Eradication Commission, the Supreme Audit Board and others, so that recognition of the effectiveness of the E-Court system is not are one-sided so that there is a continuing role between existing state institutions.

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THE IMPACT OF SERVICE QUALITY ON CUSTOMER SATISFACTION OF ALTERNATIVE TAXI

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ABSTRACT

Taxis are one of the most widespread modes of public transportation in Malaysia as a purpose of convenient travelling which also saves time in comparison to other forms of public transportation. Nevertheless, complications also arise from the use of taxi; in the past few years, the utility of smart phones and electronic gadgets have excelled. The innovation of E-hailing has been introduced to taxi industries and it was shown to be expedient in Malaysia. Speculatively, this research aims to determine the impact of service quality (safety, driver's manners, convenience, reliability, responsiveness) on the customer satisfaction of alternative taxi. The data was obtained from conductive questionnaires completed by 359 individuals who have experienced the service of E-hailing of alternative taxi in Shah Alam, Selangor, Malaysia. The study showed that the most important factors that people always concern while choosing taxi are safety, driver's manners, and convenience. Conclusively, corporates of business, development and marketing are able to improve the efficiency of consumers' need, increase number of customers and propel their commercial into this industry with marketing strategies to acquire customer satisfaction.

Keywords: Customer satisfaction, Service Quality, Alternative Taxi

1. INTRODUCTION

Mobility is a prominent necessity for every individual and in this modern society, there is a high demand for transport services especially private vehicles. Provision of public transportation services by government bodies and private corporates to the citizens is to attain the needs of public with accessibility and affordability of transport utility (Tran and Kleiner, 2005). In various countries, the responsibility of government and private bodies are apportioned by taxi services. Taxi transport is any type of mode of transportation that is accessible to the public despite of ownership White (2002). In another research conducted by Tran and Kleiner (2005), taxi is discerned as the purpose of providing special or general services of transportation to the public without considering the services of chartered transportation but services of scheduled transportation. The taxi industry has experienced prodigious changes in recent years especially in Malaysia. As of today, transportation services regulating around mobile applications have emerged and there is an increased demand on ride services such as Uber, Grab, EzCab, Jom Rides, Jom Taxi, MULA, MyCar, PICKnGO, Lady pink and Diffride. These emerging services have improved the taxi industry in Malay but competition among local taxi industry and public transportation also rises. Modern consumers are attentive; they emphasize on high quality inclusive high professionality in transportation services. Uber Technologies Inc. and Grab Malaysia have predominantly thrived the e-hailing industry in Malaysia in January 2014 (Ee, 2014). The launching of Uber began in Malaysia in January 2014 while GrabCar in May 2014 (Chi, 2014). The operation of these two companies commenced into the market of Malaysia for approximately less than five years and they managed to attain more than 10 million subscribers and users (Similar Web LTD, 2017). The development of this industry is prominent and moreover, the reorganization from Land Public Transport Commission (SPAD) is obtained by the adulation of this service as soon as legalized public service vehicle is subjected to an intermediation business license regardless of determined opposition by taxi drivers (Nik Imran Abdullah, 2017). Services of public transportation are suggested to ensure effective service quality through maintaining disciplinary of regulating schedules, safety and expedition. Public transport services are advised to have availability and accessibility for all individuals especially catered to the vulnerable, physically and mentally challenged groups (Dridi, Mesghouni and Borne, 2005). There is an increment in demand of private cars due to Malaysia's high vehicle utility rate, traffic congestions, inadequacy of parking and ineffective public transport infrastructure. An online survey on General Perception of Taxi Service in Malaysia was conducted by SPAD with more than 28000 participations of respondents; results presented that taxi drivers tend to overcharge, neglect the use of meters, poor customer

service, cleanliness and uncomfortable setting (Ibrahim, 2015).

A comparison was conducted between service quality of Uber and Grabtaxi (Geno, 2015); the results presented that Grabtax exceeds the performance of Uber in various aspects especially in customer service. Uber constantly faces issues pertaining to GPS which skews the precise location of passenger. Customers still show dissatisfaction with this mistake by countless reports that were issued to the center even though Uber alleviated this matter with refunds. In the aspects of cost, Grabtaxi perpetuates higher rates compared to Uber but due to surfeited demand, surge rate multiplier was implemented and thus, the price of Uber escalated being one of the most discussed complaints from users. However, both services are still the preferable choices compared to traditional public transport services.

Service quality is a prominent factor that corroborates to customer satisfaction (Hohanson, 1995). Past researches on public transportation has been emphasizing upon customers' perception on service quality (Govender, 2014 and Randheer et.al, 2011) with inadequate focus on service quality affecting customer satisfaction. The paper evaluates the effects of service quality on customer satisfaction of alternative taxi by utilizing the SERVQUAL model. Therefore, this research will assist existing companies and potentially rising companies to determine the impact of service quality upon customer satisfaction of alternative taxi to establish new strategies of business and to cater to customer needs. The research will begin from identification of current customer profiles and perceiving their behavior and choice criteria by constructing specific research questions.

1.1   Problem Statement

In this age, unfortunate incidents pertaining to alternative taxi services upon customers are highly probable. Consumers are utilized with various types of public transport and yet, they are forced to use alternative taxi for proper mobility because of time constraint and expeditious needs. Despite the presence of alternative taxi services to improve customers' life, there is still a rise of complications and complaints from customers regarding their services (Worapong Archarworanit, 2016). This is due to many drivers who neglect the proper guidelines that were set by their management. This research is conducted to analyze the impact of service quality on customer satisfaction of alternative taxi. Alternative taxi holds the fastest mobility on route in comparison to other public transport. Nevertheless, customers consume time before choosing an alternative taxi because of unexpected incidents that occur revolving around their services. This region of Malaysia has everything it needs to develop a customer satisfaction driven taxi services-friendly people, safety and a current major infrastructure development project. In term of technology and cultural heritage it offers the best of both worlds, but if it is to succeed then all the pieces need to be in place. This study discusses the service quality factors for measuring customer satisfaction that affect the alternative taxi services in this area. It examines and explores the service quality factors that will affect customer satisfaction for causing greater productivity and higher performance of this industry.

In the literature, there are ranges of sources addressing the factors to evaluate customer satisfaction on the transportation industry. Based on recent times, the research in Malaysia's Selangor State is inadequate. The present study is aimed at filling that gap in the body of literature. Additionally, a research like this is essential to assess and improve service delivery and design, because it will provide management with data that they can use in making inferences about the customers (Wilson et al., 2008). Thus the results of this study should be proved useful for academics; business in the field of marketing and management researchers of customer satisfaction and service quality especially in service sector organizations. The researchers plan to study the impact of service quality on customer satisfaction of alternative taxi in Shah Alam City in the province of Selangor, Malaysia.

2   LITERATURE REVIEW

Customer satisfaction is a comprehensive attitude of customer towards a service provider or an emotional reciprocation to the difference between customers' anticipation and experience pertaining to the fulfillment of needs, goals or desires (Hensenark and Albinson, 2004). This is the foundation based on formation of favorable and unfavorable perceptions regarding firms' offerings. Successful business thrives from the foundation of satisfied customers because customer satisfaction constructs high purchase, loyalty and positive hearsays (Angelova and Zekiri, 2011). Businesses that thrive for success therefore establish investments in development and implementation of programs that aims in attaining customer satisfaction.

Satisfaction relies on various factors and the literatures on this matter are scarce. Generating the factors affecting customer satisfaction requires certain research studies to be conducted in this field. Researches showed that customers desire the best of service quality and responses to their needs (Zheng and Jiaqing, 2007).   There are various factors influencing customer satisfaction including friendliness of employees, courteous employees, knowledge of employees, availability of assistance, accuracy of billing, billing period, competitive pricing, service quality, good value, billing clarity and instant services (Hokanson, 1995). The impact of service quality upon customer satisfaction especially, emphasizing on service offering, is prominent and deserves to be acknowledged by providers. Service quality variables of interest to public transport services should be the top priorities emphasized by providers.

Nature of service is difficult to be discerned and determined the process to evaluate consumer perception of service quality is complex (Kotler, et al 2007). However, the constructed service quality model, SERVQUAL by Parasuraman et al (1985, 1988) has been a consistent utility of reference by marketing practitioners. The model is according the analysis of perception gap between the perceived service quality and the expected service quality. The model proposed 10 dimensions of service quality: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, perceiving consumer and tangibility. These dimensions were later reduced to five: reliability, responsiveness, empathy, assurances and tangibility (Ravichandran et al 2010).

Past literatures have showed that behavior of personnel especially bus drivers, frequency of services, reliability of services and time are the most critical factors influencing customer satisfaction (Rabiul et al, 2014). Customer satisfaction can be attained from practiced friendliness behavior of bus driver by improving communication skills and acknowledgement of customers' needs (Disney, 1998). Service frequency, reliability, convenience and responsiveness are variables of service quality that are accounted as significance in customer satisfaction (Cavana and Corbett, 2007; Taylor et al, 2008).   Based on a research conducted upon customer satisfaction of minicab taxi service in Cape Coast, reliability, safety, comfort affordability, driver behavior and continuous service were evaluated as variables to discern the relationship with customer satisfaction by using Pearson correlation (Gana Horsu & Yeboah, 2015). The results presented that all six variables show significance with customer satisfaction.   Previous studies also have showed that the five service quality dimensions (tangibility, reliability, responsiveness, assurance and empathy) have significant positively influence customer satisfaction Khurshid et al. (2012), Mudenda and Guga (2017), Khuong and Dai (2016), Khairani and Hati, 2017). Thus, the following study will filled the gap by further investigating the impact of the five service quality dimensions (safety, driver manners, convenience, reliability and responsiveness toward customer satisfaction particularly in e-hailing services in Shah Alam. Thus, the following hypotheses were developed accordingly:

H1: Safety has an influence on Customer satisfaction of Alternative Taxi
H2: Driver's manners has an influence on Customer satisfaction of Alternative Taxi
H3: Convenience has an influence on Customer satisfaction of Alternative Taxi
H4: Reliability has an influence on Customer satisfaction of Alternative Taxi
H5: Responsiveness has an influence on Customer satisfaction of Alternative Taxi

2.1 Conceptual Framework

From the empirical and theoretical literature discussed, the conceptualization of the study will be driven by five key dimensional variables on service quality on customer satisfaction of alternative taxi in Shah Alam, Selangor.

Figure 1: Conceptual framework
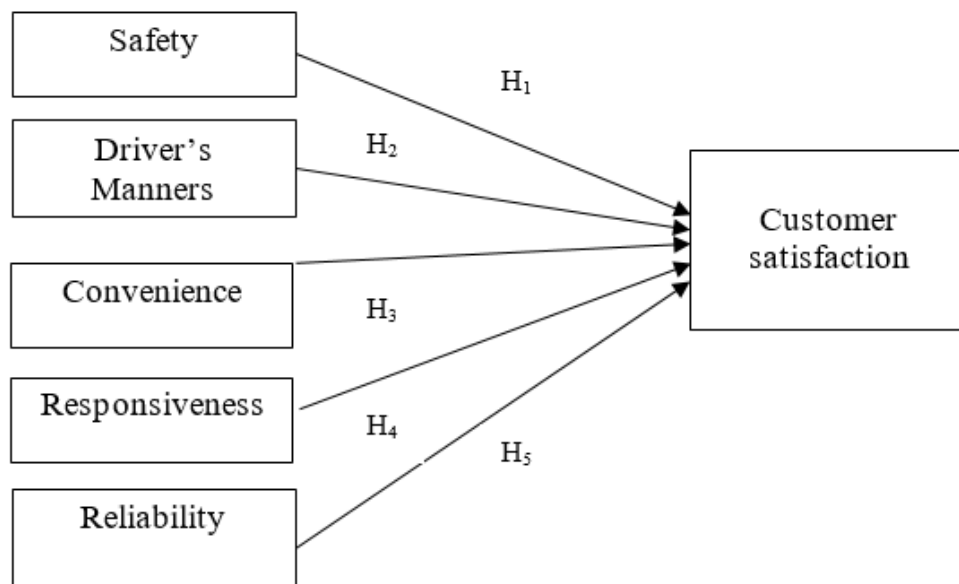
3 RESEARCH METHODOLOGY

A cross-sectional study was conducted in Shah Alam, Malaysia between November and December of the year 2017. Area sampling, which also known as geographical sampling was used by first identifying terminals within the city and randomly selected terminals were included in the sample. Accordingly, seven taxi terminals were identified and data were randomly collected from four terminals. Passengers were intercepted at the terminals while waiting to board taxi to their destinations. In total, a sample of 359 passengers was selected from the four selected taxi terminals. The questionnaire was developed based on information identified on service quality model with few modifications to fit the nature of alternative taxi operations of the city. The questionnaires were pretested on a pilot group of 30 passengers in order to prevent errors, including lengthy questions, ambiguities, and poorly framed sentences. Data collection was carried out using an adaptation of the Structured Questionnaire developed by Parasuraman, Zeithaml and Berry (1985). The questionnaire was adapted to suit the needs of the current study Kiran & Saptarshi (2017).

The reliability test was conducted to ensure that each of the scales employed are being assessed to establish the internal consistency of the present study. This system is a widely used measure of scale reliability a high level of reliability (Peterson, 1994). Cronbach"s alpha for the scales are presented in Table 1.

Table 1: Reliability Analysis for Each Construct

Constructs	Cronbach's Alpha (N= 30)
Safety	0.752
Driver's Manners	0.814
Convenience	0.865
Reliability	0.807
Responsiveness	0.784
Customer Satisfaction	0.746

The values indicate a high level of reliability. Content validity was also achieved by adequately covering all the content area. Survey method was used in collecting primary data at the selected terminals from commuters who normally travel on alternative taxi services. The data gathered were analyzed using descriptive statistics, Pearson's correlation and multiple regression analysis. The analysis was carried out with SPSS latest version. Cronbach's alpha for the scales are presented in Table 1.

4. DATA ANALYSIS AND FINDINGS

4.1 Descriptive Analysis

Table 2, shows the demographic characteristics of respondents. The female respondents were 199 (55.4%) and the male counterpart were 160 (44.6%) of the total sample size.

Table 2: Demographic Profiles of Respondents

Demographic Profiles	Frequency	Percentage (%)
Gender		
Male	160	44.6
Female	199	55.4
Age		
Below 20	76	21.2
21 - 30	152	42.3
31 - 40	81	22.6
Above 41	50	13.9
Employment Status		
Unemployed	19	5.3
Private sector	87	24.2
Public sector	88	24.5
Student	165	45.9

Most of the respondents 152 (42.3%) fell within the ages of 21-30, 81(22.6%) fells within the ages of 31-40 and 76 (21.2%) and 50 (13.9%) fells within the ages of below 20 and above 41 respectively. Majority of the respondents 165 (45.9%), are students, followed by work in the public sector 88(24.5%), 87 (24.2%) working in the private sector. Only 19 (5.3%) respondents are either self-employed or unemployed.

4.2 Pearson Correlation Analysis

Further testing was conducted to determine the correlation coefficient to measure the strength of the linear relationship between safety, driver manners, convenience, reliability, responsiveness and customer satisfaction towards alternative taxi services in Shah Alam. Table 3 summarizes the Pearson Product-Moment Correlation Coefficients Test that shows all the independent variables have positive correlation with the dependent variable.

Table 3: Correlation between Customer Satisfaction and independent variables

	Variables	1	2	3	4	5	6
1	Safety	1					
2	Driver's manners	0.639**	1				
3	Convenience	0.702**	0.793**	1			
4	Reliability	0.673**	0.571**	0.657**	1		
5	Responsiveness	0.624**	0.735**	0.745**	0.701	1	
6	Customer Satisfaction	0.698**	0.551**	0.628**	0.657**	0.580**	1

**. Correlation is significant at the 0.01 level (2-tailed)

There was a high correlation between safety (r=0.698), reliability (r =0.657), convenience (r=0.628) with customer satisfaction, meanwhile driver manners (r =0.551), responsiveness(r=0.580) have a moderate correlation with customer satisfaction.

4.3 Regression Analysis

Multiple regression is also conducted to determine the overall fit of the model and the contribution of each independent variable to the total variance explained. Model summary as reflected in Table 4 is used to determine how well a regression model fits the data.

Table 4: Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	.588	.179		3.286	.001
Safety	.449	.065	.415	6.906	.000
Driver's manners	-.048	.061	-.052	-.756	.453
Convenience	.116	.028	.118	1.914	.050
Reliability	.294	.076	.283	3.934	.000
Responsiveness	.071	.073	.073	.958	.338
R2 =0.562	Adjusted R2=0.552		F value =70.796	Sig F = 0.000	

a. Dependent Variable: Customer Satisfaction

Based on the regression model above, it shows that the 56.2% (R Square = 0.562) of the observed variability in total customer satisfaction is explained by the total service quality variables. The result indicates that all the service quality items; safety, driver manners, convenience, reliability and responsiveness are good predictors of customer satisfaction of alternative taxi services.

The results indicate that the driver manners and responsiveness dimensions of service quality in this research were found to have less significant effect on customer satisfaction. This finding is in contrast with Tran and Kleiner, 2005, who found that drivers who are polite and friendly to the customers build up customers trust to use this kind of transportation. The remaining three dimensions (safety, convenience and reliability) proved to have significant effect on customer satisfaction and this is consistent with other researchers findings such as, Khurshid et al. (2012), Khuong and Dai (2016), Khairani and Hati, 2017) and Mudenda and Guga (2017). In other words, since the observed significance level is less than 0.05, it indicates that the mentioned service quality dimensions are good predictors of customer satisfaction of alternative taxi service offered by the case company. The remaining two dimensions (responsiveness and driver manners) proved to have moderate significant effect with customer satisfaction. The implication of this result is as follows:

Table 5 : Overall Results of Hypotheses

| Hypotheses	
H1: Safety has an influence on Customer satisfaction of Alternative Taxi	Accepted
H2: Safety has an influence on Customer satisfaction of Alternative Taxi	Rejected
H3: Safety has an influence on Customer satisfaction of Alternative Taxi	Accepted
H4: Safety has an influence on Customer satisfaction of Alternative Taxi	Accepted
H5: Safety has an influence on Customer satisfaction of Alternative Taxi	Accepted

5.0 CONCLUSIONS

In conclusion, based on the above findings, it shows that there is a positive relationship between service quality and customer satisfaction. Thus, in order to be competitive, it is crucial for the e-hailing companies to maintain high service quality standards to ensure customer satisfaction. Evidence from the findings indicated that safety, reliability and convenience significantly affect customer satisfaction, followed by responsiveness and driver manner moderately affect customer satisfaction.

The study documented that service quality is the dominant route to customer satisfaction therefore, it is imperative for e-hailing service providers operating in Shah Alam such as Uber, Grab, EzCab, Jom Rides, Jom Taxi, MULA, MyCar, PICKnGO, Lady pink and Diffride car to identify and improve customer services in order to capture a larger market share and successfully developed their brand name and be the top provider in the industry.

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READINESS LEVEL OF FACILITIES MANAGEMENT COMPANY IN PROVIDING FACILITIES ON ACCORDANCE WITH THE MALAYSIAN SOCIETY FOR QUALITY IN HEALTH (MSQH)

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ABSTRACT

Issues with hospital's facilities sometimes ignore the patient safety at risk. Several times in 2015, the safety of hospital patients was compromised or nearly compromised because of building or maintenance problems. The Malaysian Society for Quality in Health (MSQH) is working actively in participation with healthcare professionals to ensure safety and continuous quality improvement in the services provided by healthcare facilities and services in the country. However, even in accredited healthcare organizations, patients were harmed by medical errors every day. This research is done to study the level of readiness of the hospital support service or the facilities service provider to fulfill the quality needs of a hospital. In the present study, the researcher has used a combination of interviews and surveys to obtain data. The research strategy is a mixed – method. Meanwhile, the research instrument used is semi – structured interviews, questionnaires. To supplement these findings the surveys were distributed to 117 staffs in the facility managing company in Penang. One hundred and twelve (112 – main survey) usable questionnaires were received back. The questionnaires were analyzed statistically using the SPSS software version 24.0 and achieved a 95.7% response rate. For the interview, four (4) expert people were chosen to answer the questions and the answers were analysed using content analysis.. The output shows the readiness level of the facilities service staff in providing services in accordance with the standard was medium in the hospital; however, there are few areas for improvement detected.

Keywords: readiness level, hospital support service, MSQH, facilities management company

1. INTRODUCTION

Hospital and healthcare services are a synonym to each other as both are vital components for human society. Both services are not the only top priority for patients but also for the staff and the general public. The services have attracted great interest from various bodies, including government, NGO in healthcare and social welfare, professional organization representing doctors and patients as well as shareholders of healthcare provided companies. The demand for healthcare service's quality has increased drastically due to various market forces such as insurance, medical tourism, and corporate growth. This resulted in a very high expectation from the consumer for the best quality which, directly, leads to the introduction of national and international accreditation bodies to act as quality assurance mechanisms (Jason, 2011). However, the accreditation scheme is totally different from government initiatives that focus to access healthcare providers with governmental objectives in mind (Handayani, 2015).

Accreditation systems first to develop to improve the quality of hospital care. In the industrial and service sector, quality has become predominant key to gain the highest possible return on investments (ROI) as well as a reduction in cost (Anderson and Zeithaml 1984; Parasuraman et al., 1985). Service organizations are well informed about the fact that they need to take preventive quality measures in order to gain customer satisfaction and retention (Spreng & Mackoy, 1996; Reichheld & Sasser, 1990). Accreditation structure is starting to develop in order to address the quality in this mixed sector especially when the healthcare system is moving forward to an immense emphasis on primary and home care. Quality assurance approaches are frequently assisted by using external peer review processes which help to check the administrative and management in place just like in many other healthcare systems. When this approach is based upon standards and leads to a score which suggests a degree of compliance with those standards, it is often referred to as accreditation.

MSQH's accreditation is needed as it is a tool to prove that the hospital not only performs evidence-based practices but also give vitality to access, affordability, efficiency, quality, and effectiveness of healthcare. However, many regulations made by the government are not followed in most states resulted in healthcare's quality poor and unattended. Since accreditation is non-mandatory, it questions the medical regulations provided by the government both at the federal and state level (Lim, 2012). This is essential for them as they bring the image of the government and states. Therefore, this research is done to determine their readiness to apply for accreditation.

The aim of this research is to study the readiness level of the hospital support service which is the facilities service provider to fulfill the quality needs of a hospital. To achieve the aim, one (1) objectives are developed which are to study the facility service requirements according to hospital standards in Malaysia.

2. PROBLEM STATEMENT

Patients are putting their trust in healthcare professionals to do and to give the best to them when they are admitted to the hospital. Accredited healthcare systems will demonstrate to the public that they are able to have a set of standards along with maintaining compliance that provides the public at very least, some reassurance of quality and patient safety standards are being met. However, patients are getting harmed by medical errors every day even in accredited healthcare professionals (Nizam, 2013).

MSQH currently become the national voice regarding of continuous quality improvement in healthcare facilities and services. This feat was achieved through active and smart partnerships with healthcare professionals, relevant facilities and agencies, and educational institutions that were involved in healthcare. MSQH had developed standards, accreditation program's plan, and implementation, promote safety and quality improvement in healthcare facilities, organizing opportunities for communication, and experiences exchange on current and best practices in healthcare in order to achieve the vision. Since 2014, MSQH had initiated the Patient for Patient Safety Movement to strengthen patients and family engagement in the delivery of healthcare services (MSQH, 2017).

The reason we need accreditation these days because of medical care used to be simple, ineffective and safe, but nowadays, it is complex, effective and potentially dangerous (Chantler, 2011). A couple of time in 2015, the safety of patients in the hospital were compromised or nearly compromised because of building or maintenance problems (Becker, 2016). Meanwhile, having a small amount of bedding for patients will not only be a burden to the society but also be the cause of negligence on safety aspects leading from the congested traffic in hospitals (Abdullah, 2017).

Institute of Medicine's Report had been released 15 years ago and since then, there have been multidisciplinary interventions and system reform to prevent patient harm and preventable harm in the hospitals was still substantial (Leape, 2015). Therefore, any shortfall in meeting service standards of the basic facilities is a great concern since a low quality of services could adversely affect patients' health in hospitals (Chew et al., 2007). However, the readiness of the facilities service provider remains unclear whether the service they provide in accordance with the MSQH's standard.

3. RESEARCH METHODOLOGY

3.1 Sample and Data Collection

The research employed a combination of interviews and survey methods. One hundred and twelve respondents (112) from two strata namely management personnel and ground personnel in the facilities management organization of Penang General Hospital were identified to take part in this quantitative survey. By using the SPSS software version 24.0, a very high response rate was achieved of 95.7%. For the semi-structured interview, the researcher chooses four (4) professional expert who was directly involved with the management of facilities to answer the questions. The main objective of the semi-structured interview is to provide a more rational description of the problem in the study as well as to ensure the validity of the question developed according to the planned concept.

4. DATA ANALYSIS AND DISCUSSION

4.1 Mean Score in SPSS

Facility Service Company Readiness According to Hospital Standards in Malaysia (Management).

Table 1: Mean Score for Driver (Process)

Descriptive Statistics	N	Mean
High	112	2.73
Medium	112	2.54
Low	112	2.50
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

Table 2: Mean Score for Driver (Technology)

Descriptive Statistics	N	Mean
High	112	2.62
Medium	112	2.54
Low	112	2.50
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

Table 3: Mean Score for Driver (Management)

Descriptive Statistics	N	Mean
High	112	2.66
Medium	112	2.59
Low	112	2.54
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

Table 4: Mean Score for Driver (People)

Descriptive Statistics	N	Mean
High	112	2.68
Medium	112	2.59
Low	112	2.55
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

Facility Service Company Readiness According to Hospital Standards in Malaysia (Operational).

Table 5: Mean Score for Driver (Process)

Descriptive Statistics	N	Mean
High	112	2.84
Medium	112	2.76
Low	112	2.64
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

Table 6: Mean Score for Driver (Technology)

Descriptive Statistics	N	Mean
High	112	2.72
Medium	112	2.64
Low	112	2.59
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

Table 7: Mean Score for Driver (Management)

Descriptive Statistics	N	Mean
High	112	2.63
Medium	112	2.60
Low	112	2.56
The Scale: 1 (Strongly Agree) 2 (Agree) 3 (Disagree) 4 (Strongly Disagree)		

From tables above, it is shows that the readiness level of facilities management company in providing facilities on accordance with the national standards of healthcare were divided into two (2) categories: management side and operational side. Additionally, both categories have further sub – categories which are: process (how the transition of the standard occurs for both side), technology (how the company existing technologies to cope with the standard), management (how the company's management handle the transition of the standard for both side) and people (how the upper and lower staff's abilities to cope with the transition of the standard). From the questionnaire results, three (3) mean score varied from the highest, medium and lowest were taken.

In process side, both parties have the same mean score question for the highest points which is the company has set up a campaign about providing standard facilities. This show the company has provide an intensive effort of providing standard facilities campaign. This will brings a positive impact for both parties to succeed. However, the lowest mean score also shared a same points for both parties which is the way the company adaption process runs smoothly or not. The transition process were going good but certain teething problems still occurs due to newer and complex process. This will impact both in the short term, however, they will benefited in the future. The researcher recommend the management and operational side unite in order to strengthen the whole process.

Next, in technology side, both management and operational scored a high mean score of 2.62 and 2.72, respectively. They are agree that MSQH standard did provide technology standard on par with the global standard. This is a great news as it is necessary we are parallel to the global if we want moving forward as well as benefit us in the future. The researcher would suggest they continue and keep improve if we want a success result in implementing the standard. Meanwhile, both parties also scored lowest points on the same question regarding of adaptation of technology without any problems. As the researcher mention above, both parties still struggling to adapt without having a couple of small problems here and there. The researcher hope they will going through with improvement (training, workshop and consultancy from expert) from both side in order to overcome this matters.

In the third category, the highest median score for both is the company encourage to get the job done according to healthcare standard. This result shows a great supportive form the board of company to the lower sides in ways to do the jobs by follow the specific requirements of standard healthcare. By continued this trend, the job process will run smoothly and thus, speed up the whole implementation process. However, they also shared another lowest score of record of hospital consumer's complaint. This complaint are necessary to detect any parts that lack to be cover. Both said that they sometimes missed to record complaints. If the complaints are not record and solve, it will affect the whole implementation process as well as show the management and operational lack of credibility. The researcher would recommend to increase the awareness as all the complaints are good to build and have a success future.

For the last sub - category, both parties post a very high mean score which they agreed that the staffs are doing the maintenance job such Plan Preventive Maintenance (PPM) according to schedule. This shows that the company were handled both management and staffs very well in term of job scheduling as it is essential to work together and achieved perfect synchronize to aim great efficiency. The researcher tend to agree as it is one of the main component to achieve the high level of readiness for the FM company to implement the national healthcare standard and suggesting to continue the existing training/workshop as well as eliminate any small fraction of problems. Meanwhile, the lowest score featured a same problem as the management sub – category which the maintenance record and access to it. The problem occurs for both parties due to manual use of recording as well as lack of self-awareness. Record by hands on paper prove to be outdated as it is easy to lose the records in a disordered heap of paper stack and cost of our valuable time to find it. The researcher suggest the company to introduce a better and modern digital technology inarguably creates better compiling of record and easy to access it. The company should provide or send the staffs for training as it can help to improve their attitude.

4.2 Result in Interviews

Table 9: Interview Candidates

Interviewees	Position
Candidate A	Facilities Engineering Maintenance Services Head of Department
Candidate B	Electrical Engineer
Candidate C	Civil Engineer
Candidate D	Mechanical Engineer

The first construct of the objective is a driver to the national healthcare standard which is the exposure to the standard and standard activities. Based on interviewees, there is no need for them to be exposed as the hospital themselves are not serious about the accreditation. The reason is, based on previous failed attempt to obtain the accreditation, the requirements of the certain condition makes the case was closed in the higher management site. "Exposure can be done to the ground-level employees, but not directly. Because of their different levels of job scope and acceptance, we can only make an indirect exposure" they added. For instance, there are proper guidelines and Standard Operating Procedure (SOP) for every single job. From this, we can conclude that they already met the standard requirement, even without direct exposure to the ground level staff.

5. CONCLUSION

In conclusion, the objective regarding the readiness level has been discussed in detail for this study. From literature review and readings, we found that there is only one standard and the standard is also accreditation for Malaysian healthcare standard namely the Malaysian Society for Quality in Health (MSQH). This conclusion can be concluded from the mean score analysis that has been analyzed through questionnaires from the respondents of the facilities management company. The result shows a mean score for the objective was at a high level but there were some items that were at a moderate level. The researcher thinks the whole company including the management and operational will be fully ready to implement the national healthcare standard (MSQH) once structural and non-structural renovations are done and proper documentation and safety training programs are developed further. However, the overall readiness level of the facilities service staff in providing services in accordance with the standard was medium; but, there are few areas for improvement detected.

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THE EFFECT OF TAX AVOIDANCE AND GOOD CORPORATE GOVERNANCE TO COST OF DEBT WITH GROWTH OPPORTUNITY AS MODERATING
(Empirical Study on Manufacturing Company and Finance Service Listed in IDX)

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ABSTRACT

Principles of good corporate governance can strengthen the relationship between the effect of Tax Avoidance, the Board of Commissioners and Managerial Ownership of the Cost of Debt on manufacturing companies listed on the Indonesia Stock Exchange (IDX). The hypothesis in the study uses the Eviews tool, tested 3 models 1) approach before using partial moderating (2) approach before using simultaneous moderating (3) The moderating growth opportunity. Samples consist of purposive sampling model with multiple linear regression analysis methods. The data used is the company's financial statements for 2013-2017. Research was taken from 28 selected manufacturing companies listed on the Indonesia Stock Exchange (IDX) and found samples 140 financial statements. The results of observation were obtained partially by Tax Avoidance has a significant effect on the Cost of Debt, the Board of Commissioners has not a significant effect on the Cost of Debt, and Managerial Ownership has a significant effect on Cost of Debt. While simultaneously Tax Avoidance, Board of Commissioners, and Managerial Ownership influence the Cost of Debt. The moderating of growth opportunity strengthens the relationship between Good Corporate Governance and positive coefficient on the cost of debt, strengthened by the Leverage and Size control variables.

Keywords: Tax Avoidance, Independent Board of Commissioners, Managerial Ownership, Growth Opportunity, Leverage, Size, Cost of Debt.

1. INTRODUCTION

Ownership and management of the company is due to the existence of asymmetrical information between the two parties Jensen and Meckling (1976). The beneficiary is management (agent). Because you know more about the ins and outs of the company comparing with the shareholders (principal). The existence of asymmetrical information, it requires effective good corporate governance to reduce the occurrence of asymmetrical information by increasing supervision of management, to reduce liquidity risk borne by shareholders (Sugiyanto 2018).

Managing a company that is effective and efficient is associated with optimal profitability. To get it, companies are required to increase revenue and reduce the burden at a minimum level. One of the burdens of corporate governance is the tax burden.

Decisions are influenced by Good corporate governance for decision making by managers in determining the cost of equity and cost of debt so that company performance improves. In applying the principles of good corporate governance can reduce the negative or positive impact on the sustainability of the company in carrying out operations. First, by increasing supervision of management aimed at encouraging decision making: Second, preventing opportunistic actions in risk management that are not in accordance with company interests: Third, to reduce asymmetric information between management and shareholders.

Asymmetri information and the main contribution of the subject or object of an individual or entity tax, including payment of taxes, tax deductions, and tax collectors, who have tax rights and obligations in accordance with statutory regulations (Mardiasmo et al., 2011). In various efforts planned by company management to minimize tax burden aggressively, this is a phenomenon that is common throughout the country. Tax aggressiveness carried out by management to reduce the tax burden paid by the company (Lanis and Richardson, 2013). Tax aggressiveness that the government with taxpayers is very different from the view, that the company, by means of conducting tax aggressiveness aims to optimize and minimize the tax burden that does not violate regulations. This is with the government.

Brown (Janica Ekasanti Santoso, 2016: 143) can be interpreted that tax avoidance is a regulation of transactions in order to obtain profits, and contributions, or tax deductions in a way that is unintended by tax regulations. Tax savings while tax expense by dividing pre-tax profit.

2. LITERATURE REVIEW

AGENCY THEORY

Agency theory introduced by Jensen and Meckling (1976) in Sugiyanto and Etty (2018) arises when there is a contract between the manager (agent) and the owner (principal). A manager (agent) will know more about the condition of his company than the owner (principal). Management (agent) is obliged to provide information to the owner (principal). Managers as agents act in the interests of shareholders, Agency theory arises because it is assumed that managers act self interest (Sugiyanto and Etty 2018) define that agency relations as a contract where one or more principals use agents to carry out company activities. In the

The agency theory meant by Principals is shareholders, owners or investors. While the agent is the management that manages the property of the owner in the company. The essence of the agency relationship is the separation of management from company ownership, so that the owner of the company can get the maximum benefit possible with the most efficient costs possible with the management of the company by professional staff.

The implementation of the contract raises costs which are referred to as agency costs, namely costs incurred so that managers act in harmony with the objectives of the owner, such as making contracts or conducting supervision. Tax avoidance behavior is influenced by the existence of agency theory because there are differences in interests between the parties, one side of the manager wants an increase in compensation, shareholders want to reduce tax costs, creditors want the company to fulfill the debt contract and pay interest. In this theory it is explained that the problem between the principal and the agent arises because of the information asymmetry, this arises when a management has more information than a shareholder. The possibility of a manager reducing the information needed by a shareholder can harm the relevant shareholders.

The researcher argues that the existence of agency theory is that the cost of debt can be influenced by agency problems, where one side of management wants to minimize taxes, on the other hand shareholders want to emphasize tax costs through low profits. So in order to mediate the agency problem, tax avoidance and the cost of debt are used to optimize their interests. Whereas for explain how contracting parties can design contracts whose purpose is to minimize costs as a result of information assimetry.

STAKEHOLDER THEORY

Internal and external parties that have a relationship with the company, and the stakeholders are influential and influenced by the company. From stakeholders, the continuity of the company to get company support must be able to contribute to its stakeholders (shareholders, creditors, consumers, suppliers, government, society, analysts and other parties). Stakeholder theory states that all stakeholders have the right to get information about company activities during certain periods that can affect decision-making.

Important aspects in stakeholder theory are rights and effects. The first aspect, namely rights, basically requires that the company and its managers must not violate rights and determine the future of stakeholders. The second aspect is the effect, requires that the management of the company is responsible for all actions taken. Independent board of commissioners and managerial ownership are influenced by stakeholder theory, namely to help company management in increasing value creation as a result of activities carried out and minimizing losses that may arise for their stakeholders. Sugiyanto, (2017). This theory states that all stakeholders have the right to obtain information about company activities that affect their company.

BOARD OF COMMISSIONERS

Board of Commissioners is a party that has an important role in overseeing the performance of directors. It is considered to have better supervision of management because it is free from various internal interests of the company (Fama and Jensen in Gita Sari, 2016: 27). According to Law No.40 of 2007 concerning limited liability companies, the board of commissioners is the organ of the company that is in charge of supervising in general and in accordance with the articles of association and giving advice to directors.

An independent commissioner is a member of the board of commissioners who is not affiliated with management, other members of the board of commissioners and controlling shareholders, free from business relationships or other relationships that can affect his ability to act independently or act solely in the interests of the company. An independent commissioner is the best position to carry out a monitoring function to create a company that is good corporate governance. By measuring the number of independent commissioners dividing the total number of independent commissioners.

MANAGERIAL OWNERSHIP

Managerial ownership is a manifestation of the principle of transparency of good CG, managing a management company must be transparent so there is no conflict of interest with the shareholders as the owner. Management that owns shares will certainly harmonize it. Meanwhile the manager does not

FIRM SIZE

The size of the company include total assets, log size, and stock market value (Sugiyanto, 2018). Because the greater the total assets, the greater the income. Riyanto (2010: 313) "The size of the company is seen from the amount of equity value, sales value or asset value. Sartono (2010: 249) is defined as follows: "Large companies that are well established will find it easier to obtain capital in the capital market compared to small companies. Because the ease of access means large companies have greater flexibility. " The larger the size of the company, the more the risk in terms of managing the tax burden. Companies that are included in large companies tend to have greater resources than companies that have a smaller scale to carry out tax management. Human resources who are experts in taxation are needed so that the tax management carried out by the company can be maximized to reduce the company's tax burden (Rego, 2003 in Dewi and Jati, 2014).

LEVERAGE

The operating costs of the company sourced from the company's debt are going accordingly. Funds are always to cover all or part of the costs needed, both short and long term funds. for operational costs. The magnitude of the use of funding sources must be considered so as not to burden the company, both short and long term. In other words, the use of funds from loans. The use of this funding source is known as debt or solvency or leverage ratio (Kasmir, 2015: 151). Managed shares are part of the company's ordinary share ownership by insiders (management) (Besley and Brigham, 2007: 146). Managerial ownership in this study can be measured using indicators of the number of shares held by managerial parties divided by the total number of shares of the company. Thus to improve the performance of the company makes management will strive to make it happen so as to make the company's risk smaller in the eyes of creditors.

The concept of thinking based on theorems related to Tax Avoidance Good Corporate Governance to Cost of Debt with moderation, with Growth opportunity and control variables Size and Leverage.

3. MATERIAL AND METHODS

HIPOTHESIS

1 Effect Tax Avoidance to Cost of Debt
The company always strives for a high level of profit. Many expenses can reduce the expected level of profit, one of which is payment of taxes. Tax avoidance is deliberately carried out by the company in order to minimize the level of tax payments that must be made by the company. By doing tax avoidance, it is seen by creditors as risky actions, thus increasing the cost of debt (Masri and Martani, 2012). Tax avoidance is proven to cause the cost of debt to be greater, because creditors assess corporate tax avoidance behavior as a risk.
H1 : Tax Avoidance strengthens the Cost of Debt.

2   Effect Independence Commissioner
strengthens theCost of Debt
Board of Commissioners is a party that has an important role in overseeing the performance of directors. It is considered to have better supervision of management because it is free from various internal interests of the company (Fama and Jensen in Gita Sari, 2016: 27). According to Law No.40 of 2007 concerning limited liability companies, the board of commissioners is the organ of the company that is in charge of supervising in general and in accordance with the articles of association and giving advice to directors. The proportion of independent commissioners has a significant positive effect on the cost of debt.
Based on the description above, the hypothesis can be concluded as follows:

H2 : Independence Commissioner
strengthens the Cost of Debt.

3 The effect managerial commissioners to   Cost of Debt

Managerial Commissioners are share ownership by company management as measured by the percentage of shares held by management. Managerial ownership indicators used to measure managerial ownership represent the percentage of company or management share ownership by the director of the company compared to the number of outstanding company shares in the overall share of ordinary shares of the company by the insider (management) (Besley and Brigham, 2007: 146).

Based on the description above, the hypothesis can be concluded as follows:

compared with the number of outstanding company shares in the overall share of the company's ordinary shares by insiders (management) (Besley and Brigham, 2007: 146). Based on the description above, the hypothesis can be concluded as follows:

H3: Alleged Managerial Ownership influences the Cost of Debt

H4: Growth opportunity strengthens the relationship between tax avoidance to the cost of debt.

H5: Growth opportunity strengthens the relationship between the Board of Commissioners and the cost of debt.

H6: Growth opportunity strengthens the relationship between Managerial Ownership of the cost of debt.

METHODOLOGY

The method of this study is quantitative research, where the method used by the writer is quantitative descriptive method. This research was conducted at a manufacturing company listed on the Indonesia Stock Exchange (IDX) through its official website www.idx.co.id.

Operational Variable Research

The objectives of the study could be summarized as follow variables used in this study are divided into four variables, namely dependent variable, independent, moderating and control variables, and independent variables Tax Avoidance and GCG. The dependent variable is the Cost of debt. And the control variables are company size and leverage.

1 Tax Avoidance

Measuring by reference (Hanum: 2013) Businesses to reduce or eliminate tax debt that must be paid by the company. By measuring the ratio level:

$$ETR = \frac{BTaxExpense}{Pretaxprofit} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

2 Board of commissioners

Board of commissioners by measuring references (Sugiyanto, et all 2016:49) Board of commissioners members who are not affiliated with management and shareholders who can influence the ability to act independently for the company are measured by the ratio as follows:

$$DK = \frac{IndependenceCommissioner}{ManagerialOwnership} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

3. Managerial ownership

Measurement of CG reference proxies (Gita Sari, et all 2016: 48) The principle of good transparency of good corporate governance, in managing management companies must be transparent so that there is no conflict of interest with shareholders as owners. By measuring the ratio level:

$$KM = \frac{SM}{SB} \quad \text{..(3)}$$

4 Cost of debt

Measurement of the cost of debt (Masri and Dwi in Sri Suhartini, 2016: 41) the cost of debt is the rate of return desired by creditors when providing funding to companies. By measuring the ratio level as follows:

$$COD = \frac{Interestexpense}{Averagecost} \quad \text{..............................(4)}$$

5   Leverage

Measuring the size of leverage and Size Sugiyanto (2018) The costs of its operations and the size of the company sourced from the company's debt are going accordingly. Funds are always to cover all or part of the costs needed, both short-term funds.

$$Leverage : \frac{TotalDebt}{Shareholderequity} \quad \text{...............................(5)}$$

Firm Size: Ln Asset

1.   Test MRA (Moderated Regression Analysis)

The test calculation to prove whether growth opportunity as a moderating variable can strengthen or weaken the relationship between the tax Avoidence, Independence Commissioner and Managerial Ownership variables on the Cost of Debt by using the following equation:

$$Y= \alpha+\beta1X1+ \beta2X2+ \beta3X3 + \beta4X1.Z + \beta5X2.Z+ \beta6X3.Z+\varepsilon$$

Y   = Cost of Debt
α   = Constanta
X1   = Tax Avoidence
X2   = Independence Commissioner
X3   = Managerial Ownership
β1- β3   = Koefisien regresi dari variabel X
Z   = Z-Moderating Growth opportunity
β4- β6   = Moderating variabel
         = Z-Moderasi Growth opportunity
         X4*X1 + X5*X2 + X5*X3
ε   = Residual error

2.   Population and Sample

The population referred to in this study are manufacturing companies listed on the Indonesia Stock Exchange in 2013-2017 and have been published. The reason this research was conducted on the Indonesian stock exchange was that the data obtained had gone public and had been audited so that the results of this study could be significant. In accordance with the characteristics of the company which was used as a sample of the 5 years period of research from 2013 to 2017.

3. Analysis Techniques
The analysis in this study will use Eviews 10. Before the previous data analysis is carried out the classical assumption test consists of normality test, multicollinearity test, autocorrelation test and heteroscedasticity test. Hypothesis testing uses a linear regression analysis test.

The analysis in this study will use Eviews 10. Before the previous data analysis is carried out the classical assumption test consists of normality test, multicollinearity test, autocorrelation test and heteroscedasticity test. Hypothesis testing uses multiple linear regression analysis test. Then to find out whether the independent variable has an effect on the dependent variable either partially orsimultaneously, a t-test and F. statistical test are carried out. To find out how much influence the independent variables have on the dependent variable the coefficient of determination is used. The multiple linear analysis model used in this study is formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_1.Z + \beta_5 X_2.Z + \beta_6 X_3.Z + \varepsilon$$

4. RESULTS AND DISCUSSION

Analysis of the results of this research will be in the form of outlines in table 1 to tabele 9 and figure.

4. Descriptive Statistics
Descriptive statistics describe the characteristics of each variable used in this study can be seen in table 2 below:

Table 1
Descriptive Statistics

	Tax Avoidance	Comisionary Boards	Managerial Ownership	Growth opportunity	Leverage	Size	Cost of debt
Mean	0.298364	0.377069	0.691673	0.591673	0.491673	0.591673	0.034587
Maximum	0.947617	0.750000	0.984291	0.984291	08947617	0.484291	0.269221
Minimum	0.000251	0.200000	0.013226	0.013226	0.100251	0.213226	0.000541
Std. Dev.	0.189526	0.093326	0.194084	0.094026	0.294012	0.394080	0.044727
Observations	140	140	140	140	140	140	140

Source: The data processed using 2019 Eviews 10

4.1 Asumsi Clasick Test

4.1.1 Normality Test

The normality test aims to determine the distribution of data in the variables used in the study. Data that is good and feasible to use in research is data that has a normal distribution. To test the assumption that the normality of the data is done using Jarque Berra (JB), if the JB probability is greater than 0.05 then the data is normally distributed, but if it is smaller than 0.05 then the data is not normally distributed (Ghozali, 2013)

Figure 4.1
Normalitas after Transformation test
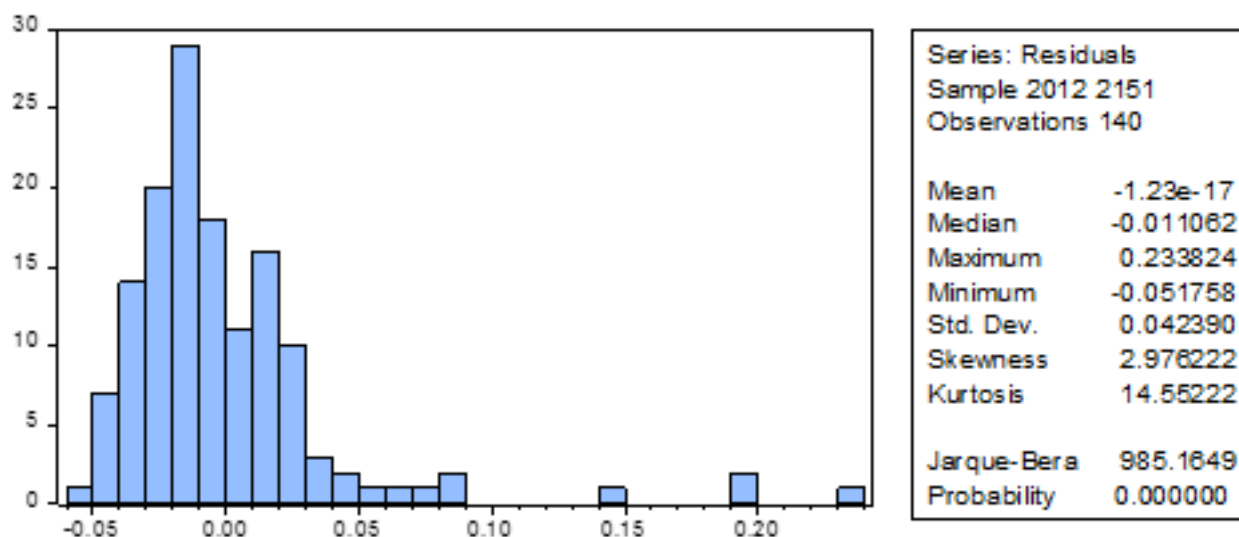
Based on the results above it can be seen that the probability Jarque Berra value is 0.000000, thus it can be concluded that the data from the variables in this study are not normally distributed. To treat normality can use the Log transformation method. The step is to transform the log by means of the Cost of Debt logarithmic $\log y = \log (y)$ or $\log y$ c x1 x2 x3. The results of the normality test using the Log will be presented as follows:

Figura 4.2
Normalitas beforeTransformation test
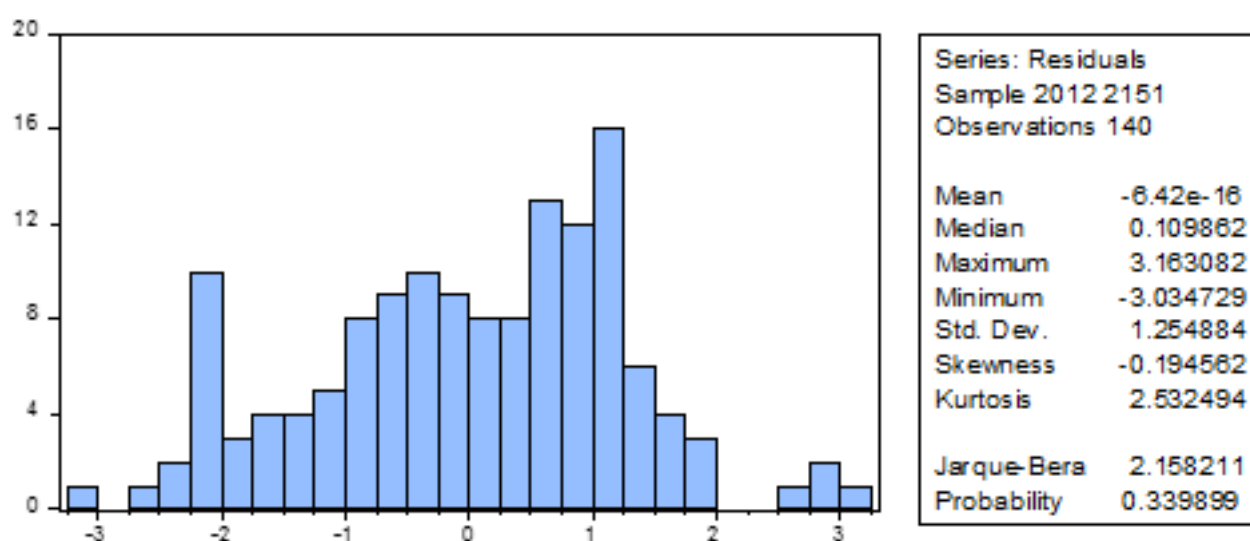
Sumber : Data di olah.

Based on the results above it can be seen that the probability value of Jarque Berra is equal to 0.339899> 0.05 thus it can be concluded that the data from the variables in this study have been normally distributed

4.1.2 Test Non Multikolinearitas

Multicollinearity test is used to test whether there is a relationship between independent variables. To detect the relationship between variables in this study by looking at Centered VIF between each variable. If it is greater than 0.10, multicollinearity occurs in the regression model, but if the correlation coefficient between each variable is smaller than 0.10, multicollinearity does not occur (Ghozali, 2013) will be presented in table 4.4.

Table 4.2
Multikolinearitas test

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
Cost of Debt	0.000465	35.44384	NA
Tax Avoidance	0.000385	3.660010	1.046872
Independence Commissioner	0.001520	17.47310	1.001797
Managerial Ownership	0.000367	14.41430	1.045131
Growth opportunity	0.000251	1.200000	1.013226
Leverage	0.189526	1.093326	1.194084
Size	0.100382	1.760010	1.146874

Source: The data processed using 2019 Eviews 10

Based on table 4.2 above, it can be seen in the Centered VIF column table. VIF values for variables that affect the Cost of debt with a value below 10. Because the VIF value of the three variables does not exist that is greater than 10. Thus, the above model has been freed from the presence of multicollinearity.

4.1.3 Heteroscedasticity test

Heteroscedasticity test aims to test whether in the regression model variance occurs from a residual inequality to one other observation, then it is called Homoscedasticity and if it is different it is called Heteroscedasticity. A good regression model is Homoscedasticity or Heteroscedasticity does not occur.

If in a regression model there is a problem of heteroscedasticity, it will cause the variance value to be no longer minimum. This will result in a standard error that cannot be trusted so that the regression results from the model cannot be justified (Ghozali, 2013). The method of knowing the presence or absence of heteroscedasticity symptoms in this study is by testing Glejser. If the significance of the prob * R < 0.05, the model contains heteroscedasticity, and if the significance of the prob * R > 0.05 then the model does not contain heteroscedasticity.

4.1 Analisys Multiple Linear Regression test

Table 4.3
Multiple linear regression test

Dependent Variable: COD
Method: Least Squares
Included observations: 140

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.051119	0.021563	2.370697	0.0192
Ta avoidance	0.052479	0.019623	2.674319	0.0084
Independence Commissioner	0.006115	0.038983	0.156857	0.8756
Managerial Ownership	-0.043205	0.019146	-2.256566	0.0256
Growth opportunity	0.051119	0.031564	3.470693	0.0192
Leverage	0.062479	0.029622	1.574314	0.0185
Size	0.076115	0.018981	1.256855	0.0723
R-squared	0.101792	Mean dependent var		0.034587
Adjusted R-squared	0.081979	S.D. dependent var		0.044727
S.E. of regression	0.042855	Akaike info criterion		-3.433844
Sum squared resid	0.249768	Schwarz criterion		-3.349797
Log likelihood	244.3691	Hannan-Quinn criter.		-3.399690
F-statistic	5.137541	Durbin-Watson stat		0.918589
Prob(F-statistic)	0.002138			

Source: The data processed using 2019 Eviews 10

Based on the results of testing the multiple linear regression analysis above it can be formulated an equation that explains the effect of tax avoidane, independent board of commissioners and managerial ownership of the cost of debt, namely:

COD: 0.051119 + 0.052479 - 0.006115 - 0.043205 + 0.0511190 + 0.062479 + 0.076115 + e

4.2 Discussion of Research Results

4.3.1 Effects of Tax Avoidance on Cost of Debt

The results of testing hypothesis 1 indicate that Tax Avoidance has a significant positive effect on the Cost of Debt, so the hypothesis 1 in this study is answered. The results of this study support Sri Suhartini's (2015) research, with the results of tax avoidance having a significant positive effect on the cost of debt.

It can be concluded that the higher the tax avoidance that is performed by the company as indicated by the low ETR, the higher the cost of debt that must be borne by the company. Conversely, the lower the tax avoidance done by a company is shown by a high ETR, the lower the cost of debt that must be borne by the company.

4.3.2 Effect of the Independent Board of Commissioners on Cost of Debt

The results of testing hypothesis 2 indicate that the board of commissioners has no significant effect on the Cost of Debt, so the hypothesis 2 in this study is not answered. This is presumably because the number of independent commissioners cannot limit the management in determining the amount of the debt. But it is different from the research conducted by Nugroho (in Sulistyowati: 2015) which states that independent commissioners influence the cost of debt. This shows that the presence of the board of commissioners in the company is an important matter. Because the board of commissioners can prevent information asymmetry from management and shareholders.

4.3 Uji Statistik t

Table 4.5
Regresi Moderating (Moderated Regression Analysis)

Dependent Variable: COD
Method: Least Squares
Included observations: 140

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.051119	0.021563	2.370697	0.0192
Tax avoidance	0.052479	0.019623	2.674319	0.0084
Independence Commissioner	-0.006115	0.038983	-0.156857	0.0056
Managerial Ownership	-0.043205	0.019146	-2.256566	0.0256
Growth opportunity*Tax A	0.051119	0.021563	2.370697	0.0192
Growth opportunity*DK	0.052479	0.019623	2.674319	0.0024
Growth opportunity*KM	-0.006115	0.038983	-0.156857	0.0046
Leverage	0.051119	0.021563	2.370697	0.0022
Size	0.052479	0.019623	2.674319	0.0004
R-squared	0.101792	Mean dependent var		0.034587
Adjusted R-squared	0.081979	S.D. dependent var		0.044727
S.E. of regression	0.042855	Akaike info criterion		-3.433844
Sum squared resid	0.249768	Schwarz criterion		-3.349797
Log likelihood	244.3691	Hannan-Quinn criter.		-3.399690
F-statistic	5.137541	Durbin-Watson stat		0.918589
Prob(F-statistic)	0.002138			

Source: The data processed using 2019 Eviews 10

Based on the results of Table 4.5 testing multiple linear regression analysis can be formulated equations that explain the influence of tax avoidane, independent board of commissioners and managerial ownership of the cost of debt with moderation of Growth Opportunity and Leverage and Size control variables obtained coefficients probability, namely:

COD = 0.051119 + 0.052479 - 0.006115 - 0.043205 + 0.051119 +0.052479 + -0.006115 + 0.051119 + 0.052479 + e

4.3.3 Effect of Managerial Ownership on Cost of Debt

The results of testing hypothesis 3 show that Managerial Ownership has a significant negative effect on Cost of Debt. So that the bigger the share of the company's managerial ownership, the lower the cost of debt. In contrast to the research conducted by Juniarti (2009) which shows that managerial ownership does not affect the cost of debt. The existence of management ownership in the ownership of the company should establish an impetus for management to improve its performance besides according to Soebiantoro (2007) in Juniarti (2009), management does not have control to determine debt policy because many are controlled by majority owners.

4.3.4 Effects of Tax Avoidance, Independent Board of Commissioners and Managerial Ownership of Cost of Debt

Based on the results of the F test with a calculated F value greater than Ftable which is 5.137541> 2.67 with a significance value of 0.002138 <0.05. Thus it can be concluded that the variables of tax avoidance, board of commissioners and managerial ownership have a significant effect together on the cost of debt variable. This shows that when there is an increase and a decrease in the value of tax avoidance, the board of commissioners and managerial ownership, it will affect the cost of debt.

The results of this study support the research conducted by Sulistiyowati (2016) which says that tax avoidance, independent board of commissioners and managerial ownership simultaneously influence the dependent variable, namely the cost of debt tested at a significant level of 0.05. If the value of Fcount is greater than Ftable, it can be concluded that it affects the cost of debt.

4.3.5 Growth Opportunity strengthens the tax investment relationship to the cos of debt.

The hypothesis of this study is that growth opportunity strengthens the relationship of tax avoids influencing the cost of debt in food and beverage consumption manufacturing companies listed on the Indonesia Stock Exchange in 2013-2017. Based on table 4.9, the results of the t statistical test for sales growth variables have a significant level. The significance level is greater than 0.05, which means that Ho is rejected so that it can be said that sales growth does not significantly influence tax aggressiveness.

Sales growth describes an increase in sales from year to year. The high level of sales growth shows the better the company is running its operations. Companies that have high sales growth rates will need more investment in various elements of assets, both fixed assets and current assets. Management needs to consider the appropriate funding sources for the expenditure of these assets. Companies that have high sales growth will be able to fulfill obligations such as tax payments.

The results of this study are in line with those carried out by Citra Laksmi Chriswono (2016) who found that Sales Growth had no significant effect on tax avoidance.

4.3.6 Growth Opportunity strengthens the Board of Commissioners' relationship to the cos of debt

The moderation results in this study are moderation in strengthening GCG against the cost of debt in food and beverage consumption sector manufacturing companies listed on the Indonesia Stock Exchange in 2013-2017. Based on table 4.9, the results of the t test statistic for the liquidity variable have a significance level of. The significance level is greater than 0.05, which means that Ho is rejected so that it can be said that liquidity does not have a significant effect on tax aggressiveness.

The higher the liquidity ratio owned by the company indicates the company is in a healthy condition. But if the liquidity is too low, it will reduce the level of creditor trust in the company, resulting in a decrease in capital loans by creditors. In this research sample, the company that is the observation is able to maintain the level of liquidity so that there is no effect of liquidity on tax aggressiveness.

This research result is in line with or consistent with the research by Wiwied Safitri (2016) showing that liquidity does not have a significant effect on tax aggressiveness.

4.3.7 Growth Opportunity strengthens the relationship of Managerial Ownership to the cos of debt

The research hypothesis is that growth opportunity strengthens the relationship between managerial ownership and influences the tax aggressiveness of food and beverage consumption sector manufacturing companies listed on the Indonesia Stock Exchange in 2013-2017. Based on table 4.9, the results of the t statistical test for the size variable have a significance level of 0.019. The significance level is less than 0.05, which means that Ho is accepted so that it can be said that it has a significant effect on tax aggressiveness.

The greater Managerial Ownership, it can be said that the transactions made by the company are increasingly complex. Company management will consider risks more in terms of managing their tax burden. Companies that are included in large companies tend to have greater resources than companies that have a smaller scale to carry out tax management.

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PEOPLE POWER OF LEGAL PERSPECTIVE ON GENERAL ELECTION DEMOCRACY CELEBRATION WHICH LUBER JURDIL ON 2019

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ABSTRACT

On April 17, 2019 Indonesia has held a democratic party called simultaneous elections or also called five votes consisting of, Regency / City DPRD, Provincial DPRD, DPR RI, DPD RI, and the President and Vice President, designation of Luber Jurdil (direct, public, free, confidential, honest and fair). Election in Indonesia is a reflection of democratic values. This is in line with the meaning of democracy outlined by the originator of democracy President Abraham Lincoln in his speech "government of the people, by the people and for the people". To implement and support the democracy of the state of Indonesia as well as a constitutional state as Article 1 paragraph 3 of the 1945 Constitution. But the implementation of the general election is not accompanied by a good political culture by the elites or political figures as the chosen political contestants who are not elected as leaders of our country, such as the call of people power or a call for mass movement to reject the results of the general election by demonstration, then how is the appeal of the people power in the view of the constitution in our country as a rule of law whether as part of democracy or a population that violates law or treason.

Keywords: Tax Avoidance, Independent Board of Commissioners, Managerial Ownership, Growth Opportunity, Leverage, Size, Cost of Debt.

BACKGROUND INFORMATION

Reflected elections: no matter how good the government is designed; it cannot be determined by the government-led officials who are selected by citizens in an open and honest way for all. Elections may vary in essence, they remain the same for all supporting societies, debate the right of access for all citizens who require conditions to get the right to vote, support each individual's interests - support the desired area of votes, and count those honest and open to the results of the vote.

The definition of democracy itself is a policy made by the people in which it is a basic understanding and resolution that has been used which is broadly a view of life that contains equal rights and responsibilities for all citizens.

In connection with the notion of democracy above, Indonesia has just completed a democratic party or General Election which is held simultaneously in 2019, not only electing the presidential and vice-presidential pairs but also electing people's representatives, both Regency / City DPRDs, Provincial DPRDs, DPRD RI, and DPD RI. The interesting part here is that the General Election Commission has set only two pairs of candidates to participate in the presidential and vice-presidential elections, namely Joko Widodo - Ma'ruf Amin and Prabowo Subianto - Sandiaga Uno.

The Joko Widodo - Ma'ruf Amin pair was supported by 9 political parties, namely PDIP, PKB, Golkar, Perindo, Nasdem, Hanura, PKPI, PSI and PPP on behalf of the Working Indonesia Coalition (KIK), while the rival Prabowo - Sandiaga was supported, by 5 Political Parties called the Indonesian Coalition of Fair and Prosperous including Gerinda, Democrats, PKS, PAN and Berkaya. The competition between the two camps seemed to be very hot, both attacking each other on social media and black campaigns. In fact, the heat of the two supporters' camps gave birth to a term that developed in communities with diction such as Kampret and Tadpole.

After the presidential and vice presidential election (KPU) voting was announced the results of the national recapitulation of presidential and vice presidential elections contained in number 987 / - PL.01.8-Kpt / 06 / KPU / V / 2019, Determination of General Election Results President and Vice President, Members of the People's Legislative Assembly, Regional Representatives Council, Provincial Regional Representative Council, and Regency / City Regional People's Representative Council in National Elections in 2019. Jokowi Dodo - Ma'ruf Amin's Pair has a national legal votes 55, 50% and Couple Prabowo Subianto - Sandiaga Uno 44.50% of the national 4legitimate votes.

The determination of the results of the national recapitulation of the presidential and vice presidential election does not necessarily be accepted by one of the Paslon (candidates) supporters, because they think the presidential election that has been held is thought to have massive and structured fraud that eventually there are some political elites inviting the public to not accept the results of the Presidential Election with an invitation called "People Power" which some experts think is part of a democracy and some say it is treason. Against this background the authors are interested in researching the term People power in the context of the 2019 presidential election with the title people power legal perspective in the 2019 overflowing jurdil democratic party.

METHODOLOGY

This study uses a normative juridical approach of study by examining and interpreting theoretical matters, legal principles concepts, and regulations on regulations and books relating to this research.

DISCUSSION

The Concept of People Power, Democracy and 2019 Elections

In the political developments that took place both after the results of the presidential election and his deputy, in reality the Indonesian people were shocked by the term people power in rejecting the 2019 presidential election results, while the term itself was used by the people when trying to overthrow the Suharto government in 1999 which was already in power for 32 years. People power has the meaning of a movement consisting of a group of individuals who join forces to achieve common goals in the effort to uphold freedom and justice. Included in political movements and social changes that oppose the authority as the holder of power.

The power of people has actually begun to be known since the Philippine community movement in 1986, the EDSA revolution. In fact, the power of people has existed before the EDSA revolution. People's power was formerly known by the terms in the concepts of "popular participation", "people's empowerment" and "community organizing and mobilization"

Democracy comes from the Greek language, which is "demos" which means people and "kratos" means government which means government of the people, or a government in which the people hold the highest sovereignty or the people are included in the government of the country.

While the State of Indonesia is aspired by the founder as a state of law, the 1945 constitution concerning the state of Indonesia is the rule of law contained in article 1 paragraph (3).

It implies that within the unitary state of the Republic of Indonesia, law is an instrument or as a means of carrying out activities in all national and state life. Therefore, the principles of the rule of law must develop in accordance with the development of society and the state, of which there are twelve main.

The Main principles which support the rule of law, including:

A. Rule of law (rule of law)
b. Equation in law (equation before law)
c. Principle of legality (legal process)
d. Restrictions of power
e. Independent supporting organs
f. Freedom of justice and impartial justice
g. State administrative justice
h. Constitutional Court
I. Protection of human rights
j. Democratic
k. Functioning as a means to realize the purpose of statehood
l. Social transformation and control

From the description above, it can be drawn that Indonesia is a democratic rule of law, in essence, our state in the 2019 election requires the supremacy of the constitution and also the form of the highest social agreement, with the understanding of the rule of law and democracy aimed at limiting government power and rejecting all forms of power without limits.

Election is a means of popular sovereignty to elect members of the People's Legislative Assembly, members of the Regional Representative Council, the President and Vice-President, and to elect members of the Regional People's Representative Council, which is carried out directly, publicly, freely, confidentially, honestly and fairly in the Republic of Republic of Indonesia is based on Pancasila AND the 1945 Constitution of the Republic of Indonesia. Indonesia operates a democratic political system in 2019 by implementing it simultaneously without reducing the values in the general elections LUBER JURDIL:

LUBER
- Direct: voters have the right to vote fully and directly without contribution
- General; all citizens are entitled to receive elections
- Free: every citizen is free to choose without pressure from anyone or any power
- Confidential: in voting, Voters agreeing that their choice will not be recognized by any party in any way.

JURDIL

- Honest: During the election, voters or the election committee that involved in the election must be honest in accordance with applicable regulations, and no fraud is committed.
- Fair: all voters and parties involved will get the same assistance regardless of ethnicity, religion, race, class or social level.

Call for People Power, or Legal Perspective Makar

In Indonesia, general public can use demonstrations to show the power of people. In the demonstrations, people can show their common interest in upholding freedom together.

Demonstrations are activities that carried out in a way to express thoughts through oral, written, and group demonstration in public in addition to demonstrate are copyright approved by the 1945 Constitution and the Universal Declaration of Human Rights.

In sending every citizen an obligation and responsibility for the rights of others, respecting moral rules that are generally agreed upon, complying with applicable laws and regulations, protecting public order and security and helping the integrity of national unity and ties. Questions and opinions in any way and regardless of boundaries.

While treason comes from the word "aanslag" (Dutch) which means attack or "aanval" which means attack with ill intentions (misdadige aanranding). Meanwhile, the opponent's attack or attack.

Crimes against State security ('treason') according to article 104 of the Criminal Code. "MAKAR" with the intention of taking lives or depriving of liberty or negating the ability of the president or vice president to govern is threatened with capital punishment or life imprisonment or imprisonment for a maximum of 20 years.

Required the necessity of the beginning of the execution of the crime of treason, not enough of an offender, it is only an act of preparation but must be realized in a beginning of the act of implementation.

Makar itself is divided into 3 types including:

1. Plots that oppose the legal interest for the security of the Head of State or his Deputy (Article 104 of the Criminal Code);
2. Plots that oppose the legal interest in the integrity of the State Territory (Article 106 of the Criminal Code);
3. Plots that conflict with legal interests submitted by the State Government (Article 107 of the Criminal Code).

The treason involved in the demonstration of the election results here is that which was approved in article 107 of the Criminal Code which must meet the requirements with intentions and beginnings, but what we must understand is the treason article which makes the paper plot which is widely interpreted as article 110 of the Criminal Code.

CONCLUSION

As a constitutional state that adopts a democratic system, it is clear that there are rights regarding freedom of opinion and expression protected by the law. People Power's invitation to reject the results of the determination of the presidential and vice-presidential election commission should be unethical in a democratic country, but freedom of opinion cannot be called a betrayal because basically betrayal is an attack on the government in an attempt to overthrow the government. So, freedom to approve or criticize the government cannot be approved by treason because its form is not an attack that can bring down the government. However, if the demonstrators decide on the provisions of Article 6 of the Law concerning freedom of approval and the beginning of its implementation there must be this matter which can be approved as treason.

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THEME 7 :

TEACHING AND LEARNING QUALITY, EQUITY AND RELEVANCE

DEVELOPMENT OF PTSB PORTABLE DIGITAL TRAINER 1 V2 FOR TEACHING AND LEARNING PURPOSE

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ABSTRACT

PTSB1v2 Portable Digital Trainer1 v2 (PPDT1v2) is a portable and user-friendly training kit that has been created for the subject of Digital System. The main innovation to create PPDT1v2 was due to the absence of equipment to carry out the experiment laboratory. PPDT1v2 is mainly created for lecturers and students to utilize during teaching and learning sessions. The objectives are to create a trainer that able to use during laboratory and demonstration in the teaching and learning process. Besides, it also to get the result, according to the analysis of each experiment to ensure it can fulfill the syllabus of the Digital System. The method used for design and develop this PPDT1v2 trainer is Autodesk Inventor which is to design 2D and 3D, Proteus Design Suite to create a printed circuit board (PCB) and run simulations, Arduino IDE to program the code system, Bluetooth communication to control all Boolean gates and android apps to design MIT Inventor. The result of PPDT1v2 invention is student be able to get the exact answer of Boolean Operation and Sequential Logic.

Keywords: Portable Digital Trainer, Inventor, Proteus, Arduino, MIT Apps Inventor.

1. INTRODUCTION

PPDT1v2 is a teaching tool that uses Arduino programming software and also applies interfaces using the MIT app inventor software as a medium for connecting Bluetooth and programmed android apps. PPDT1v2 is the second version of the tool that comes from the enhancement of PPDT.

PPDT1v2 is equipped with an android application that allows students to control the logical operation using a mobile phone. Students can understand the circuit connection and identify each input and output pin. PPDT1v2 is lightweight, weighing about 400g and is easy to carry anywhere. It is also very user-friendly and focuses on the subject of digital systems.

The main problem that stimulates the idea of creating PPDT1v2 is based on the Continuous Quality Improvement (CQI) report from the digital subject coordinator of the system. It was found that the percentage of CLO2 and PLO4 decreased by 8% as a result of the students being unable to develop digital circuits based on the given schematic (CLO1). Students were also unable to use laboratory equipment well (PLO4). This problem can also be identified after the course lecturer develops a number of questionnaires to students on the importance of producing a PPDT1v2. A total of 54 respondents (98%) agreed if the trainer kit is created for the subject of digital systems.

Some scientific studies have been conducted before producing PPDT1v2 and Figure 1 shows the production process of PPDT1v2.

Fig 1. PPDT1v2 Process

2. LITERATURE REVIEW

A concept design of PPDT1v2 is initially based on the general idea of the existed Digital trainer in the market but the trainers are not matched with the Digital System syllabus in Polytechnic and expensive [1]. The method starts with designing 2D and 3D products using Autodesk Inventor. Next is construct the PCB sketching using Proteus Design Suite, code the Arduino program, create Apps using MIT Inventor and last part is etching, drilling, soldering, and troubleshooting before a test run the PPDT1v2.

Fig 2. 2D and 3D drawing
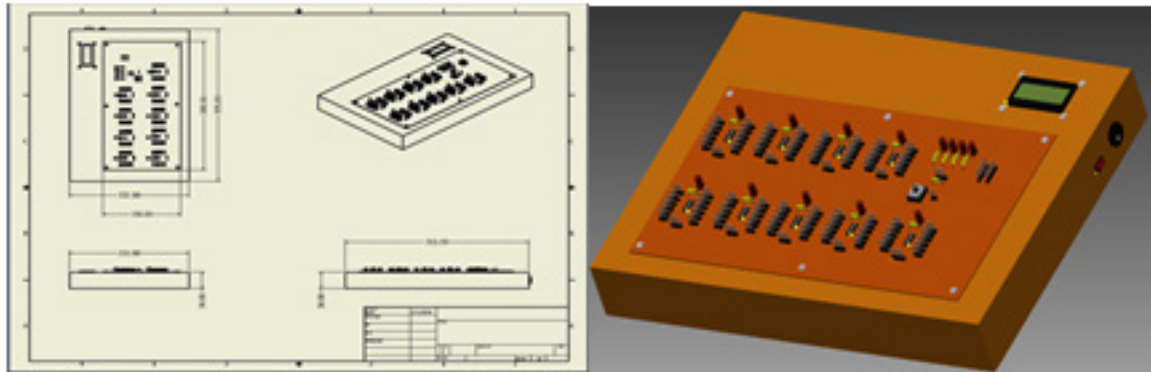
The first step to create PPDT1v2 is to design a two - dimensional sketch along the X or Y axis on a plane. The user can create planar geometry for features such as extrude and rotate it by using the 2D sketch. A 2D sketch is flat, has a width and length however there is no depth or thickness [2]. There is no shade and shadow, therefore there is little realism in a 2D sketch. Users can create 2D sketches in partial (IPT), assembly (IAM), or drawing (DWG) files. The three-dimensional or 3D sketch is a system or effect using a film or object to provide width, length, and depth. Users can create geometry in 3D space at any point in a 3D sketch. This is usually used to create paths for cabling, tubing, sweeping, and lofts, or to create surface edges. Only in part (IPT) files can users create 3D sketches. This sketch is used to see the product's actual appearance.

The second step is to simulate and design software tools using Proteus, which is a software that is developed for electrical and electronic circuits by Lab Center Electronics [3]. It also has the features of 2D CAD drawing. It includes schematics, simulation, and design of PCBs. ISIS is the schematics drawing software used to simulate the circuits in real-time. During runtime, the simulation allows human access, thus providing real-time simulation. ARES is used in the design of PCBs. It also has the feature of viewing output together with components in a 3D view for the designed PCB.

Fig 3. Simulation and PCB circuit created
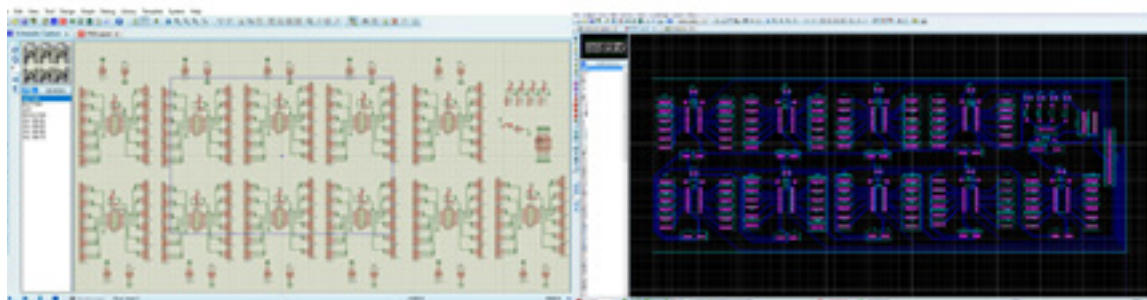
Next, by searching for "MIT AI2 Companion," download the general application from the Play Store and install it on the phone. Users can view the PPDT1v2 application from the phone by downloading this application. Thus, only Androids support the PPDT1v2 application. Select "AI Companion" from the Connect menu. By scanning the QR code, the user can connect by clicking on "Scan QR code" (# 1) or entering the code in the text window and clicking on "Connect with code" (# 2). Once the connection is successful, navigate to the application page of PPDT1v2.

Fig 4. MIT Inventor of PPDT1v2
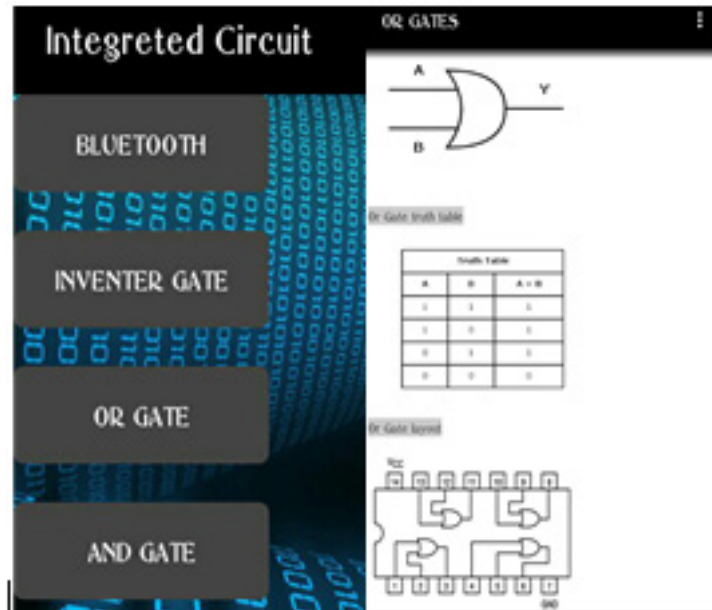
Lastly, in the process development, there are a few steps to follow. Begin by printing the design onto the shiny side of the transfer paper. Place the PCB in the etching solution and agitate it for several minutes until all the copper has dissolved around the design. Next, to check the diameter on the drilling chart, drill each and every hole size from the largest to the smallest. Remove the back material from the stack after all the holes have been drilled. Then, solder into the PCB. Then, to secure the part, twist the leads a bit. Make sure the soldering iron warmed up after that and use the moist sponge to clean the tip. Place the soldering iron on the component pad and feed the end of the solder onto the board afterward.

Fig 5. PPDT1v2 on PCB board

3. RESULTS AND DISCUSSION

As in Figure 5 using a printed circuit board (PCB), the hardware result of PPDT1v2 development is a thin board made of fiberglass, composite epoxy, or other laminate material. Conductive pathways are etched or printed on the board, connecting various components such as transistors, resistors and integrated circuits on the PCB. Once the programming is completed the casing installation is performed [4]. The PPDT1v2 casing is installed with a label to make reference easier for students and lecturers.

Fig 6. PPDT1v2 complete board with specification

NO.	CRITERIA	SPECIFICATION
1.	Memory	• 8-Bit Microcontroller ATmega328
2.	DC Power Requirements	• 5Vdc 200A • Power Adapter 9Vdc 1A
3.	AC Power Requirements	• 240Vac 6 A
4.	Host/ Slave Communication	• Bluetooth Module HC-05
5.	Digital Output	• Maximum quantity:11 • Operating Voltage:5Vdc 20mA
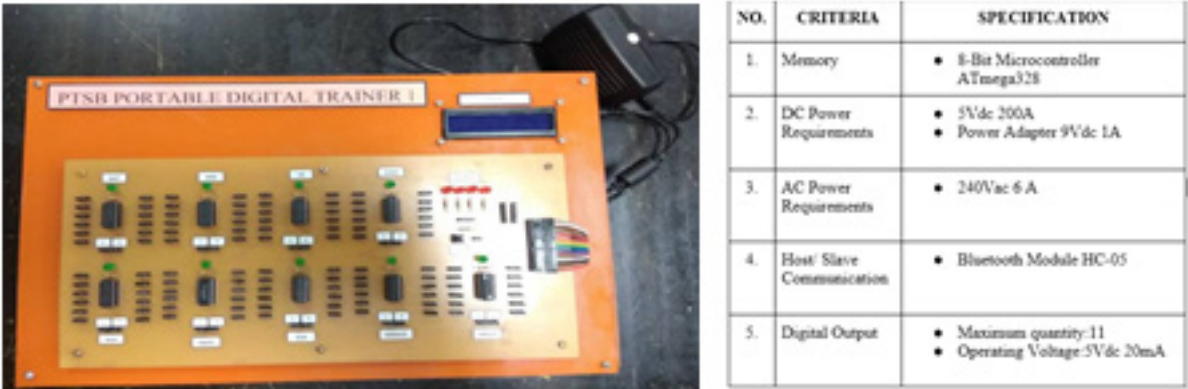
Experiment 1 – Determine the output of Boolean Operation using Combine Gate.
This experiment was conducted based on the combination of two gates which is AND gate and OR gate. The input and output only active HIGH and active LOW which is 1 and 0. If the input for A is LOW and input for B is LOW, the output will become LOW. If the input for A is HIGH and input for B is HIGH the output becomes HIGH. Figure 7 below shows the circuit connection using PPDT1v2. The result is shown in Table 1.

Fig 7. Connection Experiment 1 (PPDT1v2)

Fig 8. Connection Experiment 1 (Circuit)
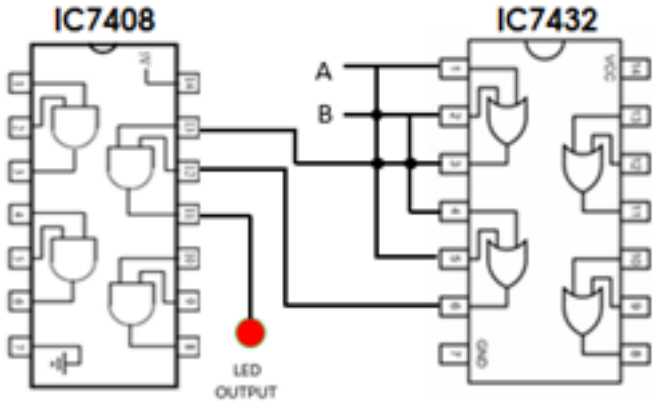
The result analysis for experiment 1 is using IC7408 (AND gate) with IC7432 (OR gate) connection which is input A is connected to pin 1, input B is connected to pin 2 and the output of pin 3 from IC7432 becomes an input for pin 13 (IC7408). Input A also connected to pin 5, input B also connected to pin 4 and the output of pin 6 from IC7432 becomes an input for pin 12 (IC7408). So the output of pin 11 from IC7408 is connected to the LED and the data will record as in Table 1.

Table 1
Result of Combine Gate (AND and OR gate)

INPUT A	INPUT B	OUTPUT
0	0	0
0	1	1
1	0	1
1	1	1

Experiment 2 – Determine the output of Sequential Logic for SR NOR Flip Flop
This experiment was conducted based on SR NOR Flip Flop truth table. If the input for S, is LOW and input for R is LOW, the output will become 'No Change '. If the input for S is HIGH and input for R is LOW, the output will become 'SET'. Figure 9 below shows the circuit connection using PPDT1v2. The result is shown in Table 2.

Fig 9. Connection Experiment 2 (PPDT1v2)

Fig 10. Connection Experiment 1 (Circuit)
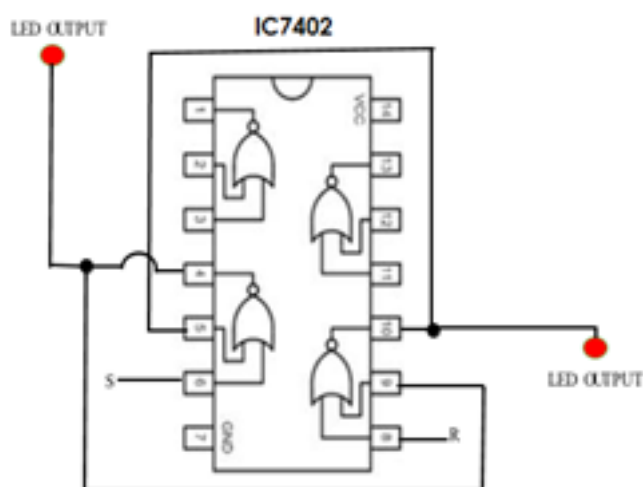
The result analysis for experiment 2 is using IC7402 (NOR gate). For SR NOR flip flop, it uses two NOR gate which is input S (Set) is connected to pin 6 and input R (Reset) is connected to pin 8. Input pin 5 is connected to output pin 10 and input pin 9 is connected to output pin 4. The output pin 4 and pin 10 are connected to LED 1 (Q) and LED 2 (Q'). The data will record as in Table 2.

Table 2
Result of SR NOR Flip Flop

S	R	Q	Q'	OPERATION
0	0	0	1	No Change
0	1	0	1	Reset
1	0	1	0	Set
1	1	1	1	Invalid

4. CONCLUSION

As a conclusion, the PTSB Portable Digital Trainer 1 v2 (PPDT1v2) has a complete design and functionality that meets the objective. It was achieved a significance of research outcomes as reducing a low-cost PPDT1v2 in which all the components are easy to find, interfacing monitoring using free software and using android applications. PPDT1v2 are also easy to install and if has problems with the circuit boards, it can be easily fixed by the PPDT1v2 team. For the recommendation, PPDT1v2 uses LED and a 16x2 LCD to display the output but the writer suggests using a touchscreen LCD module for future development because it looks more futuristic and it will be easier to interact. Students do not have to use jumper wires to jump from one gate to another instead they will just use the touchscreen LCD and use the virtual reality jumper wires. Thus the trainer will look and feel more premium.

ACKNOWLEDGEMENT

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ISLAMIC FINANCIAL LITERACY AMONG TVET STUDENTS

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ABSTRACT

Financial literacy is an essential attribute that allows people to reach a successful financial state. Hence, Islamic financial literacy also has become an increasingly important ability in today's complex world. Thus, the objective of this paper is to suggest a model to measure Islamic financial literacy, testing invariance in the proposed measure from three scales: financial knowledge, financial attitude and financial behaviour. From literature, young people are among the least financially literate demographic groups. In this sense, an Islamic financial literacy survey was conducted among students of Ungku Omar Polytechnic as one of the established TVET institution in Malaysia. This research is the first effort to measure Islamic financial literacy among TVET students in Malaysia. The survey is based upon the instruments developed by the Organisation for Economic Co-operation and Development (OECD). For an analysis of the collected data, Structural Equations Modelling (SEM) was employed using SmartPLS 3.0. The suggested model indicates that Islamic financial literacy is affected positively and significantly with financial behaviour and financial attitudes but not with financial knowledge. According to OECD, global problem is the inadequacy level of financial literacy, therefore it is appropriate to research this issue in depth. This paper deals with defining literacy in a general way in the first part, further with Islamic financial literacy, selected surveys in this area as well as defining the indicators of Islamic financial literacy.

Keywords: Islamic Financial Literacy, Financial Literacy, Financial Attitude, Financial Knowledge, Financial Behaviour

1. INTRODUCTION

Aftermath the global financial crisis during 1997 and 2008 Great Recession, many countries progressively promoted financial literacy as an essential financial inclusion skill through numerous global initiatives and became part and parcel of national strategies of financial inclusion. The importance of financial literacy not only among adults but also among youth or students in order for them to make important financial decision for their future as they transition into adulthood (Sazana et al., 2018a). Previous studies report that financial literacy levels among respondents of surveys are alarmingly low in many countries (Sekita, 2011) especially among youth (Sazana et al 2018a). Little (2014) also mentioned that many people nowadays do not have the basic skills of budgeting and balancing their checkbook, which this can be as an evident of their financial illiteracy that affects them into a large amount of credit card debt.

As cited by Nguyen (2013), popular definitions of financial literacy include: (1) having knowledge in multiple financial concepts; (2) having the ability to manage finances; (3) having the ability to make positive financial decisions; and (4) increasing one's financial capability so one can invest in his or her future endeavors (Huang et al., 2013; Remund, 2010; Scott, 2010; Willis, 2009). Financial literacy underlines equipment of individuals with certain awareness, knowledge, skill, attitude, and behaviors in regards to their financial decision making. Financial literacy is operationalized at the OECD/INFE questionnaire in three dimensions; financial knowledge, financial behavior, and financial attitudes (OECD, 2013). Islamic financial literacy is an Islamic financial knowledge means "the stock of knowledge that one acquires through education and/or experience specifically related to essential Islamic finance concepts and products" (Abdullah and Anderson, 2015). Islamic financial literacy simply refers to financial literacy specific to Islamic financial products and concepts (Nabee Mohomed, 2015). Abdullah & Chong (2014) proposed the conceptual definition of Islamic financial literacy as "the ability of a person to use financial knowledge, skill and attitude (OECD, 2012) in managing financial resources according to the Islamic teachings".

Financial Knowledge is an important component of financial literacy, necessary for undertaking activities such as following news about the economy and financial landscape, comparing financial products and services and making appropriate, well-informed financial decisions (OECD, 2017). Financial Behavior is the action or reaction of a person in response to financial decisions (Kehiaian, 2012). The actions and behaviors of consumers are what ultimately shape their financial situations and well-being in both the short and longer-term (OECD, 2017). Financial Attitude is a sufficient knowledge and ability to act in a particular way that will influence the decision of whether or not to act (OECD, 2017).

The development of validated constructs for Islamic financial literacy is crucial since most contemporary research only focuses on conventional financial literacy which contains some elements that are not compatible with the principles of Islamic teaching (Sazana et al., 2018c). In view of above concerns, this study is focusing on assessing financial literacy within the context of Islamic practices among college students particularly business and finance students of Malaysian Polytechnics. Specifically, Islamic financial literacy is considered a new area with very limited literature (Sazana et al., 2018b). This research contributes to fill this gap by studying the extent of the relationship between financial knowledge, financial behavior, and financial attitude towards Islamic financial literacy particularly among college students.

2. METHODOLOGY

The purpose of this research is to examine the determinant factors of Islamic financial literacy among the students of Ungku Omar Polytechnic as the pioneer TVET institution in Malaysia. The determinant factors that were tested in this research are the independent variables (financial knowledge, financial behavior and financial attitude), and the dependent variable (Islamic financial literacy). This research used previous literature to develop a list of determinant factors. The data for this study was compiled from a distribution of questionnaires given to a sample of the population in Ungku Omar Polytechnic. The data was analyzed using SmartPLS 3.0.

2.1 Research Design

This research used the "descriptive and exploratory" approaches. A descriptive study refers to one designed primarily to describe what is going on or what exists whereas an exploratory study is undertaken when few researches have been conducted in an area and little information is available (Sekaran, 2003). In this research, a descriptive research was conducted in the form of descriptive surveys to assess the determinant factors of Islamic financial literacy among TVET students such as Ungku Omar Polytechnic. The exploratory research method is required because limited existing research works are available in the area of Islamic financial literacy especially in the context of Malaysia.

The variables were developed based on Islamic financial literacy questionnaire administered to the respondents. The questionnaire was divided into five subsections which are demographic factors, financial knowledge, financial behavior, financial attitude and Islamic financial literacy. None of the previous studies have employed a factor analysis to examine the relationships between variables in the research of Islamic financial literacy. Thus, this study contributed to the existing literature by providing a methodologically rigorous approach to modeling and predicting TVET students' Islamic financial literacy. Factor analysis was utilized to examine the hypotheses in this research. Three hypotheses were being tested as the following:

Hypothesis 1: Financial knowledge has a positive and significant relationship with Islamic financial literacy
Hypothesis 2: Financial behavior has a positive and significant relationship with Islamic financial literacy
Hypothesis 3: Financial attitude has a positive and significant relationship with Islamic financial literacy

2.2 Sampling and Population

In order to fulfill the objective of this research which aims to understand the Islamic financial literacy and its determinants, this research only focused on the population of Commerce Department' final year students of Ungku Omar Polytechnic.

The offer and demand of Islamic finance products and services in our banking and finance industries cannot be repudiate any more. For that reason, it is very significant to understand and examine the determinant factors of Islamic financial literacy among final semester students who possess academic knowledge especially in finance matters. Among others, current students specifically commerce background students are one of our future promising generation who shall apply their knowledge when using finance products and services not only in conventional context but also in the Islamic context.

Therefore, the respondents for this research was focused only among Commerce Department's final year students in Ungku Omar Polytechnic as they had finished financial courses in their curriculum and able to applied it in their future transactions of Islamic finance products and services. Thus, the population for this research were among final year of Commerce Department students, Ungku Omar Polytechnic. For that reason, to avoid biasness in the research result, the non-commerce department students (i.e., engineering, information technology and hospitality) were not chosen as the respondents in this research on the justification that they do not have the academic knowledge on finance matters as they are not studying financial knowledge in their academic curriculum. Form the total of academic programs in Commerce Department of Ungku Omar Polytechnic which comprises of five programs at diploma level namely, accountancy, finance and banking, finance and Islamic banking, retailing management and business studies, only two programs were chosen for the distribution of questionnaires, which are banking & finance and business studies students for the purpose of data analyzed.

Below is the sampling table by using proportionate stratified random sampling. Accordingly, application of stratified sampling method involves dividing population into different subgroups (strata) and selecting subjects from each stratum in a proportionate manner. The stratification for this sampling by choosing only from two programs of final year Commerce Department students which were Diploma in Banking & Finance and Diploma in Business studies. The number of sampling is according to Krejcie and Morgan Table (1970).

Table 1
Number of Population and Sampling

	Number of Population	Number of Sampling
Final Year of Diploma in Banking & Finance	60	52
Final Year of Diploma in Business Studies	68	59
TOTAL	128	111

2.3 Sampling Techniques and Research Instruments

Sampling is defined as the process of selecting a group of subjects for a study in such a way that the individuals represent the larger group from which they were selected (Gay, 1987). Gay (1995) confirmed that the minimum acceptable sample size depends on the type of research: descriptive research should be 10% of the population; correlational research should be 30 subjects; causal-comparative research should be 30 subjects in determining the sample size, and experimental research should be 15 subjects per group.

Using a calculation of 5% margin of error, 95% confidence level, and the total number of populations was 128 respondents, Raosoft's website calculator assisted with identifying that a sample size of 97 is necessary to represent the students of Commerce background students in Polytechnics (Raosoft, 2013). It is assumed that respondents would opt out of the study, respondents would start and not complete the study, and recruiting additional respondents would not be needed as the number of sample population for this study was 97 students. The questionnaires were administered and collected personally by the researcher.

A quantitative approach was adopted and primary data was collected via a questionnaire. It should be noted that some improvement on the items were made and added to the constructs to ensure compatibility with the area of Islamic financial literacy as well as the context of the study. All constructs were measured based on five-point Likert scale ranging from 1 "strongly agree" to 5 "strongly disagree." The validity and reliability of the questions were also being tested through Pilot Test (cronbach alpha value was 0.691).

3. RESULTS AND DISCUSSIONS

To measure Islamic financial literacy, the constructs were fully developed by the researchers as uni-dimensional variable. The determinant factors are identified based on previous studies which established the relationship between Islamic financial literacy and the following three factors, namely financial knowledge, financial behaviour, financial attitude (OECD, 2017). First, the researcher used SPSS version 23.0 to process the descriptive statistics and reliability analysis on the collected data and to assess the demographic profile of the sample and the internal consistency of the constructs.

Table 2
Respondent's Profile

Demographic characteristic		Total	%
Gender	Male	22	23
	Female	75	77
Age	21 years' old	92	95
	>21 years' old	5	5
Program	Diploma in Banking & Finance	56	58
	Diploma in Business Studies		42
Religion	Islam	41	100
		97	

To analyse the research model, the researcher used Partial Least Squares (PLS) analysis with SmartPLS 3.0 software. Following the recommended two-stage analytical procedures for SEM, the measurement model (validity and reliability of the measures) was tested and then the structural model (Hair, Hult, Ringle, & Sarstedt, 2013) was examined.

First, the measurement model was tested for convergent validity. This was assessed through factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). Table 3 shows that most item loadings exceeded the recommended value of 0.60 (Chin et al., 2008) except items FK1, FB1, FB2, FA2, IFL1 and IFL2. Composite reliability values, which depict the degree to which the construct indicators indicate the latent construct, exceeded the recommended value of 0.70 while average variance extracted, which reflects the overall amount of variance in the indicators accounted for by the latent construct, at the recommended value of 0.49 to 0.59.

Table 3
Validity and reliability of constructs

Constructs		Items	Loadings	Cronbach Alpha	AVE	CR
Financial Knowledge	FK1	Types of Islamic financial products and services	0.504	0.701	0.529	0.814
	FK2	The objectives of *maqasid shariah* is to protect religion (*al-din*), life, intellectual, dignity/descendants and property	0.820			
	FK3	The forbidden elements in Islamic transaction is *riba* (interest), *gharar* (uncertainty), *maysir* (gambling) and other prohibited elements	0.755			
	FK4	The major sources of funds for unfortunate people is from *Zakat* and *Waqaf* funds	0.787			
Financial Behavior	FB1	Pay bills on time	0.495	0.652	0.485	0.780
	FB2	Transaction dealings with trusted people only	0.519			
	FB3	Always perform prayer to gain relief and protection in financial aspects	0.831			
	FB4	Always keep away from earning through *haram*(prohibited) transactions	0.858			

Constructs	Items		Loadings	Cronbach Alpha	AVE	CR
Financial Attitude	FA1	Financial strength and comfort come from the practices of Islam	0.754	0.751	0.593	0.842
	FA2	The prohibition of *riba* (interest) in Islam is established by the Quran	0.369			
	FA3	Understand that financial situation is in the hand of Allah	0.905			
	FA4	Having faith that Allah will always fulfil the financial needs	0.921			
Islamic Financial Literacy	IFL1	Awareness on the availability of Islamic instruments in the market	0.535	0.660	0.502	0.785
	IFL2	Investment activity is only in permissible activities by Islamic teaching	0.395			
	IFL3	Believes dan practices are according to Islamic religion in all financial matters	0.844			
	IFL4	Financial matter is one of many ways to perform the duties as servant of Allah	0.924			

To assess the structural model, Hair et al. (2013) suggested looking at the R^2, beta (β), and corresponding t-values via boot- strapping procedure with a resample of 5000. Financial knowledge negatively and insignificantly affected Islamic financial literacy (β =-0.045). Financial behaviour positively and significantly affected Islamic financial literacy (β =0.671). Financial attitude positively and significantly affected Islamic financial literacy (β =0.333). Thus hypothesis 1 was not supported. However, hypothesis 2 and hypothesis 3 were all supported. Moreover, the independent variables explain 80.2% of variance in dependent variable (R^2=0.802). The R^2 values of 0.802 are higher than the 0.26 value that Cohen (1988) suggests would indicate a substantial model.

Fig. 1. Structural Equation Model
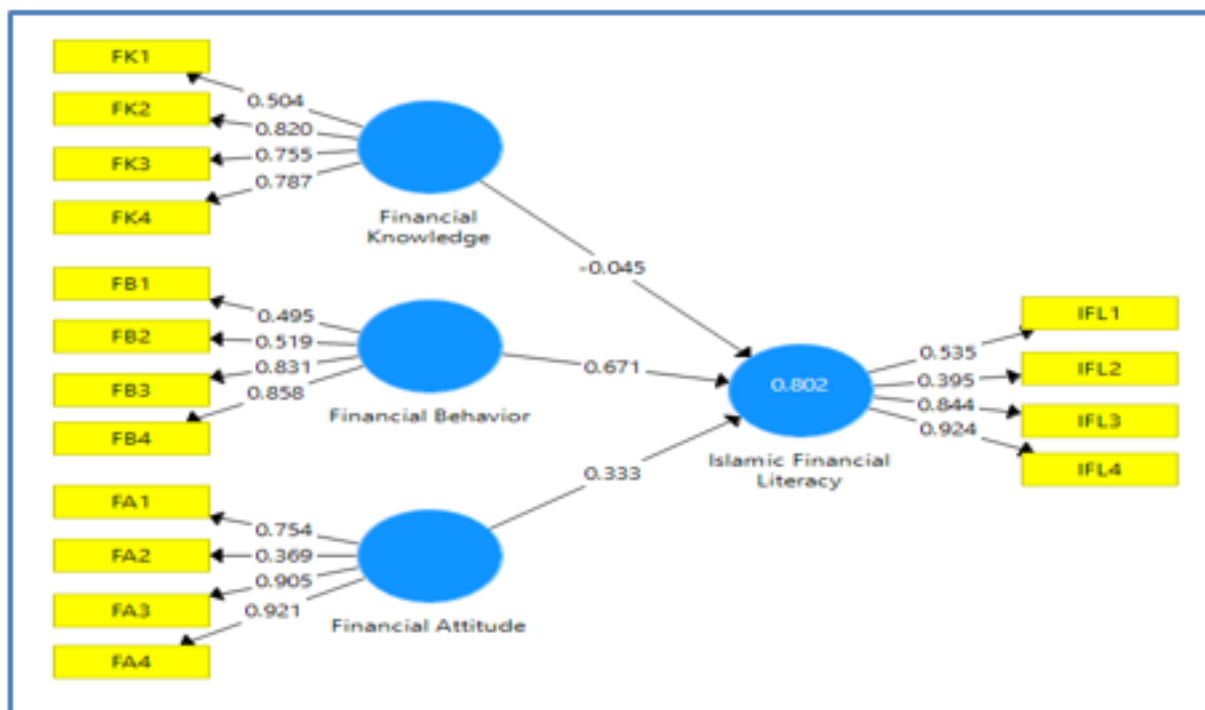
4. CONCLUSIONS

As the conclusion, the structural equation model (Fig. 1.) above indicates that Islamic financial literacy is affected positively and significantly with financial behaviour and financial attitudes but not with financial knowledge. Hypothesis 1 was not supported, but hypothesis 2 and hypothesis 3 were all supported. Therefore, the objectives of this studies were answered through the analysis and discussion from the previous part.

This is a preliminary study seeking to understand the factors effecting Islamic financial literacy among TVET students. Due to limited population and sampling size which covered one TVET institution only, it would be interesting to see future studies to include more TVET institutions in Malaysia. Therefore, the results for future studies can be generalized to the broader population. It is strongly hope that this research will not only contribute significantly towards the literature of Islamic finance but also it will help to build a universal financial framework that financial educators, credit counsellors, and debtor educators would use to improve financial literacy that parallel with Islamic teaching.

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AN EVALUATION OF INTERNSHIP PROGRAMME BASED ON KNOWLEDGE AND SOFTSKLILL COMPETENCY

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ABSTRACT

The internship programs have become an important learning tool and being recognized as an important way of strengthening soft skills and preparing students for their future profession. Therefore, Higher Educational Institutions need to distinguish the knowledge and soft skill levels of their students so that strategies and intervention could be implemented to rectify their capabilities. The main purpose of this study is to evaluate the knowledge and soft skill competency from the visiting lecturer's viewpoints on Politeknik Tuanku Syed Sirajuddin (PTSS) engineering students participating in the internship program. A total of 53 intern students from the Mechanical and Electrical Engineering students had participated in this study. A questionnaire was designed to collect data and was analyzed using SPSS 23.0. The value of Cronbach's alpha for the whole items was 0.958. The results of this study indicated that visiting lecturer's were satisfied with the knowledge and soft skill competency portrayed by PTSS engineering students in preparing themselves for the real work environment. Besides, there was no significant difference in soft skills among Mechanical and Electrical Engineering students. At the same time, some suggestions were given by the visiting lecturers to overcome certain weaknesses of the students is listed soft skill criteria's.

Keywords: internship program, soft skills

1. INTRODUCTION

An Internship is a learning approach that is one of the major educational strategies in the world, Hasan [3]. To produce effective education lead to skilled individuals and to meet the industry-required skills then mutual learning needs to be developed. The purpose of industrial training according to Hasanefendic [5] is to create synergies between knowledge, work and learning, and application of practical knowledge in real work situations. Training will also speed up students to identify their weaknesses and capabilities to reduce the gap between existing conditions and work expectations as set by the organization, Halizawati [4].

Ministry of Education through the Malaysia Education Blueprint 2013-2025 has laid down technical and vocational education as one of the core areas to be paid attention to produce skilled and quality human capital as well as meeting the country's aspirations of having skilled manpower. For that reason, the link between education and industry institutions has become one of the key pillars of the ministry to ensure that the workforce produced in their respective institutions is in line with industry requirements Hasanefendic [5]. He noted that developed nations such as Germany, France, and Japan have proven that industry is an area that spurs the economy and their country's income. These countries have also shown the benefits of technical education leading to innovation and excellence in engineering. In fact, in the developed world, the technical education institution is also a platform that balances the needs of skilled manpower with other professions.

In Malaysia, rapid changes in technology and promising economic growth have led to a demand for vocational education and training organizations in producing students who can compete in the globalization era, Minghat [8]. The Economic Planning Unit of Malaysia (EPU) states that Malaysia needs to improve and improve the quality of the workforce by raising educated and skilled human capital. For that reason, the government has implemented various initiatives including the upgrading of Polytechnics. The existence of polytechnic is one of the approaches to the education system in Malaysia to reduce the mismatch among students with the needs of the workforce in the industrial sector.

Therefore, to be an institution of choice in technical and vocational education, the polytechnic management should strive to make polytechnics a premier institution and subsequently the graduates are fulfilling the needs of employers as well as the work market today. Graduates currently employed by the employer are those with technical skills and employability skills.

Therefore, this study aims
1. To evaluate the skills of employability of polytechnic engineering students as they undergo industrial training.
2. To evaluate is there any significant difference skills among mechanical and electrical engineering students

The findings of the investigation will be helpful for the polytechnic to identify loopholes in the offered programs, hence some necessary actions can be planned to overcome the problems.

2. PROBLEM STATEMENT

Industrial training is important to prepare graduates with job skills and make them ready for the job world after graduation, Zhao & Liden, [15]. Industrial training should be taken seriously to ensure that students are ready to enter the job market with the skills and knowledge provided while undergoing studies at educational institutions. Through this industrial training program, polytechnic students are expected to be able to compete with students and graduates from other training institutions and colleges to position themselves in a challenging job market.

However, according to Hasanefendic [5], the implementation of industrial training will not achieve the goal if there is no assessment on the effectiveness of industrial training conducted by the students. The need to study the effectiveness of industrial training was highlighted by Peterson [11] where he stated that the determination and analysis of industrial training must be made systematically and thoroughly as there were industrial training that often caused problems from solving problems. Thus, in order to achieve the goal of industrial training, the objective of the industrial training set up should take into account the factors that can improve the effectiveness of industrial training.

A study by Azman [1] on industry training students found that students involved in industrial training were often used by employers to do administrative work such as printing jobs, sending letters and other tasks that were not related to their field of study. According to him again, it is very detrimental to the trainers they do not learn what to do. While the study by Chen [2] found that the employer did not provide a suitable training place with the aim of industrial training. In some studies on the effectiveness of industrial training such as the study by Parent and Williamson [10], Shazaitul Azreen [13] found that the level of effectiveness of industry training at the middle level. They also argued that every industrial training a student had to be monitored by educational institutions so that students acquired knowledge for their future careers.

Meanwhile, according to Rashid [12], industrial training became useless as trainees did not receive proper training during industrial training, Hasanefendic [5]. Some feedback received from the employers and trainees showed that the level of effectiveness of the industry training was moderate, Muhammad Zul Azri [9]. The findings of the study by Shazaitul Azreen [13] found that the level of application of what was learned while in the classroom was at a minimum. Coaches can not apply what is learned in industrial training due to a lack of trust by employers to trainees as well as no support from older employees. The implication, the goal of implementing industrial training by the institution is stunted and trainees do not have the experience they need before graduating.

For justification, it is important to assess the effectiveness of the industry's training. However, the practice of assessing the effectiveness of training in Malaysia is often missed and does not follow the proper performance indicators. The effectiveness of the assessment of the polytechnic industry training will improve if the evaluation process is conducted in a transparently and systematically manner based on the correct performance measurement. Through the evaluation phase as well, the ministry is not only able to identify the level of effectiveness of industry training but at the same time identify the factors that prevent and support the polytechnic students' industrial training.

3. METHODOLOGY

There were 36 organizations involved in placing PTSS engineering students for internship programs for June 2018 session and the training may take six months. Some of these organizations have been participating in the industrial training programs for many years and others may be first-timers. However, such status will not be a major barrier in their assessment of students' performance. List of skills as highlighted by Mihail [7] is used as a basis to identify skills that should be attained by the students from this study. The questionnaire focuses on four dimensions of soft skills which are (i) effective communication, (ii) policies, procedures, and regulations, (iii) professional ethics and (iv) reporting.

3.1 Evaluation of the knowledge and skills of polytechnic engineering students

Feedbacks from visiting lecturer's on the performance of PTSS engineering students from their experience with the industrial training programs were obtained. A group of students from mechanical and electrical engineering programs who went for an internship in June 2018 session was chosen as a population and the distribution of students' academic programs is tabulated in Table 1.

Table 1: Students involved in the industrial training program June 2018 session.

No.	Academic Programs	Number Of Students
1	Diploma in Mechanical engineering	33
2	Diploma in Electrical engineering	20

The questionnaire asked the lecturers to rate on a five-point scale the skills possessed by the students. The mean acquisition is categorized based on mean interpretation as in Table 2.

Table 2 : Mean Interpretation

Mean	1.00 – 1.67	1.68 – 3.33	3.34 – 5.00
Mean Interpretation	Low	Medium	High

*Adapted from Wiersma [14]

3.2 Evaluation of is there any significant difference skills among mechanical and electrical engineering students.

Null hypothesis (H0) : there is no significant difference in soft skillls between mechanical and electrical engineering students.

The questionnaire was analysed to find out the differences between mechanical and electrical engineering students' skills by using the independent t-test. The results obtained depends on the following condition:
The 2-point significance level used was 0.05, then if
•	Significant value > 0.05, Ho accepted
•	Significant value < 0.05, Ho rejected

4. RESULTS AND DISCUSSIONS

Based on Table 3, it shows that visiting lecturers have a high satisfaction on each element in skills possess by trainees who undergo the industrial training in their company. Generally, one may notice that almost majority of the lecturers rated their trainees between a scale of 4 to 5. The trainees give a good example during the industrial training as shown in the mean value in the range of 4.0 to 5.0 as shown in Table 3. The three highest means of lecturers agreed that they are in policies, procedures & regulations and professional ethics. By looking at this figure, it can be noticed that visiting lecturers gave such an excellent impression to the trainees. As an engineering student, it is important to project good personality and attitude in order to become professional engineers. This study continued to examine the ability of the students in meeting the industry needs. Data has shown that students who undergone industrial training has the characteristics set forth by the market. They are able to give full commitment to the organisation.

Table 3: Mean For Each Item

No.	Element	Mean (M)	Standard Deviation (SD)
1	Effective communication	4.53	0.575
		4.57	0.605
2	Policies, procedures and regulation	4.66	0.553
		4.72	0.455
		4.74	0.445
3	Professional ethics	4.32	0.956
		4.58	0.570
		4.62	0.596
		4.64	0.558
		4.62	0.627
		4.53	0.668
		4.53	0.639
4	Reporting	4.23	0.993
		4.15	0.988
		4.13	0.921

Even though the result shows that visiting lecturer's satisfied with student's performance but in some areas especially in reporting feel that student's skill still lacks. The report or journal is a daily and weekly record of student activities during their internship submitted to the industrial supervisor for assessment periodically. Besides, students need to write a summary in which they are to give a brief of the technical aspect of their training. As a result, several short courses should be conducted in the future to develop those skills needed. It's in line with studied by Hazmilah Hasan et al., [6] concluded that the employer's had presented evidence which highlights the weakness of the student's performance primarily on documentation writing, and the university has been sought to guide them to overcome this. The employers also recommended that the university revisit its curriculum so as to balance the theoretical and practical aspect of the engineering education. According to the employers, there is indication that students find it difficult to understand and perform during their placement in the industry. These statements corroborated the fact that the university and the industry have to initiate and exert on the collaborative agreement to explore how each party can complement one another.

To determine the second objective of this study, the Independent T-Test from SPSS software was used to analyse the questions. From Table 4, T-Test indicated that the studies significant value is 0.783, 0.409, 0.882 and 0.568, which is very much higher than 0.05 (assume value), thus revealed that there is not enough evidence from the data to reject the Null hypothesis. Therefore, it can be concluded here that there is no significant difference in soft skillls between mechanical and electrical engineering students.

Table 4: Independent T-Test Result

Item	Factor	N	Mean	SD	df	t	sig	Result
Effective Communication	Mechanical	33	4.55	0.564	51	0.276	0.783	H_0 accepted
	Electrical	20	4.50	0.607				
Policies, procedures and regulation	Mechanical	33	4.76	0.435		0.832	0.409	H_0 accepted
	Electrical	20	4.65	0.686				
Professional ethics	Mechanical	33	4.58	0.614		-	0.882	H_0 accepted
	Electrical	20	4.60	0.503		0.149		
Reporting	Mechanical	33	4.21	0.992		0.575	0.568	H_0 accepted
	Electrical	20	4.05	0.999				

5. CONCLUSION

The present paper reveals that PTSS engineering students' performance in industrial training is at a high satisfactory level regarding their personal and core skills. The information gathered can provide important insights from the perspective of visiting lecturers which is valuable in improving the overall soft skills competency for future professionals. Exposure to industry practice is vital for students to acquire employability skills through industrial experience. Next, this result can be understood that mechanical and electrical students are having similar performance despite the differences in teaching and learning approaches by the polytechnics. Thus, it can be concluded that the issue of lack of basic knowledge and incompetence in writing and reporting occurs among the students. A more strategic plan that includes a smart collaboration between universities and industry must be carried out to minimize such weaknesses.

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INTEGRATING RELIGION INTO MATHEMATICS EDUCATION IN HIGHER EDUCATION INSTITUTION

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ABSTRACT

Religion plays a decisive role in large aspects of life, including generating motivation and inspiration in learning and developing certain knowledge. Needless to say, mathematics is an elusive subject regarded by many students in higher education. By scrutinizing religious doctrine in term of mathematics and the duty to study, religion may deliver its relevance in today situation, a life that demands high skill in mathematics. This study, using library research method, demonstrates applicable functions of religion, as motivation and inspiration, that can underpin the academic activities, especially learning and developing mathematics concepts in a higher education institution. The concept of 'sacred science' from Seyyed Hossein Nasr was employed to reveal the pivotal role of religion, especially Islam, in searching for knowledge. Nasr believed that God as transcendent supreme reality emanates in a profane world. Therefore, an effort to understanding reality and its mathematical structure is a form of intimacy to God. This indicates that religion still has its significance in mundane academic activities. The teaching-learning process of mathematics will be more meaningful by inserting religion as motivation and inspiration.

Keywords: Integration, sacred science, mathematics education, higher education

1. INTRODUCTION

It is generally understood that religion and mathematics are two different things, and are conflicting in some aspects [1]. Religion comes from a revelation that requires total faith. On the other hand, mathematics is more demanding for logic and proof activities. Both of these characteristics seem contradictory; therefore, religion is considered to have no role and relevance in every part of mathematics, both its contents and teachings.

The assumption above is indeed common in this modern era, but the history of mathematics records that religion and mathematics have strong ties [2]. In a broad sense, there is no definite boundary that can strictly separate religion and mathematics. Both have many dimensions, furthermore, there are certain dimensions of the two that intersect with each other [3]. So, by exploring further in the multi-facet dimensions of religion and mathematics, this study will reveal the existence of the possible integration between them. Hopefully, this contact can lead a mutually beneficial form of cooperation.

Teaching mathematics in universities has a strong character in instilling logic and a good understanding of concepts, as well as engaging in context, and establishing a fair and democratic learning environment [4]. Mathematics education does not only emphasize the cognitive side, but also affective aspects such as values and motivation [5]. These aspects contribute to perseverance in mathematics learning and the formation of inclusive classes that are welcoming to various ideas. On this basis, another side of education is needed that does not merely talk about the content and material of mathematics education. The religiosity, beliefs and spirituality of educational practitioners are important aspects that contribute to the quality of learning and mathematical progress. Those kinds of aspects require more attention to be studied further [6-8].

On the other hand, teaching on religious values should not be restricted in religious education courses, but crossed over in other class, including science and mathematics courses [9]. Therefore, exploration of the role and function of religious entities in science and mathematics must be studied moreover.

The initial stage, before stepping further in exploring the existence of religious entities in mathematics classrooms, is necessary to redefine the meaning of religion. In a broad understanding, religion is generally understood as something related to the appearance of God(numinous) [10-11]. This definition is not imperfect, but it will raise new questions about the meaning of God. It arrives at circular reasoning. Rudolf Otto described religion as Mysterium tremendum et fascinans, but this understanding can refer to arbitrary reality [12]. Subsequently, it can obscure the line between religious reality and other worldly entities.

Some of the more detailed definition of religion, in the viewpoint of the social sciences, proffered by Weber and Durkheim. Weber noticed religion as a social reality [13]. Whereas Durkheim understands it as an entity that contains sacredness and is used as forming social ties [14]. Indeed, religious reality cannot be clearly defined with no ambivalence in it. So, what is needed is not a correct definition, but a functional definition that can be used to understand a social phenomenon of religious experience. Therefore, it should be interpreted as granting religious traits. Namely, the form of experience that presents a transcendent understanding, perception behind reality or meta-reality and relations with the highest entity that is outside humankind.

With the understanding that religion as a transcendent, sacred and referring to a supreme-being entity, religious forms can be seen in various phenomena in the classroom, in a form of behaviours, understandings, thoughts or beliefs that can be observed empirically. Religion that is understood formally and institutionally restricts out landscape to perceive the forms of spirituality and sacredness existing in mathematical activities. Instead of giving a clear picture, the narrow understanding of it delivers us to perceive that mathematical activities are void from spirituality.

This research will be useful to be able to see how religion can enter and play a role in mathematics education activities. To achieve that, the thing to do is to see that religion is a large entity and has many dimensions, so it cannot be understood formally and institutionally, by referring merely to scriptures, ecclesiastical doctrines and rituals. With this understanding, we can observe the forms of spirituality in daily life that are experienced by mathematics learners. Furthermore, various studies on how the role of religion and belief in the classroom will be discussed. So far, there is a very little amount of research about the correlation between mathematics education and religion. Some related studies had put religion as a form of psychological phenomena of education, such as religious motivation, encouragement of devotion and as other affective forms.

The main purpose of this study is not only to see how the role of religion in mathematics classes, but also how it can be used for the progress of mathematics and education in higher education. Therefore, this paper will discuss theories about the integration of religion and mathematics. The theoretical review has also touched on the discussion about the integration of science and religion. To be honest, there are more studies on religion and science than the study of religion and mathematics. Hopefully, the comprehensions taken from the study of science and religion can inspire and be applied in the field of mathematics, with a certain bold note surely.

The study that examines how the role of religion, especially aspects of belief, in a special space in mathematics education is the study of Goldin [15]. With the perspective of educational psychology, they examine the affective side and its role in mathematics education. On this perspective, they can see how the role of religion, which is manifested in affective form, can contribute to the teaching of mathematics. The spirit of teaching from the encouragement of faith and religious doctrine can be applied in mathematics classes. In addition, forms of spirituality such as conceptualization of reality always appear in mathematics can be regarded as a religious experience [16-18].

Also, religious teachings about justice can be employed in education. We can recognise how an enduring position, a religious belief that forms a consistent attitude or habits of a person, can contribute to learning [17]. Several ethical values such as service, humanity, justice that is performed in the classroom, actually rooted in the deep spiritual realm and one's belief. The social dimensions of science (including mathematics) and religion enable them to collaborate actively [18]. Religious forms that are transformed into other forms are defined as implicit religion [19] Besides the phenomenon of insertion of religion into a classroom, there is also an understanding that spirituality arises in a space that is considered secular.

Spirituality is not only present in the religious space but is also possible to emerge in daily activities, including mathematics [20-21]. At least, there are four forms of spirituality present in mathematical activities. Pragmatic Platonism in mathematics, the forms of beauty in mathematics, patterns and regularity in mathematics, and finally the mystical view given to mathematics where religion and spirituality are widely understood, so that they are not closed only to the teachings of religious doctrines, but experiences of the transcendent and sacred.

In special studies on Islam, the integration of religion and mathematics is rarely found, but they are more focused on Islam and science. Even like that, science can be interpreted as knowledge (Nasr; Sardar; Amin Abdullah), which allows mathematics to enter into it. Views on the forms of science and mathematics in the Qur'an are widely studied. However, some thinkers try to go beyond the method of matching that period. The concept of sacred science (Nasr), Islamization of Science (Alfaruqi), and Ijmali (Sardar) [22]. There is a view that contradicts with the previous scholars who eager to constitute Islamic science, Hoodboy and Salam consider that science free-value that is not necessary to be changed into Islamic form [23-24]. Of these various concepts, there is still little talk about how spirituality exists in mathematics, except Nasr. But it is still far from the comprehensive and systematic concept that present in a single work. However, Nasr presents resinous understanding about interwoven connections between religion and mathematics. He has proposed that we (Moslem) must return to the old view of the world, and present the traditional knowledge (gnostic) in Islam.

It is not easy to find and even integrate religion in mathematics education classrooms, especially in universities. But, fortunately, from a little clue from some of the existing studies, it was founded that there are at least two entrances for religion to insert mathematics classroom. First, the role of religion is interpreted as an affective form, such as motivation and calls to worship, in mathematics learning. Second, the redefinition of mathematics and religion, which enables the linking of several dimensions both with the emergence of daily religiosity and sacred mathematics.

In this study, the discussion will focus on the issue of how the role of the affective domain, which originates from religion, plays a role in improving the quality of mathematics learning. The next focus is to reveal how religion, as a viewpoint of reality and the concept of sacred knowledge, is able to arrange the integration into mathematical activities. The results of the study in the form of integration will be drawn into the realm of mathematics in tertiary institutions.

Some concepts that underlie the study will be discussed further to be able to meet the focus of research. Concepts such as belief in the mathematics classroom, sacred science and higher education's math teaching will be discussed in more depth. The three studies will expose: 1) the form of religion in the classroom that has been transformed, 2) the facets of religiosity in mathematical activities, 3) the application of the integration of mathematics and religion in mathematics education in universities.

Gerald Goldin, Bettina Rösken and Günter Törner explained in their writing, "Beliefs - No Longer a Hidden Variable in Mathematical Teaching and Learning Processes," about how religion can be present in mathematics learning. This study is very rare and interesting, but there are two problems, first reducing religion to a psychological entity. Secondly, it has not revealed religion in the internal side of mathematics itself.

The study of Voss, Leach and Kessler has provided a breakthrough, or even radical, view of seeing mathematics as nothing but a religious activity. However, with this precisely fade the role of religion itself. As if religion in its formal form, Christianity, Islam, etc., do not need to be present, because mathematics is religion itself. On this basis, there should be additional study.

Nasr's opinion about Islam and the connectivity between humans, nature and God, as well as his perspective on science, including mathematics, are valuable ideas that can be studied further. This research will stretch Nasr's thinking into the realm of mathematics and teaching in tertiary institutions.

The research used the literature study research method to uncover the focus of the research. Various literature related to the theme and focus of the study had been read and analyzed to be able to answer various problems in this study. Qualitative data analysis was used to look at patterns in the data and to describe the results.

2. METHODOLOGY

2.1 Research approaches and methods

This study used qualitative research methods. Qualitative research is one of the descriptive research methods and tends to look for meaning from the data obtained from the results of a study.

This research is a literature study or library research. According to Sugiyono (2012) literature study is a theoretical study, references and other scientific literature relating to culture, values, and norms that develop in the social situation under study [25].

2.2 Research focus

The focus of this study is how the role of affective domains originating from religion plays a role in improving the quality of mathematics learning. Also, this research had revealed how religion, as a perspective of reality and the concept of sacred knowledge is able to compile the concept of integration of religion, especially Islam, in mathematical activities.

2.3 Data analysis technique

In conducting research, researchers used constant comparative method data analysis techniques, namely data analysis that is constantly to compare one datum with other data, then constantly compare categories one with other categories [26].

In this study, data sources were obtained through written sources such as scientific journals, reference books, scientific essays, literature, and other reliable sources both in written form or in digital format that are relevant and related to the object under study. This research tried to integrate religion into mathematics learning in higher institutions education.

3. RESULTS AND DISCUSSIONS

This section will discuss how the possibility of mathematics and religion can integrate. Integration is interpreted as a form of active collaboration to achieve a certain goal. Partial activeness from one side, whether only form religion or mathematics, is not considered a form of integration. Integration requires influential openness and interpenetrating each other.

To observe the idea of integration between religions and mathematics, several concepts will be discussed such as the affective form of religion in the classroom, sacred understanding of mathematics and its application in mathematics education in higher education. However, before discussing the main issues, as a foundation, the meaning of religion will be discussed first. So, there will be no confusion in understanding the interchanging terms such as spiritual, sacred, religion and religiosity.

3.1 Chasing religious meaning

Religion is something elusive, this is because, in reality, religion is very difficult to be given the constraints upon it. Practically-functional, religion is a human effort to describe something that cannot be described, a supreme reality. Because it is an active act (understanding), religion will always move (Pantai Rei) and escape all the strict definitions that try to embrace it [27]. However, as the object of a scientific study, thinkers tried to ensnare the meaning of religion in the series of definitions to help them to be more focused on conducting a phenomenological and empirical study.

Taylor tried to see the essence of every religion. By examining various religions in primitive societies, Taylor defined religion as belief in something spiritual. The initial form of public belief, animism, was a form of worship and belief in the existence of spirits or anima in various objects around them. According to Frazer, religion is not only seen from the belief in its adherents but also its function. Frazer examined how the role of magic in society. Frazer concluded that the function of religion is to understand natural phenomena [28]. Roughly speaking, religion can be understood as a form of reasoning for natural law (Frazer saw it as a rudimentary and savage science). Magic activities aim to control the forces of nature outside of infirm human being. It's like technology in modern society. The influence of the evolutionary theory of social Darwinism affects these two thinkers, thus they perceived indigenous religion and society as the initial stage of the evolutionary process heading to modern society.

Emile Durkheim, following his predecessor, looked for basic forms of religion in a simple society. However, Durkheim further defines religion as a form of social order. The community ties that are intertwined are the result of the existence of religious forms, both in the form of sacred and profane understanding, totems, taboos and rituals. It is this basic element form that functions in shaping society [29]. Durkheim thus viewed religion as a social phenomenon. This premise is used by Peter Berger, in religion as a social construction, which provides the foundation of how religion, which is a social activity, can be seen and studied empirically.

Berger's notion provides a renewal wind by providing that religion is not only seen as the transcendent, mystic and supernatural entity [30]. Transcendent experiences may emerge in an immanent form and enter into world activities. Therefore, religious forms are complex phenomena. His form is always changing shape. They could be personal and private, or be community-based and institutionalized. Religious phenomena do not appear in independent entities but they are always connecting to other entities. Here, we need a broad and comprehensive lens in looking at religious forms [31].

3.2 Religion as an affective dimension in mathematics classes

As a social reality, the religious phenomenon is always in touch with each other. Its appearance is not in a vacuum, but in a particular context which is dense with meaning and other phenomena. Because of its liquid and permeable to all expanses, religion can appear in secular spaces, such as mathematics class [32].

Certain religious beliefs that lie in the understanding of a mathematics teacher can appear not only in the private space but also in the public sphere where he is a teacher of mathematics. Therefore, the religious identity of a teacher and its religious values may appear in the teaching behaviour in the classroom [33].

At a certain level, this understanding underpins contextual religious teaching. That the implementation of religious education is not only on religious subjects but it across to other classes. Various core materials such as goodness, justice and love, devotion are applicable in many other subjects.

The appearance of religious forms in classrooms is legal. So, it is not surprising that Gerald Goldin, Bettina Rösken and Günter Törner state that Beliefs - No Longer a Hidden Variable in Mathematical Teaching and Learning Processes. In their research, they revealed that religious forms which were transformed into various values and beliefs, as well as motivation, love, kindness and justice, could be seen as affective dimensions of education. This affective dimension can make a positive contribution to learning mathematics. Learning motivation sourced from religious doctrines is a variable that can improve the quality of learning

Besides being a motivation for learning, religious doctrine is also able to provide an understanding of the concept of justice to someone. Enduring attitudes and behaviours towards values emerge from religious doctrines. This attitude can manifest in the choice of action in the process of learning mathematics [34]. Treating the student fairly, not discriminating students on their race and identity is an embodiment of religious doctrine. Also, religious values provide provision for teachers and students in creating democratic conditions, stimulating critical thinking and metacognition [35]. At first glance, this is very mundane, but if it is examined more deeply, the behaviour comes from things that are very spiritual and religious.

Religious forms can also appear in the teaching content. Mathematics is a cultural product. Therefore, the mathematical material may be inset culture or history. Then there is an opportunity for material outside mathematics can be included in geometry, arithmetic, number theory and so on, which are purely mathematical fields [36]. If the cultural elements could insert in teaching content, so it is possible for various forms of religion appear in the learning of mathematics.

In the explanation above, it has been revealed that mathematics and its learning are entities that are inclusive and can be entered or connected with other entities, such as cultural, values and religion. In this observation, religious forms can enter into mathematics and its learning in the two realms. First, the learning process/learning techniques, which are shaped by the choices and behaviours of teachers that originate from religious doctrines. Second, religion can enter into learning material/content as a form of contextual/cultural mathematics.

The deep penetration of religion in mathematics and learning occurs in the realm of learning content. As mentioned above, values and religiosity can be supplemented with the learning content. But unfortunately, value and religious entities have not yet become the core content. In sort, religiosity is merely a supplemental material. On the next discussion, we will go further. It will reveal how mathematical material can be interpreted as an embodiment of spirituality and religiosity. In this case, the deepest fusion occurs between religion and mathematics. Hence, religiosity is not regarded as subsidiary material.

3.3 Syed Hossein Nasr's sacred science and perennialism

This section discusses the thoughts of Seyyed Hossein Nasr in particular on his view of nature, humans and science. Nasr revealed that there is a bond between humans, nature and God. Nature is seen as something sacred because it is part of the integration of God. Also, Nasr provided the idea of sacred science, a science that was able to become a religious activity and was able to perceive nature as something sacred. Nasr's view will be drawn into the realm of mathematics, to explain about sacred mathematics. A concept which states that mathematics is a religious activity and aims at God. In detail, Nasr's thoughts will be discussed below.

Nasr considers that in Islamic teachings nature is considered as a form of the embodiment of God (theophany). Nasr gave a theological understanding that God is not only transcendent but also radiates into his creation. God is immanent. This view is a critique of modern science which views nature as something spiritually empty. In Nasr's view, humans must respect nature, because there is a divine part of nature.

Nature as a theophany also gives the consequence that when humans study nature, they are studying divine behaviour. Order, harmony and natural beauty are manifestations of God. The study of nature as a spiritual activity and is a form of worship. An activity to embrace God. These activities are sacred and spiritual, not mundane.

> Nature as a devout Muslim who sees the world as the handiwork of God and considers the observation and study of Nature as a religious duty….. Muslim attitude toward Nature as a purposeful domain in which the power and wisdom of the Creator is manifested [37].

This theological foundation provides an understanding that all scientific activities, both science and mathematics, which try to reveal the harmony of nature are religious activities. Islam, in Nasr's view, assesses worship is not merely a ritual, but learning and understanding reality is part of worshipping God.

Secular understanding of science and mathematics is incompatible with Nasr. Secular science explores nature and performs mathematical abstractions, but they cannot see the presence of God.

> A person may have the aptitude to understand the meaning of symbols, which is itself a precious gift from Heaven, but lack spiritual realization and therefore lack the possibility of ever experiencing the cosmos as theophany [38].

Science and mathematics in a secular view cannot see nature as a cosmic union with the highest entity. Also, they do not consider that their activities are acts of worship. Science is only limited to the methods and technical steps in standard scientific procedures.

Indeed, humans can use their spiritual and intellectual dimensions to seek the ultimate truth that transcends the methods of ordinary science [39]. When a man can penetrate scientific methodology and see his scientific activities as worship, then he will be able to see that the activity is a religious ritual.

To see the highest reality in nature, Nasr proposed a new form of science, namely sacred science. This form of science criticizes modern western science which eliminates the spirituality in it. Sacred science involves a metaphysical view of his observations. Thus, this science not only sees the entity as a matter but as cosmic unity and the manifestation of the divine eminence.

> The aim of such traditional sciences has been to produce not a knowledge of a particular order of reality in a closed system and cut off from other orders of reality and domains of knowledge, but a knowledge which relates the domain in question to higher orders of reality as that knowledge itself is related to higher orders of knowledge [40].

When looking at the law and order of nature, a believer not only sees the relationship between variables and constants, but he sees beauty and harmony as a manifestation of the existence and presence of God. Studying science and mathematics is learning how God governs the universe and how God created nature with extraordinary order.

> What is, in fact, traditional cosmology but a way of allowing the human to contemplate the cosmos itself as an icon! Therefore, both types of knowledge of the cosmos, as viewed from the perspective of sacred knowledge and through eyes which are not cut off from the sanctifying rays of the "eye of the heart," reveal the cosmos as theophany [41].

According to Nasr, scientific activities, including in science and mathematics, should not merely as a fulfilment of the scientific method and verification steps. Furthermore, scientific activity is a sacred path and a rite which tries to present the sacred. Like the sacrament rituals and tawaf in the Kaaba, a human effort to present the unseen, namely God as the highest reality.

3.4 Sacred mathematics

Mathematical activities in western history and Islamic culture are actually very related to religiosity [42]. Historical records say that the Pythagorean sect was a community considering mathematics as a sacred ritual [43]. Numbers and comparisons are manifestations of divine reality. This view is also more or less adopted by Platonism. In Platonism, the nature of reality is an idea. That is something perfect and permanent. Mathematics is a result of idealization of profane reality. Mathematical ideas are considered as a form that is higher than empirical reality.

In Islamic culture, Muslim thinkers paid serious attention to mathematics. Al Khawarizmi and Al Biruni are renowned thinkers who devoted themselves to mathematics [44]. Muslim mathematicians accepted mathematical views as something spiritual but adapted to their faith and theology. Therefore, mathematics in Islamic culture was very strong and was deep-rooted in worship and art.

3.5 Possible integration between religion and mathematics in higher education

Mathematics in universities is taught not only in the mathematics department but in various other departments. Being able to provide a foundation and precision analysis tool makes mathematics widely used in the fields of science, engineering and even social sciences [45]. Because of its extensive implementation, mathematics and teaching require something innovative.

Learning mathematics in universities requires not only an understanding of mathematical concepts but also their application in various fields and their correlation with the social life of humanity [46]. Mathematics in universities is inclusive mathematics, meaning that it must be ready to be positioned in every context of the problem. Therefore, teaching and learning also require openness, equal dialogue and strong motivation [47].

Various characteristics of mathematics education require something outside of mathematics to be something innovative and creative. On this basis, the integration of mathematics and religion is one of the solutions in fostering an inclusive, innovative, contextual and applicable mathematical learning environment.

Based on the above study, there are several strategies for integrating religion and mathematics. First, religious values are transformed into forms of affection that enable students and instructors to act according to these values. With the foundation of good religious values, a learning atmosphere and learning methods that are good and in harmony with religious values are realized. Second, instil the understanding that mathematics is a religious activity. If they view the mathematical activity as sacred and spiritual, it will make them more motivated, enthusiastic, diligent and do it with sincerity in every mathematical activity. Both of these strategies, each has weaknesses, but by doing it together it is expected to be mutually overcome each other's shortcomings.

The integration strategy that has been mentioned can touch the level of actors, learning strategies and learning content. Hopefully, in the future, there will be a more comprehensive study about religion and mathematics in a broader domain such as the education system, school administration and further development of mathematical concepts derived from or motivated from religious doctrine. Various concepts that have been outlined, no matter how good, need the existence of empirical studies and trials. It is hoped that in the future there will be research which will conduct experiments on the concepts that have been elaborated.

4. CONCLUSIONS

The general view is that religion and mathematics are two different things, and in some ways conflicting. However, religion and mathematics have many facets and dimensions. There are dimensions in which both are interlocked and integrated. Based on this view, it will be possible if religion is integrated into mathematics and learning in a higher education institution.

Mathematics education in higher education requires learning that is motivated, inclusive, contextual and applicable in various fields. This requirement opens opportunities for religion and spirituality to take part in the establishment of appropriate mathematics learning.

There are two strategies to integrate mathematics and religion in mathematics education in higher education. First, the transformation of religious values into an affective dimension that encourages the formation of conducive learning. Second, delivering a notion about sacred mathematics. Mathematics is an integral part of the religious system and is a form of religious worship. This notion provides learners with the assurance that mathematics is a religious activity. This view provides spiritual meaning to mathematical activities, which is previously considered as mundane. It is the quality that enables the establishment of an admirable work ethic of mathematics.

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CLEAN WATER QUALITY RESEARCH AND DEVELOPING 1 WATER FOR LIFE WATER FILTER

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ABSTRACT

The project of developing a water filter system "1 Water for Life" is an innovation of building and developing a centralized water treatment system. Research findings from the location that have been visited, it was found out that many problems occurred from the usage of untreated water by the local community. Therefore, an idea of building and developing a clean water treatment that is clean and user-friendly was initiated among the researchers. The system developed used the rapid gravity sand filter method. This system goes through six levels of treatments, starting from getting the water source either from an underground water source or from a river. After that, the water will go through the filtering proses, gravity filtering, oxygenated, oxidation, and storage. This system involves of the installation of three PVC tanks with the size of 500L each, fine sand, rough sand, fine pebbles, rough pebbles, fibre mess, coconut shell charcoal, bamboo charcoal and also PVC pipes. This system has succeeded in treating waters in the island and rural areas that have problematic water situations such as smelly water, murky, brackish, and salty water with unstable PH value. Six parameters have been chosen, which are Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD5), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), ammonia-nitrogen and PH value. This project has been acknowledged and recognized by different agencies from inside and outside of the country (Malaysia). Therefore this social project innovation has a high impact in improving the health level among the communities especially toward those who live in rural areas. Replication of this innovation is easy to be applied and has been done according to the suitability of the concerned location.

Keywords: rapid gravity sand filter, oxygenated, oxidation, pH value.

1. INTRODUCTION

In many developing countries the issue of clean water supply is not a new thing in rural areas. The water system used is irregular and many are having problems using well water and river water as the main source of clean water not enough for such a high demand.

Nature Quality Act (Akta Kualiti Alam Sekitar, AKAS) 1974, defined nature as the physical factors for the areas around humans including soil, water, air, weathers, smells, biological factors for animals, plants and ecstatic social factor. One natural and important fact of human is to have a tendency towards the importance of water. The needs of water involve many daily usages such as for domestic and industrial use. Looking at the importance of water usage in human daily life, the continuity and needs of using water have contributed to the lack of clean water problem. It is clear that now many water sources are contaminated due to the present of dangerous foreign substances wherever the sources are from.

Because of that, alternative clean water sources need to be found to cater the daily needs. Rainwater is one of the main sources of water that can be used as a water supply. Underground water is also a source to overcome the problem. To get clean water, one of the way is by using water from the wells and taking water from the rivers. The usage of water from wells is just by using a pump or a motor to pump water into the water tank in the house, whereas the usage of a tube well is by using a motor or a pump but what differentiate them is that the machine has a filter to filter unclean water from the underground water source.

2. METHODOLOGY

RESEARCH RESULT TOWARDS WATER SUPPLIES

2.1. UNDERGROUND WATER SUPPLY

Earth water is defined as underground water which is found under the water level within the soils and the forming of geologic including:

i. A well, a hole or something like its nature that is dug under the soil, including any channel built and connected with a well that makes it easy for water to be collected.
ii. Any digging into the underground soil strata where the water level of the digging is depending totally or most of it towards the water that enters it from any strata or any earth water that is set.

Physical and chemical character of water

i. The only element found in 3 conditions at a temperature available in our earth.
ii. iFroze at 0oC and boil at the temperature of 100oC
iii. In solid condition less dense from fluid
iv. Have a high specific heat
v. Pure water have a pH 7 value

The quality level of raw water must not be beyond the standard of raw water level set by the World Health Organization (WHO) as what being stated in the table 2.1.1 schedule.

Schedule **2.1.1** standard of raw water level set by the World Health Organization (WHO)

PARAMETER	STANDARD SET
Murky	Not more than 1000 unit NTU
Colour	Not more than 300 unit HAZEN
pH value	6.5 – 9.2
Dissolved oxygen	6 ppm
Biochemical Oxygen Demand (BOD)	1500 ppm
Chemical Oxygen Demand (COD)	1 ppm
Total dissolved solid	0.5 ppm
Ammonia level	0 – 5000 number / 100 ml

2.1.2 Content of Raw Water

Water that is from natural water sources such as underwater or the surface is composed of dissolved materials and suspended solids. Big size dissolved materials are easy to be removed using the sedimentation process. Suspended solids that are too small or colloid particles are not easy to be removed. Colloid particles can only be removed by going through physical and chemical nesting. Chemical nesting for a colloid is coagulation by mixing chemicals to change the colloid contents to increase its removal level.

Physical nesting is known as flocculation where it encourages the clump of colloid particle group becoming a bigger floc and make it easier for deposition. Dissolved particles either mineral or solid can be made as suspended solid with the customization of a solution chemically or physically for convenient water treatment. The period for the gravity precipitation and natural process of a few suspended solids and dissolved materials in the water is shown in schedule 2.1.2.

Schedule 2.1.2: Shows the period of precipitation of a few suspended solids and dissolved materials by gravity (source: L. Bays, 1986)

Diameter size (mm)	Type of particel	Time of suspended for a depth of 1m
10	Rock	1 second
1	Sand	10 seconds
0.1	Small sand	2 minutes
0.01	Clay	2 hours
0.001	Bacteria	8 days
0.0001	Colloid	2 years
0.00001	Colloid	20 years
0.000001	Colloid	200 years
0.0000001	Dissolved materials	infinite

2.2 WATER QUALITY PARAMETER

2.2.1 Murkiness

Water murkiness is caused by suspended materials in the water. These materials disperse or reflect lights that are shine towards water and made the water to become murky. Water that disperse little light will produced low reading, whereas water that disperse or reflect a lot of lights will produce a high reading. Suspended materials that caused water murkiness includes organic and non-organic materials and also planktons.

The murkiness is an important character that needs to be observed in the water supply. The murkiness is dangerous and it can cause a problem to health, make the water looks not appetizing and at the same time it can cause a problem to the work of water supply operation. The most important thing need to be observed or bear in mind is the danger towards health caused by murky water.

Murkiness more than 5 NTU (Nephelometric Turbidity Unit) can be seen by users and it is not appetizing to drink. This will be more dangerous if a user uses a different water source, which might not be safe or installing a device on their own to their house that might be the cause of bacteria that spreads diseases as the consequence of lacking maintenance. Murkiness analysis is also being used to assess the effectiveness of water treatment in a water plant. The measurement of murkiness after the process of precipitation and before filtering can measure the effectiveness of clumping and precipitation process.

Any increase in measuring murkiness after deposition shows that the usage of thickener needs to be changed or corrections need to be done towards the water filtering operation. Waters that have been through the process of precipitation but haven't been filtered supposed to have the value of murkiness less than 10 NTU. Waters that have a high level of murkiness will cause a high loss of column and shorten the lifespan of the filter.

2.2.2 Colour

Colour in water is because of minerals, aquatic life or organic materials from the soils and plants. Colour also can be caused by industrial pollutions or city. Colour usually becomes a problem to the surface of the water, but sometimes the content of iron or manganese also cause water to have colour. Colour in waters can be categorized as genuine colour or delusional. Genuine colour is caused by organic compound inside the water, whereas delusional colour is caused by colour from compounded materials in the water such as clay or iron. In the process of water treatment, the genuine colour is hard to be clear of.

Colour is measured by comparing the sample water's colour with a standard chemical solution. The unit for the measurement is in Colour Unit (C.U). Usually, water that has a genuine colour less than 15 C.U cannot be detected/seen, whereas the genuine colour of 100 C.U will look like tea. The colour in water shows the content of high organic materials that can produce trihalomethanes when it reacted with chlorine. Colour in water needs to vanish in order to produce clear water.

Colour test must be done to raw water, treated water and water from the distributions system. More important if the water source is from the earth surface. The result of raw water and treated water will show the effectiveness of the treatment plant. Colour test from users' pipes can give information about whether there is organic growth in the distribution system or rusted pipes. At least 50 mlair samples are collected using glass or plastic bottles. Sample water must be cool at 40 oC and the test must be done in 24 hours.

2.2.3 Ferum

Ferum is a metal that is influenced by the geological structure of soil and the formation of rocks. It was produced from dissolved ferus ion (Fe^{2+}) in earth water. Standard thickness for ferum is from 1mg/L until 10mg/L. If it is exposed to the atmosphere, it will cause it to be not dissolved and suspended as ferik hidroksida. The effect is water will change to yellowish and brownish colour and there will be brown sediment. If the thickness of ferum reached 0.3 mg/L, the problem of odours and colour will arise. World Health Organization (WHO) also have set that the content of ferum in drinking water is less than 0.3 mg/L. If the content of ferum taken is too high, it will cause danger to health, which is lung cancer. The bad thing about ferum in water is, it will cause tube and pipes rusting and later produced a dangerous high solution of ferum that is hazardous to human (M. Negulescu, 1985).

2.2.4 Manganese, Mn

Water supply that contained manganese will make the pipes and clothes dirty at a level of more than 0.15mg/litre. At a higher concentration, it will produce unwanted taste in drinks. Manganese usually will create a coating toward pipes although the concentration is just 0.05mg/litre and the coating maybe will fall as black sediment. A value guide of 0.2mg/litre was aimed at its dirty character.

2.2.5 Aluminium

Aluminium Sulphate (alum) is being used long ago as a coagulant to make the colour and murkiness in water disappear. If it is not being used excessively, there will be no dissolved aluminium salt formed in the water. On the other hands, cautious analytic control must be set to prevent the disposition of aluminium hydroxide. The aluminium content must be more than 0.05 gm/m³ and supposedly there will be no disposition in clean water that was being used as the sample water.

Sometimes Aluminium will exist in pipe water because of its use as a coagulant in water treatment. This will raise comments from users and usually, this shows that pH is not been controlled correctly, imperfect coagulant process, broken filter or other mistakes in the treatment process.

2.2.6   pH

pH solution is hydrogen ion measurement that produces a lot of acidic solutions, meanwhile, the lack of H ion will make it alkaline. The alkaline solution will have many hydroxide ions, OH.

Water molecule, HOH (usually written as H_2O) has a low capability to dissolved or ionize. In truly neutral water (non-acidic and non-based) the concentration of H ion and OH is the same. Below is the formula for pH:

$$pH = -\log [H] - \log 1/[H]$$

The range of pH is between 0 till 14 where the value of pH 7 ([H] is 10) nature is alkaline. Aquatic organisms and bacteria are sensitive to the change of pH value. In low pH value, aquatic organisms' life will be affected and metal erosion will also occur. pH meter is an equipment to measure the pH value.

2.2.7   Ammonia Nitrogen (AN)

Ammonia Nitrogen is formed from microbiology activity and usually exists in water surface and underground water. Usually, Nitrogen is measure in biological reaction. Nitrogen is an important element in biological reaction. Nitrogen can exist in a few forms as follows:

 i.   Organic nitrogen is a nitrogen that bound in a powerful compound like
 ii. ammino acid and Amina.
 iii. Nitrogen ammonia is a mediation compound formed during the process of biological metabolism.
 iv. Nitrogen nitrate is a compound that doesn't exist in a big quantity at a mid-oxidation level.
 v.   Nitrogen nitrate is a compound that exists at nitrogen final oxidation level.

2.2.8   Cuprum

Cuprum metal that exists in water is an Aquis solution. It is influenced by pH and a couple of other organic components. The colour of this metal is red and yellowish and it is shiny. Because it is shiny, it is suitable as a material to make jewellery. The nature of this metal is flexible causing it to have commercial value because it can conduct heat and electricity very well. Usually, cuprum came from industrial waste such as metal plating, industrial cuprum plating, textile, ships anti-rust paint, and also, animal farming i.e. pig. Cuprum concentration in water is low. This makes it's easy to be detected just by tasting the water. It will not hinder humans' health if it is in a small quantity. If the quantity of cuprum is too many, it will cause the alkaline in the water to decrease and affected the marine life form and also human. For water that has not been contained the level of cuprum is less than 0.005mg/L. "Another usage of cuprum in water supply system is, it is used for biological development in pools and also to avoid oxidation inside underground pipes (M. Negulescu, 1985)".

2.3 WATER QUALITY LEVEL

Water quality level is explained according to the below arganizations:

1. World Health Organization (WHO)
2. Malaysian Ministry of Health
3. Quality Company

2.3.1 Water quantity control

Measure the prepared data for the supplied water intake and outflow to the rotation system. Retaining and maintaining the level of water storage is one way of controlling the mechanism. Places for water storages will able a temporary storage place for important usage or emergency cases in the water distribution system. Supervision level gives a good sign of any problems that occur, for example, to decrease the water flow in level to enable enough pressure to be retained downstream for houses at high places or for fire controlling and others.

Other companies use special surveillance system to help them supervise the quantity and quality of water, it is called SCADA (Supervisory Control & Data Acquisition). SCADA system through a computer can updates information from the operation. It functions continuously in 24hours with update information every minute. SCADA system can produce quick and fast actions to change the quality and quantity of the water.

2.3.2 Raw water quality

In making sure the quality of raw water source is supervised every day and samples of raw water are observe by operator to:

i. Develop understanding towards river system changing.
ii. Gives early warning to treatment plant for changes that influence treatment process.
iii. All staffs will observe the river and report any pollution or unordinary situations that might affects public health.

3. LITERATURE RESEARCH

3.1 MOHD RIDZAL BIN ABD RAZAK/ ACTIVATED CARBON FROM COCONUT SHELLS FOR WATER FILTER / Mechanical engineering Bachelor Degree Thesis (Liquid-Thermo).

A water filter system was created to test activated carbon. The water used in the test was taken from Melaka Water Corporation (PAM). The water was filtered with activated carbon and sand was compared and analysed with filtered water from Melaka Water Corporation (PAM) that only used sand as a filter. Water analyst was done in order to get the suitable heating temperature of activated carbon to be used in the absorption of organic and chemical substance in water.

Results from literature research 1:

Researcher have chosen filter material from carbon such as burning woods and bamboos to make charcoal. This process took 5 hours to produce a quality carbon.

3.2 Mohd Mahyeddin Mohd Salleh*, Nurdeng Deuraseh, Suhaimi Ab. Rahman, Shuhaimi Mustafa Halal Products Research Institute (HPRI), Universiti Putra Malaysia (UPM), Serdang, Selangor, Malaysia. / THE USAGE OF ANIMAL BONES IN WATER FILTER PRODUCT: A RESEARCH AT HIJRAH WATER SDN. BHD.

This paperwork discussed the issue of using animal bones in water filter product and the Islamic point of view about it. Generally, animal bones are one of the important materials used as active carbon to filter dirt in water and to be used as a ceramic bio to maintain the calcium in the water. Most if the bones used in the industry were from illegal sources or the halal status is doubted. This research used the qualitative research method based on document analysis and interviews. The researchers choose Hijrah Water Sdn. Bhd as the location of research in the capacity that the company is the pioneer of Halal water filter in Malaysia. Based on the research done, it is found out that animal bones are the material used by most water filter company because they are easy to get and the price is cheaper than other materials. According to Syafie Sect, istihalah method cannot be applied in water filter product if the source of animal bones are from haram animals. However, as a halal alternative, materials from nature such as seashells, coconut shells, and tilapia fish scales can be used to replace animal bones that are been used in the water filter industry.

Results from literature research 2:

From literature research 2, the researcher have chosen filter materials from silica sands and stones from different sizes so that it will not rise any concerns from Muslim users.

3.3 HASANALIZA BINTI BUJANG ABDILLAH / Water Quality at Kesit River, Batang Lemanak, Engkilili, Sarawak / university Malaysia Sarawak

The main objective of this research is to determine the water quality at Kesit River and to class Kesit River based on ' Interim National Water Quality Standard of Malaysia' (INWQS). Kesit River is a stream of Batang Lemanak River and it is the only stream that is not polluted by the logging activities in the forest. Five stations have been chosen along the Kesit River and one station in Lubok Subong, Batang Lemanak. Sampling was done twice of the duration, once during the hot season and another one during raining season. Six parameters has been chosen which are Dissolved Oxygen (DO), Biochemical Oxygen demand (BOD5), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), ammonia-nitrogen and pH. A few other parameters were also measured which are temperature, water clearness, conductivity, redox, river water flow, Particles Size Analysis (PSA), reactive phosphorus and nitrogen-nitrate. Water Quality Index (WQI) for both Kesit River and Batang Lemanak each were 95.51 and 99.69 during hot season whereas 98.80 and 93.36 during raining season where it is categorized as clean. However, based on INWQS, Kesit River is in Class I for all parameters except BOD5, Batang Lemanak was in Class I for parameters like COD, DO, pH and ammonia-nitrogen, and Kesit River was found still clean and can be categorized in Class I based on INWQS.

Results from literature research 3:

The researcher took a water sample and chosen suitable parameters to get clean water's quality classification after the water gone through the build filter system. Six parameters were chosen which are Dissolved Oxygen (DO), Biochemical Oxygen demand (BOD5), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), ammonia-nitrogen and pH. Licensed labs were chosen to make the testing towards the water parameters.

4. PROJECT INNOVATION

Clean water system treatment consist of 6 phases:

PHASE	COMPONENT	FUNCTION
Phase 1- Water source	Underground or river water source	Supply water source
Phase 2- Filter	Shower pipe	That the water comes out in a shower form so that the fine sand will not scatter. Filter dirt/physical materials such as wood, grass, leaves and others.
Phase 3- Mesh Filter	Rough and fine river sand 	Reduce big size organic and non-organic waste in the water. Clearing the filtered water. Reduce the murkiness of the water.
Phase 4 - Oxygenerated Filter	Big and small river pebbles 	Add oxygen /mineral in the water.
Phase 5- Oxidation	Coconut shell/bamboo charcoal 	Take out additional materials or unwanted water toxin. Get rid of the smells, brackish taste and oil. Stabilize the temperature and water pH.
Phase 6 - Clean water storage	Storage 	Store treated water.

Added value on the project produced:

NUM	BEFORE	AFTER	ADDED VALUE ITEM	CHARACTERISTIC
1.	Murky water	Clear water	Usage of rough and fine sands	Sedimentation process causes the water to become clear.
2.	Smelly/oily water	No smells	Usage of coconut shells/bamboo charcoal	Oxidation process get rid of the smells and taste in the water.
3.	Salty/brackish water	Neutral water	Usage of coconut shells/bamboo charcoal	Neutralization process stabilize the pH level.
4.	Limited/lack of water source	Continuous water	Usage of storage tanks	Underground water source/storage process to make sure continuous water supply.
5.	High electric tariff	No electric tariff	Usage of solar panels	Green technology system can be apply in all places especially places that doesn't have electric power supply.

Effects of project usage and water testing evidences:

NUM	LOCATION	IMPACT	EVIDENCES
1.	Madrasah Tahfiz Al-Quran Al-Islamiah (MATAIS)	Solved murky and smelly water problem for 400 students and teachers.	Refer My Test Lab result in Attachment 4A
2.	Sekolah Kebangsaan Tebing Tinggi (SKTT), Tanah Merah Kelantan.	Solved murky and smelly water problem for 1200 students and teachers.	Refer My Test Lab result in Attachment 4B
3.	Pusat Penyelidikan Maritim, Pulau Bidong Terengganu	Solved murky and brackish water problem for researchers and tourists.	Refer My Test Lab result in Attachment 4C
4.	Research & Innovation to Develop Water Filter System Croi Metri Village, Cambodia	Solved murky and smelly water problem for 6000 villagers.	Refer My Test Lab result in Attachment 4D

My Test Lab result in Attachment 4A

SAMPLE MARKING: PUNCA AIR - MADRASAH TAHFIZ AL-ISLAMIAH, PASIR MAS

TEST PARAMETER	UNIT	TEST METHOD	RESULTS
BODs @ 20 °C (Date of analysis : 09 AUGUST 2017)	mg/l	APHA 5210B, 21 st Edition	N.D (<5)
COD	mg/l	APHA 5220C, 21 st Edition	31
Ammoniacal Nitrogen (as NH_3 - N)	mg/l	APHA 4500-NH, B&C, 21 st Edition	N.D (<2)
Iron (as Fe)	mg/l	APHA 3125B (ICP-MS)	2.08
Manganese (as Mn)	mg/l	APHA 3125B (ICP-MS)	0.10
Escherichia coli	MPN/ 100 ml	APHA 9221 F	N.D

My Test Lab result in Attachment 4B

SAMPLE MARKING: PUNCA AIR - SEK. KEB. TEBING TINGGI, TANAH MERAH, KELANTAN

TEST PARAMETER	UNIT	TEST METHOD	RESULTS
BODs @ 20 °C (Date of analysis : 3 Ogos 2016)	mg/l	APHA 5210B, 21 st Edition	N.D (<4)
COD	mg/l	APHA 5220C, 21 st Edition	45
Ammoniacal Nitrogen (as NH_3 - N)	mg/l	APHA 4500-NH, B&C, 21 st Edition	N.D (<3)
Iron (as Fe)	mg/l	APHA 3125B (ICP-MS)	1.28
Manganese (as Mn)	mg/l	APHA 3125B (ICP-MS)	0.25
Escherichia coli	MPN/ 100 ml	APHA 9221 F	N.D

My Test Lab result in Attachment 4C

SAMPLE MARKING: PUNCA AIR - Pusat Penyelidikan MAritim Pulai Bidong, Terengganu

TEST PARAMETER	UNIT	TEST METHOD	RESULTS
BODs @ 20 °C (Date of analysis : 12 Jun 2017)	mg/l	APHA 5210B, 21 st Edition	N.D (<4)
COD	mg/l	APHA 5220C, 21 st Edition	30
Ammoniacal Nitrogen (as NH_3 - N)	mg/l	APHA 4500-NH, B&C, 21 st Edition	N.D (<3)
Iron (as Fe)	mg/l	APHA 3125B (ICP-MS)	1.28
Manganese (as Mn)	mg/l	APHA 3125B (ICP-MS)	0.25
Escherichia coli	MPN/ 100 ml	APHA 9221 F	N.D

My Test Lab result in Attachment 4D

SAMPLE MARKING: PUNCA AIR - Croi Metri Village, Cambodia

TEST PARAMETER	UNIT	TEST METHOD	RESULTS
BODs @ 20 °C (Date of analysis : 12 Jun 2017)	mg/l	APHA 5210B, 21 st Edition	N.D (<5)
COD	mg/l	APHA 5220C, 21 st Edition	28
Ammoniacal Nitrogen (as NH_3 - N)	mg/l	APHA 4500-NH, B&C, 21 st Edition	N.D (<3)
Iron (as Fe)	mg/l	APHA 3125B (ICP-MS)	2.33
Manganese (as Mn)	mg/l	APHA 3125B (ICP-MS)	0.35
Escherichia coli	MPN/ 100 ml	APHA 9221 F	N.D

Project Impact (unforeseen) and evidences

Cost and Time Impact

BRANDED FILTER	"1 Water For Life" COST	SAVING	SAVING %
Purchased cost RM2380/ house hold (Estimation 10 people/ house hold) Estimation 200 people 1 community = RM2380 x 20 = RM47,600	RM4500 for one community	Save RM43,100	94.54%
Maintenance Cost Change of Cartridge RM505/year	No maintenance cost (Usage of natural sources/materials).	Save RM505	100%
Cartridge change once a year	Maintenance of materials, once in two years time.	Save 1 year	100%

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APPLICATION OF THE 21ST CENTURY LEARNING ELEMENTS (PAK21) IN THE ARABIC LANGUAGE TEXTBOOK UNDER THE STANDARD CURRICULUM FOR PRIMARY SCHOOL

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ABSTRACT

This study aims to identify and analyse the elements of 21st century learning (PAK21) applied in the revised Arabic Language Textbook for Year 4 under the Standard Curriculum for Primary School (KSSR). PAK21 is one of the approaches in the learning process that is centred upon students in schools. The PAK21 elements applied comprise the aspects of communications, collaborative, critical thinking, creativity, and the application of ethics and moral values. This study employed the content analysis method to identify the PAK21 elements applied in the textbook. The data analysis involved the revised Arabic Language Textbook for Year 4 under the Standard Curriculum for Primary School (KSSR). Meanwhile, the quantitative method is used to analyse the learning activities related to the PAK21 elements in the textbook. The data analysis that identifies the frequency of PAK21 application in the textbook is categorised according to the main elements. PAK 21 has a major focus in the context pf Arabic language learning in moving towards international standard education. The findings report for an approach in Arabic language learning that has the potential to satisfy the current educational needs and subsequently leads to the introduction of new changes in the effort to uphold the mastery of Arabic language learning among students in Malaysia.

Keywords: Arabic language learning; 21st Century Learning; communication; collaborative; critical thinking and creativity.

1. INTRODUCTION

Textbook is the fundamental book that is often used in the classroom as part of the teaching and learning materials for students. It usually comprises several pages that are compiled into a unit or chapter and are utilised to conduct the process of teaching and learning. Most textbooks contain texts and graphics that are comprehensive and arranged according to a certain specification [1]. In the teaching and learning of the Arabic language, the Arabic textbook often plays a role as the main learning materials including in the Malaysian education system. According to Ali Al-Qasimi (1991), the term 'textbook' (al-Kitab al-Madrasi) that refers to the teaching of Arabic to non-Arabic speakers is different from its usual definition. In this regard, such term refers to "materials that comprise learning as its main content and include additional fields such as dictionaries, trainings and tests, as well as guidance for teachers" [2].

The Year 4 Arabic Textbook was published by the Institute of Language and Literature or Dewan Bahasa dan Pustaka (DBP) on 2019 based on the Standard Document of Curriculum and Assessment (Dokumen Standard Kurikulum dan Pentaksiran, DSKP). In the context of Malaysian education, the preparation of textbooks is often aligned with the curriculum needs as governed by the Ministry of Education Malaysia (MOE). Hence, the textbooks reflect and mirror the curriculum needs that are parallel with the state educational policy as well as the National Education Blueprint. According to Hutchinson and Torres (1994), textbooks are also capable of being the agent of changes in the implementation of curriculum [3].

Looking at the 11th Education Transformation Shift (Malaysia Education Development Plan, 2013-2025), the MOE has identified 11 transformations that need to be improved from time to time. The first transformation focuses on implementing the Standard Curriculum for Secondary School (Kurikulum Standard Sekolah Menengah, KSSM) and the Standard Curriculum for Primary School (Kurikulum Standard Sekolah Rendah, KSSR) which were revised on 2017. For that reason, the revised Standard Curriculum for Primary School for Year 4 Arabic Language was introduced by the MOE on April 2018. Through its second transformation, the Standard Curriculum for Primary School aims to promote the learning of additional languages where students are encouraged to master the Malay and English language as well as learning additional languages. Hence, the curriculum focuses on the mastery of the four basic skills in the Arabic language, namely listening, speaking, reading, and writing [4].

Such objective is aligned with the building of the Six (6) Students' Aspiration, namely (i) Knowledge; (ii) Bilingual Competency; (iii) Thinking Skills; (iv) Ethics and Spirituality; (v) Leadership; and (vi) National Identity. The main focus lies on the aspect of bilingual competency that refers to the students' proficiency in the Malay and English language as well as the learning of other additional languages. On the other hand, the thinking skills shall introduce students with various ways in obtaining knowledge and practising life-long learning in

order to connect various disciplines of knowledge as well as producing new knowledge. Every student will be encouraged to master various cognitive skills such as reasoning and critical thinking, creative, and innovative for them to apply knowledge and think critically beyond the academic context.

For the objective to be achieved, changes lie not only on the planning but should also be parallel with the implementation. In this regard, the changes in implementation should be regarded from the aspect of curriculum, pedagogy, and assessment. Aligned with the educational transformation in the 21st century, the MOE has decided on Five (5) Fundamental Standard for 21st Century Learning (PAK21) that focuses on student-centred learning by highlighting on the aspect of (i) Communication; (ii) Creativity; (iii) Collaborative; (iv) Critical Thinking; and (v) Moral Values and Ethics. This is intertwined with the building of the KSSR framework on the basis of six main pillars of (i) Communication; (ii) Spirituality, Attitude, and Values; (iii) Humanity; (iv) Self-Competency; (v) Physical and Aesthetic Development; and (vi) Science and Technology [5].

Therefore, the MOE has officially implemented the 21st Century Learning (PAK21) into the education system on 2014. The 21st Century Learning (PAK21) is a new transformation in the world of education where it focuses on student-centred learning process. The main elements of the 21st Century Learning (PAK21) include (i) communication: understanding and sharing of knowledge among students as well as between teachers and students, (ii) collaborative: cooperation between teachers and students as well as among students in the exchange of ideas; (iii) critical thinking: the exploration of rational ideas tin making decisions, (iv) creativity: generating ideas in producing new innovations; and (v) application of moral values and ethics: instilling moral values and ethics towards the construction of identity. These elements serve as the fundamental basis in the 21st Century Learning (PAK21) that are instilled into the revised edition of the Year 4 Arabic Language textbook under the Standard Curriculum for Primary Schools (KSSR) [5].

The objective of the KSSR Arabic Language is to produce students with competent mastery in basic Arabic language skills, capable to communicate using simple sentences, and portray positive attitudes in the building of pragmatic individuals towards the development of religion, race, and nation. Hence, the construction of DSKP is aligned with the Common European Framework of Reference for Languages (CEFR) as part of the effort to increase students' awareness to interact and communicate about themselves and their surrounding [4].

For Level II (Year 4) students, their competency in the Arabic through their ability to comprehend phrases and sentences, constructing simple sentences, as well as able to communicate and expand their language skills in the context of their personal background and surrounding. This addresses the Context of Situation theory by Bronislaw Malinowski (1935) which suggests that "a language is only meaningful if it is used in its context" [6].

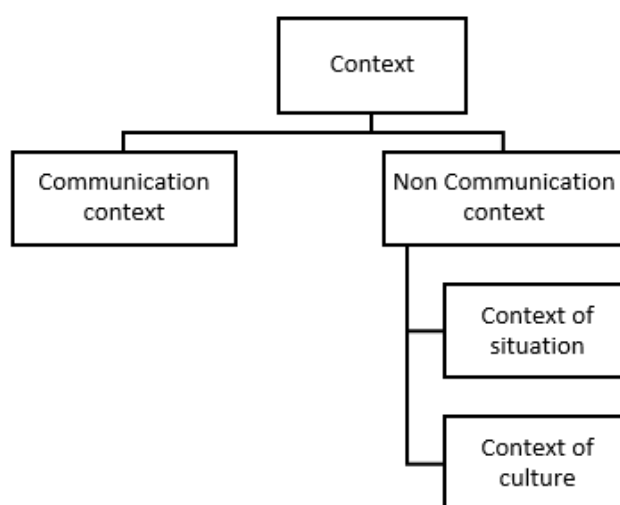**Figure 1 : Context of Situation Theory (Malinowski, 1935)**

Figure 1 above shows that Malinowski's (1935) focus on contexts can be applied in the writing of textbooks as well as during the implementation of teaching and learning. Situational context refers to the instilling and usage of time, place, atmosphere, and methods. Meanwhile, the cultural context comprises life, social, gender, education, ethnic, understanding, and confidence. The efficient application of these contexts into teaching and learning has the potential of upholding the Higher Order Thinking Skills (HOTS) along with the adaptation of the 21st Century Learning. Situation and culture are often interrelated. Hence, it is vital for both contexts to be adapted into the learning of second or third language as it shall lead to the improvement of language proficiency, better comprehension of phrases, as well as easy and accurate communication.

Therefore, this study aims to analyse the elements of 21st Century Learning (communication, collaborative, critical thinking, creativity, and the application of moral values and ethics) that are instilled in the writing of Year 4 KSSR Arabic Language textbook. Textbook is the main learning material that is used by teachers and students during the teaching and learning process in schools. The findings can be classified based on the fundamental standard of 21st Century Learning that serves as the pillars in the construction of the revised Standard Curriculum for Primary School (KSSR) on 2018.

2 METHODOLOGY

This study employs the qualitative research design via analysis of documents and descriptive statistics. Mohd Abdul Majid Konting (2000) states that descriptive research is a study that aims to explain a phenomenon or a situation that is happening in its real context [7]. Meanwhile, Syed Arabi Aidid (2002) further elaborates that descriptive research provides a picture of the actual existing condition [8]. A qualitative descriptive research allows the researcher to see the process, meaning, and understanding obtained from words or pictures. [9]. The qualitative method is also capable of identifying how a program's policy changes in every stage of its implementation [10].

The instrument used in this study is the revised edition of the Year 4 Arabic Language KSSR textbook. There are four elements of 21st Century Learning that serve as the main pillars in the analysis of document namely communication, collaborative, critical thinking, and creativity. These elements were analysed using the qualitative method that is usually used in content analysis [11] as well as in the collection of information and data analysis [12]. Content analysis is "an external communication research technique that is conducted via objective, systematic, and quantitative" [13]. The content analysis method was used to record, analyse, and evaluate the elements of 21st Century Learning applied in the preparation of textbook learning materials via objective, systematic, and scientific.

The discussion above justifies the use of content analysis method in identifying and analysing the 21st Century Learning elements in the Year 4 Arabic Language KSSR textbook. Findings from the content analysis are explained using descriptive statistics by stating the total, frequency, and percentage that are applied I the construction of the textbook to cater the teaching and learning process at schools.

3. FINDINGS AND DISCUSSION

The Ministry of Education (MOE) has introduced the 21st Century Learning that involves communication, collaborative, critical thinking, creativity; and the application of moral values and ethics [4] that are appropriate with the local context (Malaysia) in order to promote global competitiveness, which is aligned with students' development. Hence, the application of the 21st Century Learning in the revised edition of the Year 4 KSSR Arabic language textbook is based on the statement below:

> *"A learning process that is student-centred and is based on the elements of communication, collaborative, critical thinking, and creativity as well as the application of moral values and ethics" [14].*

> *(Source: MOE, 2014)*

3.1. Communication

The Ministry of Education Malaysia (MOE) defines communication as:

> "Verbal and non-verbal interactions that happen between teacher-students, student-student, and students-materials for them to tell and share the knowledge that they have comprehended with their friends" [14].

> (Source: MOE, 2014)

Communication is a process of exchanging information from an individual to another. In the context of education, communication refers to the conversation between teachers and students, and students with other students in order to share knowledge or information. This is known as the student-centred communication. Communication is the main aspect that is highlighted in the preparation of materials for Arabic language learning as it involves basic skills in the learning and mastery of language. The main objective in the element of communication is for students to observe, listen, and respond to other students or teachers, convey their thoughts with clarity and logic, understand the message, and communicate with confidence as they convey ideas or thoughts.

Table 1 below shows the communication elements that have been applied in the revised edition of the Year 4 Arabic Language textbook (KSSR) via building activity. There are three (3) activities that instil the aspect of communication which require students to communicate as the activities are conducted in class.

Table 1 : Elements of Communication in the Textbook

Types of Activity	Frequency	Percentage
أَسْتَمِعُ وَأَتَكَلَّمُ	16	57.1%
أَسْتَمِعُ وَأَقْرَأُ ثُمَّ أَمَثِّلُ	4	14.3%
أَقْرَأُ وَأَمَثِّلُ	8	28.6%
Total	**28**	**100%**

Based on Table 1, the elements of communication in the Year 4 Arabic Language textbook are evident through keywords like "أَتَكَلَّمُ" which means "to speak" and "أَمَثِّلُ" which means "to act". The analysis found that the word "أَتَكَلَّمُ" is repeated for 16 times (57.1%), while "أَتَكَلَّمُ" is repeated for 12 times (42.9%). The "أَتَكَلَّمُ" activity involves two-way communication of either students with students or students with teachers. Meanwhile, the "أَمَثِّلُ" activity involves students with students and it requires them to conduct a role-play for situations given by the teachers. These activities allow students to accurately express creative ideas via verbal or writing. This is aligned with the findings by Badrul Hisham (2016) where the aspect of communication skills has a moderate mean of 3.59. This is due to the need for teachers to further promote their students to communicate as they attempt the given projects. In order to encourage students to communicate confidently, teachers should conduct more presentations or projects in class. This will train students to reduce their anxiety in facing the audiences. [16].

3.2.   Collaborative

The Ministry of Education Malaysia (MOE) defines collaborative as:

"The active and holistic cooperation and unanimity between teachers-students and students-students which allows the exchange of ideas and views among students" [14].
(Source: MOE, 2014)

Collaborative learning is a learning approach that involves the exchange of knowledge between students with students or students with teachers [17] which requires the in-group learning activities such as the exchange of ideas, views, opinions, or knowledge throughout the learning process. Collaborative learning is often students-centred as it allows the exploration or learning or learning materials. The main objective of collaborative learning is to connect students' skills in the aspect of involvement, cooperation and teamwork, as well as community responsibility.

For the 21st Century Learning to be achieved, there is a need for collaborative element to be instilled into the construction of the Year 4 Arabic Language textbook by making it as part of the activities in the teaching and facilitating process. Collaborative Learning can be conducted via six (6) approaches, namely (i) Cooperative Learning; (ii) Writers Group; (iii) Learning Community; (iv) Peer Teaching; (v) Problem-Based Learning; and (vi) Discussion Group. In this accord, collaborative learning is an activity that is highlighted in the preparation of learning materials in textbooks. This is because the collaborative elements in 21st Century Learning focuses on students' active involvement during the learning process via; (i) effective cooperation, (ii) respecting and appreciating the contributions made by other team members, (iii) acquiring interpersonal skills through collaborative activities, and (iv) being a good leader and team member [4].

Types of Activity	Keywords	Frequency	Percentage
Inside-Outside Circle Think, Pair and Share Silent Card Shuttle	Effective Collaboration	3	30%
Fan "n" Pick	Respecting contributions by other members	1	10%
Numbered Head Together Three Steps Interview 4 Corner	Interpersonal Skills	3	30%
Three Stray One Stay Gallery Walk Hot Seat	Leaders and good team members	3	30%
Total		**10**	**100%**

Source: Year 4 Arabic Language Textbook, Revised Edition, 2019 [15]

Table 2 above shows the collaborative elements instilled in the Year 4 Arabic Language textbook. The keywords used to portray the elements of collaborative were derived from activities that resemble "effective collaboration", respecting contributions by other members", "interpersonal skills", and "leaders and good team members". The analysis found ten (10) collaborative elements in the Year 4 KSSR Arabic Language textbook. From these elements, "effective collaboration", "interpersonal skills", and "leaders and good team members" have three (3) elements each, which constitute 30%. The aspect of effective collaboration and leaders and good team members involve discussions in order to achieve the groups' objective by making the best decision among its members. Meanwhile, interpersonal skills involve the development of social skills that is needed by students in the aspect of leadership, decision making, building trust among members, communication, and conflict management skills. Whereas, the "respecting contributions by other members" activity has one (1) element (10%). In this element, students are trained to respect the contributions of ideas, effort, and energy made by other members of the group in achieving task completion. Collaborative learning also asissts teachers in improving, strengthening, and enhancing students' competency in writing literacy in order to face the challenges in the 21st Century Learning [18].

Therefore, it can be concluded that the instil of collaborative activities in the textbook has the potential of identifying students' talents in various aspects including collaborating to achieve mutual objectives, responsibility and appreciating ideas from others, and tolerance among team members. In collaborative learning, teachers act as a guidance who promotes expansion in the learning process. From the aspect of the students, the collaborative approach shall trigger their learning (academic), provide them with learning experience, assist in the development of their verbal communication skills and expand their social skills, increase their pride and construct the positive development of students' community. In other words, collaborative learning has the potential of creating a learning community that is parallel with the 21st Century Learning.

3.3.   Critical Thinking

The Ministry of Education Malaysia (MOE) defines critical thinking as:

"The exploration of thoughts that logically and rationally evaluates an idea in order to make a wise decision using reasons and evidence" [14].
(Source: MOE, 2014)

Critical thinking refers to an individual's ability to evaluate the pros and cons of a situation. From the educational perspective, critical thinking happens when students begin to explore their thoughts in order to evaluate ideas that are rationally accepted and decide about the ideas using appropriate reasons. Critical thinking requires one to consider an idea by evaluating, contrasting, and questioning on its right and wrong by referring to appropriate judgement in making a decision.

The efficacy of critical thinking may depend on several factors including the use of a wide range of sources especially when it comes to the information obtained by students. Critical thinking can happen through the instilling of several important features such as having information that is suitable with the topic, having the curiosity and ready to explore a topic through reading, conducting a question and answer session with teachers, as well as executing practical activities to gain specific information. There are seven ways that can be employed to increase students' understanding towards critical thinking, which include asking why, how, and why does it happen; identifying evidences for facts; rational discussion; and well informed of the possibility for several correct answers [19].

Table 3 : Elements of Critical Thinking in the Textbook

Types of Activity	Frequency	Percentage
أَسْتَمِعُ وَأُحَدِّدُ	8	22.8%
أَقْرَأُ وَأُحَدِّدُ	4	11.4%
أَسْتَمِعُ وَأُمَيِّزُ	3	8.6%
أَقْرَأُ وَأُمَيِّزُ	3	8.6%
أَقْرَأُ وَأُصَنِّفُ	3	8.6%
أَسْتَمِعُ وَأُصَنِفُ	2	5.8%
أَقْرَأُ وَأُرَتِّبُ	4	11.4%
أَقْرَأُ وَأُنْتِجُ	3	8.6%
أَسْتَمِعُ وَأُنْتِجُ	1	2.8%
أُفَكِّرُ وَأَتَوَاصَلُ	2	5.8%
أُفَكِّرُ وَأَتَعَاوَنُ	1	2.8%
أُفَكِّرُ وَأُبْدِعُ	1	2.8%
Total	**35**	**100%**

Source: Year 4 Arabic Language Textbook, Revised Edition, 2019 [15]

Table 3 shows the use of keywords that represent the instilling of critical thinking elements in the Year 4 Arabic Language textbook, which include (setting) "أُحَدِّد", (contrasting) "أُمَيِّز", (categorising) "أُصَنِّف", (arranging) "أُرَتِّب", (producing) "أُنْتِج", and (thinking) "أُفَكِّر". The analysis reports for twelve (12) elements of "أُحَدِّد" applied in the textbook, which constitutes to 34.2%, six (6) elements of "أُمَيِّز" (17.2%), and five (5) elements of "أُصَنِّف" (14.4%). Meanwhile, the "أُفَكِّر", "أُنْتِج", "أُرَتِّب" and elements have four (4) respectively, which constitutes to 11.4%. This makes the overall critical thinking elements in the textbook as 35 elements. The study also found that most Form 2 students in Kedah have recorded a low level of critical thinking skills particularly for the Integrated Life Skills (Kemahiran Hidup Bersepadu) subject. On the other hand, the inclination towards critical thinking is the highest and the relationship between critical thinking skills with the inclination towards critical thinking is positive between the two variables [20].

The instilling of critical thinking activities has produced well-informed students in various aspects and fields. The implementation of knowledge exploration has subsequently produced students who are curious to explore knowledge via reading, questioning, and conducting hands-on to obtain information. By having knowledge and information, students will be able to make wise decisions by justifying every decision made. As a result, they will be more open minded in perceiving views from various parties as well as portraying their modesty.

3.4   Creativity

The Ministry of Education Malaysia (MOE) defines creativity as:

"The process of generating ideas that produces innovation in materials, activities, and projects
that are new, unique, useful, and with good quality" [14].
(Source: MOE, 2014)

Creativity refers to one's ability to produce something that is new and authentic using good quality processes. Students should think creatively to produce new and beneficial inventions. This is one of the vital elements that should be instilled among students especially in the process of teaching and learning via textbook. This is because creativity is wide and it involves projects as well as the students' thinking and creativity. Nevertheless, students may still require guidance from teachers. In this regard, the role of a teacher is to evaluate whether the products produced by students are new or already existed as well as to determine its uniqueness and authenticity. Critiques and practical views are necessary for students to improve the products that they invented. In addition, teachers may also ask the students to explain about their products. This will allow them to evaluate whether students are capable of providing solid arguments to defend the unique quality of their inventions. This is where teachers can instil the elements of critical and creative thinking by encouraging students to give their opinions and ideas that can improve the invented products. Therefore, students shall have the opportunity to generate ideas from their peers.

Teachers are only required to guide students to think from various angles and views. This will produce students who are brave to convey their ideas without worrying about possible critiques as well as upholding their ability to think creatively about something that they wish to produce.

Table 4 : Elements of Creativity in the Textbook

Types of Activity	Frequency	Percentage
أَكَوِّنُ وَأَكْتُبُ	4	22.2%
أَقْرَأُ وَأَكَوِّنُ	7	38.9%
أَسْتَمِعُ وَأَكَوِّنُ	2	11.1%
أَكَوِّنُ وَأَمَثِّلُ	1	5.6%
أَعِدُّ وَأُقَدِّمُ	3	16.6%
أَعِدُّ وَأَقْرَأُ	1	5.6%
Total	**18**	**100%**

Table 4 shows the words or keywords pertaining to the elements of creativity that are used in the Year 4 Arabic Language textbook. Among the keywords are ("أكون" building) and "أعد" (preparing). The analysis found that the word "أكون" was used for fourteen (14) times (77.8%) in the textbook while the word "أعد" was used for four (4) times (22.2%). The total number of creativity elements used in the textbook is eighteen (18). For creativity to be achieved, students should be open minded in viewing various situations from every angle in order to generate different ideas and subsequently use it in a positive situation. For them to be creative, students should be brave to take the risks in trying something new as well as having the willingness to accept critiques. A creative individual is also visionary and has a clear goal in turning imagination into reality. Nevertheless, a creative individual should never feel depressed with the failure of the product that they produce. This is supported by Starko A. J., (2005) who suggests:

"… A teaching activity that produces an enjoyable, or even creative, outcome does not
necessary enhance creativity unless the students have the opportunity for creative thinking…"
[21]

Thus, teachers play a major role in promoting students' creativity where they will be able to perceive knowledge and skills, practise the right attitude and values, and expand their creativity and innovativeness. They should also be exposed to the elements of creativity at an early age in order for their hidden talents and potential to be discovered. Therefore, the schools' curriculum model requires a general model that can be applied in all disciplines of knowledge along with the existing teaching and learning model.

4. CONCLUSION

Based on the findings and discussion, it can therefore be concluded that curriculum, pedagogy, and assessment are interrelated with one another. The selection of pedagogical strategy should complement the curriculum objectives that are to be achieved in the teaching and learning. The variety of activities also plays a vital role in the practise of the 4K1N skills (Communication, Collaborative, Creativity, Critical Thinking and Moral Values and Ethics) in the 21st Century Learning. The assessments are also holistic, standard, flexible, aligned with students' ability and development, and balanced between knowledge and skills. In this accord, knowledge and skills are among the important elements that are assessed in the Classroom Assessment where they are evaluated using assessments that are planned, built, invigilated, marked, recorded, and reported by the teachers themselves. The subject teachers will evaluate students' competency level based on their experience during the process of teaching and learning. The instil of the 21st Century Learning in the Year 4 Arabic Language textbook also addresses the objectives in the Malaysia Education Blueprint.

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THE EFFECT OF STUDY HISTORY SHEET (TEIKEI-BUN) ON ENGINEERING SCIENCE STUDENT'S CRITICAL THINKING AND LEARNING OUTCOME.

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ABSTRACT

Education needs to prepare the students in future with knowledge and skill that are used in real world context. Skill that must owned are critical thinking, problem solving, information literacy, and global awareness. Thus, the learning process must be meaning full and significant form for daily life. This study investigated the effect of the Study History Sheet (SHS) or TEIKEI-bun for critical thinking and learning outcome into a student of Engineering Science Course. The instrument of teaching in this study was based on the One Page Portfolio Assessment (OPPA) .This study is a quantitative research with a survey design was used and the data were analysed using the descriptive statistical data. Respondents consist of 30 students Engineering Science course from 2 different classes of Civil Engineering Department. Two methods of teaching implemented with conventional method for control group and TEIKEI- bun for sampling group. Questionnaire distributed after class to all respondent to evaluate of their critical thinking and learning outcome. Comparison of result for Quiz with both groups are used to support the learning outcome finding. Research finding that worksheet score higher for critical thinking and learning outcome but no significant different on the average rate of Quiz result. Teikei-bun developing logical expression, make student abilities to clarify reasons and composing sentence differentiate fact and opinion. Beside it has provide fun and meaningful learning experience.

Keywords: Critical thinking, meaningful learning, learning outcome, conventional teaching, study history sheet

1. INTRODUCTION

This research is conducted to investigated the effect of the Study History Sheet (SHS) or TEIKEI-bun inspired for critical thinking and learning outcome towards Engineering Science Course students. The National Education Blueprint (2015-2025) highlighted the importance of critical thinking ability in the nation's education agenda for the next decade [1]. Therefore, students ought to be instructed to express their own thoughts, think innovatively and be critical in learninTHE Eg.

Critical thinking is mode of thinking about any subject, content, or problem in which the thinker improves the quality of his or her thinking by skilfully analysing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking [2].

While critical thinking is a systematic process, it also invites creativity and curiosity. Whether students are writing an essay, composing a piece of music, inventing a new piece of machinery, or designing a website, they need to know how to balance technical skill with imaginative thought [3].

Developing these skills will make it possible for students to make reflective judgement. Students will be able to make a reasoned judgement, based on the available information. As critical thinking skills develop, students should feel more confident about creating original work of their own.

According to Ithnin et al [4] the learning approach by SHS shows that it is possible for students and teachers to identify and address problems in a joint effort by using each other's experience and knowledge. The main importance of the SHS is that it creates an opportunity for reflection. The benefits of reflective practice are to (i) encourage independent learning, (ii) develop thoughts and responses in an structured way, (iii) apply in daily life (iv) enable to identify personal strengths and areas for development and (v) improve written and communication skills [5].

Therefore, it can be concluded that SHS approach are more to student centred learning or independent learning compared to conventional approach which is more to teacher or lecture centred learning in teaching and learning process. Table 1 shows the differences between SHS and conventional approach

Table 1 : Differences between SHS and Conventional approach [6]

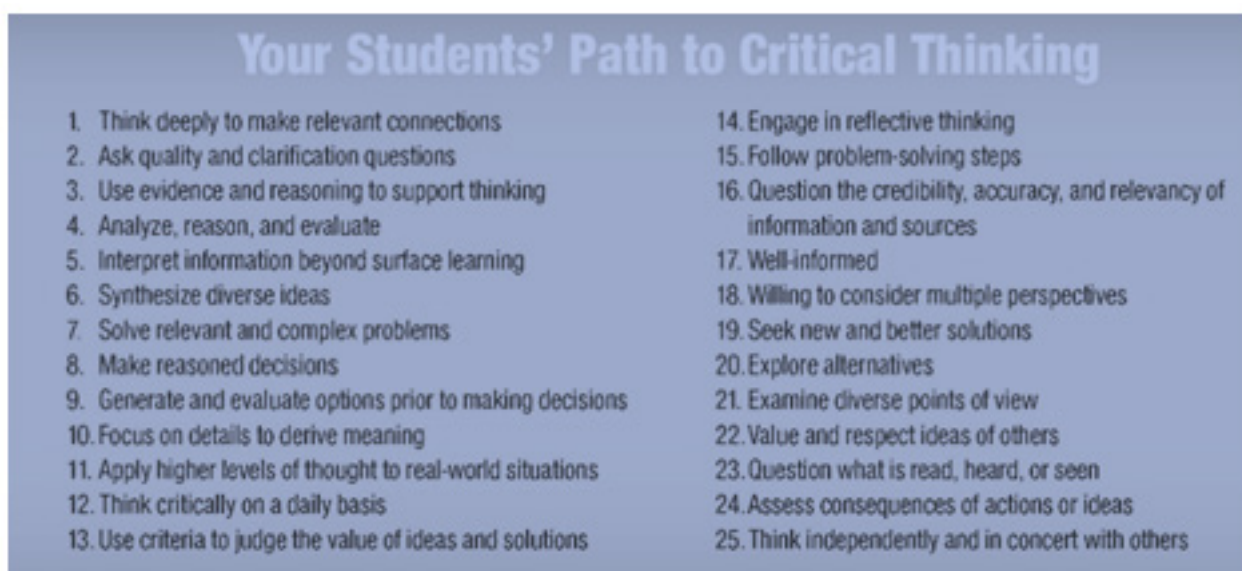|	Conventional Approach	SHS Approach
Content	Learners work to find correct answers.	Learners work to construct any one of a number of possible correct answers.
Instruction	Learning starts with what learners do not know.	Learning starts with learners' previous knowledge.
Classroom Environment	Learners learn passively in an often silent classroom.	Classroom environment resembles an active workplace with various activities and levels of sound depending on the kind of work being done.
Technology	Teachers use various kinds of technology to explain, demonstrate, and illustrate various topics.	Learners use various kinds of technology to conduct research, communicate, and create knowledge

2. METHODOLOGY

This study is a descriptive research by quantitative approach. The data was conducted by survey and test. The data were analysed using the descriptive statistical data (mean score). Respondents consist of 30 Engineering Science students from two different classes of Civil Engineering Department.

The study begins with two methods of teaching implemented. Group A is the controlled group with conventional method and Group B, the sampling group with Teikeibun inspired approach. Questionnaires were distribute after class to all respondents to evaluate their critical thinking through their perception after the learning session. The comparison results of Quiz with both groups are use to support the learning outcome finding.

The questionnaire was designed after comparing with previous research findings. The survey contain 20 questions designed and adapted from 25 Critical Thinking Strategies for The Modern Learner by portal Teach Thought [7] as shown in Figure 1. While according to Ithnin [8] students response using history sheet provide a fun and meaningful learning experience. Through SHS, our engineering student also willing to express their thoughts and opinions respectfully.

Figure 1 : 25 Critical Thinking Strategies For Modern Learner [7]

Your Students' Path to Critical Thinking

1. Think deeply to make relevant connections
2. Ask quality and clarification questions
3. Use evidence and reasoning to support thinking
4. Analyze, reason, and evaluate
5. Interpret information beyond surface learning
6. Synthesize diverse ideas
7. Solve relevant and complex problems
8. Make reasoned decisions
9. Generate and evaluate options prior to making decisions
10. Focus on details to derive meaning
11. Apply higher levels of thought to real-world situations
12. Think critically on a daily basis
13. Use criteria to judge the value of ideas and solutions
14. Engage in reflective thinking
15. Follow problem-solving steps
16. Question the credibility, accuracy, and relevancy of information and sources
17. Well-informed
18. Willing to consider multiple perspectives
19. Seek new and better solutions
20. Explore alternatives
21. Examine diverse points of view
22. Value and respect ideas of others
23. Question what is read, heard, or seen
24. Assess consequences of actions or ideas
25. Think independently and in concert with others

The questionnaire consists of two sections. Section A are Participants demography (gender) with information measured on nominal scale. Section B are measured perception respondent in critical thinking using 5-point Likert scale. The Likert scale was designed to measure respondent opinion on agreed or disagreed with the fact expressed on the 5-point scale. Table 2 shows the scoring of items in the Likert scale developed by Mohamad Najib [9] was used 1 for strongly disagree and 5 for strongly agree

The results of the data are analysed using mean score. There are three range of mean score are represented by lower, average and high frequency. The interpretation of the mean score was adapted from Landell [10] to categorize on the frequency of critical thinking of respondent as in Table 2.

Table 2 : Interpretation of Mean score (Landell, 1977)

Range of Mean Score	Frequency
1.00 – 2.40	Lower
2.41 – 3.80	Average
3.81 – 5.00	High

3. RESULTS AND DISCUSSIONS

This section is divided into 3 parts for discussion which are the respondent demography, critical thinking, and learning outcome.

3.1 Respondent Demography

From Table 3 below shows the respondent's frequency distribution by gender. Each group consist of 15 respondents. Group A, for controlling respondent with conventional teaching involved 8 males and 7 females students. While Group B with SHS approach consists of 10 male and 5 female students. The data shows, no significant difference in the distribution of gender differences between the two groups.

Table 3 : Respondent Gender

	Group A (Control)	Group B (Sample)
Male	8	10
Female	7	5
TOTAL	15	15

3.2 Critical Thinking

The data obtained from the questionnaire for this study is show in Table 4. The score mean for each item for both group are referred to the Interpretation of Mean score (Table 2).

The overall mean score for group A (controlling group) is 3.34 in average. The data shows that the lowest mean score with 2.81 score are item number 2 and number 15, and average student can clarify reasons to make sentence and capable to seek new and better solution. Meanwhile the highest mean score of 3.86 shows that respondents are capable to question what they read, heard or seen.

For Group B respondents with SHS approach, overall the mean score are high with 3.83 score. The highest score mean 4.18 described how respondents are capable to question what they read heard or seen, followed by 4.09 mean score for item number 10 which is they can relate ton daily life. While the lowest mean score on item number 17 with 3.58, average correspondents to respondent's ability to examine various point of view.

From the data shown that there are 11 items of critical thinking mean score increased from average to high level between score of group A (conventional) and group B. The item represent by number (1) think deeply, (3) seek evidence, (4) analyse reason, (5) interpret information, (6) fun learning, (8) focus on detail opinion, (10) related daily basis, (12) existing knowledge, (14) multiple perspective, (16) explore alternatives, and (18) respect others' idea.

Table 4 : Critical Thinking Mean Score

Items	GROUP A		GROUP B	
	Mean Score	Level	Mean Score	Level
1. Think deeply to make relevant connections	3.56	Average	3.82	High
2. Clarify reasons to make a sentence	2.81	Average	3.68	Average
3. Seek evidence and reasoning to support my thought	3.47	Average	3.89	High
4. Analyze reason and evaluate my opinion	3.72	Average	3.86	High
5. Interpret information beyond surface learning	3.04	Average	3.84	High
6. Make learning become more fun	2.95	Average	3.88	High
7. Generate and evaluate fact to make statement or opinion	3.61	Average	3.74	Average
8. Focus on details to derive my opinion	3.51	Average	3.82	High
9. Apply to real-world situations	2.95	Average	3.74	Average
10. Relate on daily basis	3.56	Average	4.09	High
11. Use criteria to judge the value of ideas and solutions	3.82	High	3.88	High
12. Engage in reflective thinking (existing knowledge)	3.72	Average	3.82	High
13. Follow problem solving steps (Problem – thinking – solution)	2.95	Average	3.77	Average
14. Willing to consider multiple pe rspectives	3.47	Average	3.81	High
15. Seek new and better solution	2.81	Average	3.79	Average
16. Explore alternatives	2.95	Average	3.82	High
17. Examine various point of view	3.04	Average	3.58	Average
18. Value and respect ideas of others	3.51	Average	3.96	High
19. Question what i read, heard or seen	3.86	High	4.18	High
20. Asses consequences of action or ideas	3.75	Average	3.75	Average
OVERALL MEAN SCORE	**3.34**	**Average**	**3.83**	**High**

3.3 Learning Outcome

Figure 2 shows the results of student assessment score for group A and group B obtained from quiz given. From the data obtained, Group A recorded the highest score range on 41% to 60% while group B on both score range of 61%to 80% and 81% to 100%. There is no significant differences between achievement for both group A and B. It is because both group shows the same number of respondents achieve the passing mark of 40% in their quiz mark.

Figure 2 : Result of student assessment score
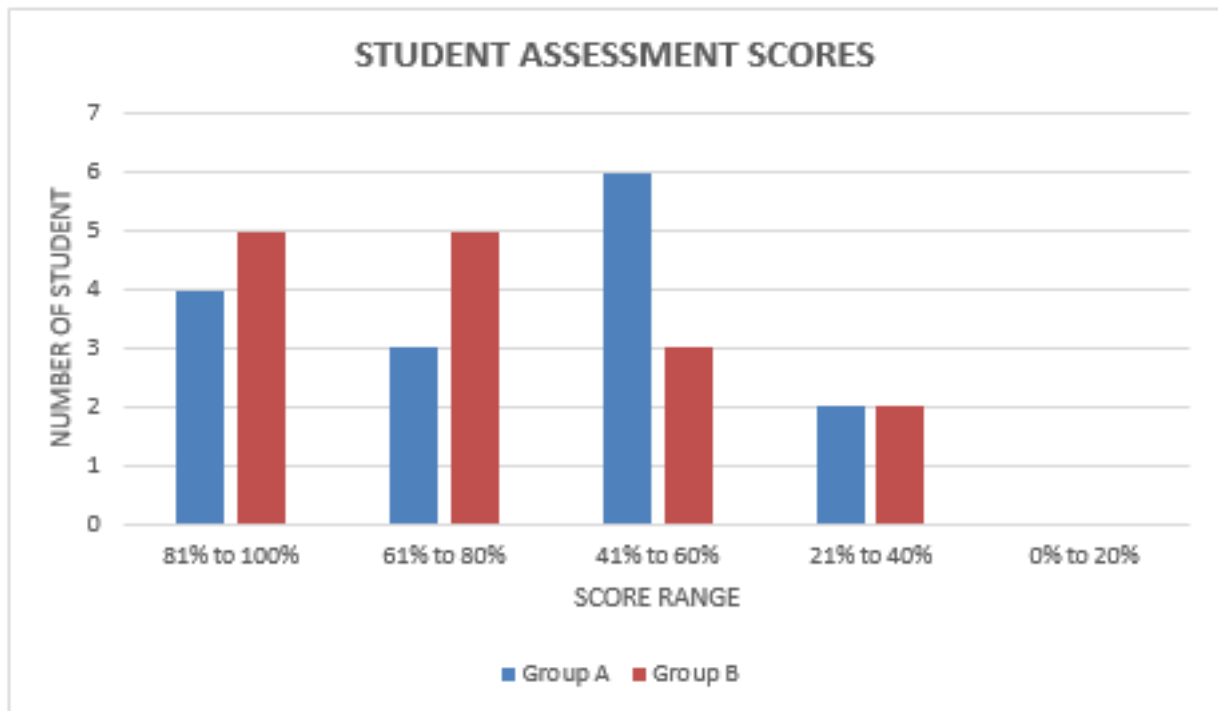
4. CONCLUSIONS

Overall, this study has successfully demonstrated pattern or trends in result of conventional and SHS approach for engineering science course student. Based on the analysis of the data in this study, it can be concluded that worksheet score higher for critical thinking but no significant different on the average rate of Quiz result for the learning outcome. From the finding of questionnaire for critical thinking, it can be conclude that SHS developing logical expression, make student abilities to clarify reasons and composing sentence differentiate fact and opinion. Beside it has provide fun and meaningful learning experience. It shows that SHS can improved method of learning.

In addition to the SHS approach, students are able to compare their knowledge before and after lesson, draw out the major topic for any lesson and make it more interestingly, frankly discuss their feeling and reflection about each lesson.

SHS approach is a new method of teaching and learning therefore study can be conducted and we recommend the SHS in other lessons because it make students reflect any lessons no matter how brief the lesson is. It can be used in any other topic and courses not limited to engineering science course only. Furthermore, SHS can be an important exercise for student to develop their critical thinking. Therefore, SHS should be exposed to all student in various fields.

The SHS can be one of the ways to fulfil Science, Technology, Engineering and Mathematic (STEM) approach that is a part of education policy and curriculum in Malaysia.

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REFLECTION OF STUDY IMPLICIT DERIVATIVE BY USING TEIKEI-BUN STUDY HISTORY SHEET

Nor Aishah binti Ahmad, Nur Raihan binti Abd Salim, Roslinda binti Ithnin
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ABSTRACT

The laws of mathematics govern everything around us, and without a good understanding of them, students can encounter major problems in learning. Assessment in the form of history sheets are instruments or tools to collect information in order to determine the extent to which the student shows the desired learning outcomes. This study aims to look on how this history sheets could help learners' progress. Thus, to have a good model of assessment in classroom-based learning, it must reflect what has been learned. This study utilized about learning history sheets or writing templates that allow students to develop their expressive abilities in relation to mathematics lesson they learn. It also includes TEIKEI-bun inspired history sheet using fifteen polytechnic students as respondents. Data was analyzed by using qualitative analysis. Two core skills were identified: the willingness and ability to express their thought on mathematics learning. The two skills could be used to strengthen social development of students' writing. Furthermore, assessment of students' responses using the TEIKEI-bun inspired history sheet is the research instrument for the purpose of gathering information from respondents. Findings indicated that students felt that mathematics was difficult. It also indicated that for the students to be in active learning involves them in doing something and thinking about what they are doing. Therefore, there was a significant improvement in respondent knowledge in Before Study and After Study in TEIKEI-bun inspired history sheets. The application of TEIKEI-bun inspired sheet was observed to be feasible tool for the student to be actively involved in education and also the assessment of the students is done more effectively.

Keywords: TEIKEI-bun, Study history sheets, Active Learning, Qualitative research, Lecture

1. INTRODUCTION

A didactic method is one of the teaching methods that are teacher-centered and is content-oriented. This method is commonly used in the modern education system. For decades, educators and educational researchers have questioned the effectiveness of entirely lecture-based teaching methods (Barr & Tagg, 1995). Educators and researchers have come to recognize the "complexities of teaching and learning for understanding as opposed to just knowledge retention" (Ritchhart, Church, & Morrison, 2011, p.7). Bonwell and Eison defined strategies that promote active learning as "instructional activities involving students in doing things and thinking about what they are doing" (Bonwell and Eison, 1991). An approach that emphasizes active learning focuses more on students' skills in disseminating information and requires students to do something like reading, discussing and writing that requires higher thinking. They also tend to place more emphasis on students' exploration of their attitudes and values.

During the teaching and learning process, students must ensure they can understand all learning items. Many researchers have shown that the development of critical thinking skills can improve mathematics achievement (Chukwuyenum, 2013). Examining for understanding is a critical part of teaching and learning that assist to determine whether the students understand what they need to. Besides, students' preparation for class is also an essential component of their college education. There simply is not enough time in class to accomplish the learning objectives for most courses (Ewell & Rodgers). To measuring how many improvements students have improved in one duration of the lesson, the assessment tool can be a valuable tool for diagnosing more effective teaching. The assessment also viewed as a tool to diagnose and also to use in measuring students' achievement of learning outcomes and objectives and evaluating student performance in education (Fook & Sidhu, 2013). This can be done by giving the students a set of questions for lecturers to gather information and also to monitor the students' progress. The general difficulties for students are when they do not understand what they study. When the students are being assessed, they are likely to be self-motivated towards their studies.

2. PROBLEM STATEMENT

Engineering Mathematics 1, 2 and 3 are requisite courses for engineering students in Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA). These courses are offered for Semester 1, 2 and 3 of the academic year respectively. From the previous examination result, there was a substantial number of students who failed their courses. The Department of Mathematics, Science and Computer (JMSK) have already conducted many revision programs to cater to weak students as an initiative to help students achieved good grades for their courses. However, despite programs conducted for them, the failure percentage for mathematics still increase. For some students, difficulties in mathematics are the consequence of a history of underperformance due to an unaddressed learning difficulty, or gaps in their learning history. When students participate in the learning process in the class, does it help them from just remembering to understanding to analyzing and creating? The goals of assessments are to assess student achievement in the topic implicit derivative and to identify trends in achievement over specific periods. Assessment in higher education needs to be renewed because innovative types of assessment methods are needed to meet the demands of 21st century learners (Kearney & Perkins, 2011).

3. METHODOLOGY

3.1 Research Design

This study employed a qualitative research design to explore the application of TEIKEI-bun inspired history sheets among students in Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA). Burns and Grove [2009] have provided their opinions that qualitative research is a systematic and subjective approach to highlight and explain daily life experiences and to further give them proper meaning. This study was conducted in PSA in Shah Alam, Selangor, Malaysia. A tentative number of 15 students from the Department of Electrical Engineering were selected. Both genders, second- semester students were represented by respondents. The sample size was determined based on students who took course Engineering Mathematics with Implicit Derivative in the syllabus contents. This study applies the TEIKEI-bun inspired study history sheet as the research instrument to gather information from respondents.

The study history sheet contains four main sections. There are 'before study', 'summary', 'after study' and 'thoughts about the lessons'. This history sheet challenges students to observe and write their views and answers accordingly. The student respondents must be able to observe and reflect on the topic. This exercise inspires students to express their thought in mathematics learning. The session which was conducted during the lecture hours was started with an explanation regarding the concept of the implicit derivative. The student also wrote a reflection of the lesson learned. Within two hours of the lesson, the students proved that they could relate some relevant connection between a previous lesson and the next lesson. In the 'before study' section of the study history sheet, the students stated that they mainly did not know implicit derivative. The objective of the section 'before study' and 'after study' is interesting to the respondent's level of alertness regarding the topics learned. This study was conducted to determine whether study history sheet was effective in enhancing students' attention and increase learning specifically in the topic Implicit Derivative.

Fig. 1. The TEIKEI-bun Inspired Study History Sheet.

Study History Sheet   Summarize the following worksheets in the appropriate boxes

Before Study   Worksheet 1   Worksheet 2   *After Study*

Write 3 sentences using   Write 3 sentences using
'implicit derivative'   'implicit derivative'

Worksheet 3

Program:
Class:
Name:

Looking back at the 'before-during-after' study activities, what did you learn from this lesson? Please be frank.

What are your suggestion about this lesson?

4. FINDINGS

A total of fifteen participants were chosen for this study. In the analysis of data, the editing analysis style (Crabtree & Miller, 1999) was employed. Acting as the interpreter, the researcher read through texts in search of meaningful segments. Once segments were identified and reviewed, a category scheme that can be used to sort and organize the data were developed. Each experience was analyzed and significant statements extracted. The researcher identified and extracted about seven significant statements.

4.1 Before study

In this study, we want to bring a change to the passive way of learning where there is no active participation by students. The study history sheet was demonstrated and briefed of the items and wording of responses by the students. Our aim of distributing the history sheet before the lecture is to analyze the extent to which students are engaged in this topic and also to make the students more focused on lectures and to evaluate students' key concept learning of implicit derivative. In this context, as the teaching of the topic Implicit Derivative process begins, we will assess the background of knowledge on topics to be taught to students.

The lecture of course Engineering Mathematics 2 was conducted with the introduction of a TEIKEI-bun history sheet to the students before the lecture begins. The TEIKEI-bun history sheet contains sections on 'before study', 'summary', 'after study' and 'thoughts about the lesson'. In the 'before study' section, whereby students must write down everything about their knowledge to the subject matter which is delivered on that day. In normal circumstances, a lecture was delivered for about 2 hours and following which students are required to fill in again in the worksheet for the 'after study' section when the lecture for the topic has been completed.

Fig. 2. Students Answering the 'Before Study' section in TEIKEI-bun inspired study history sheet.
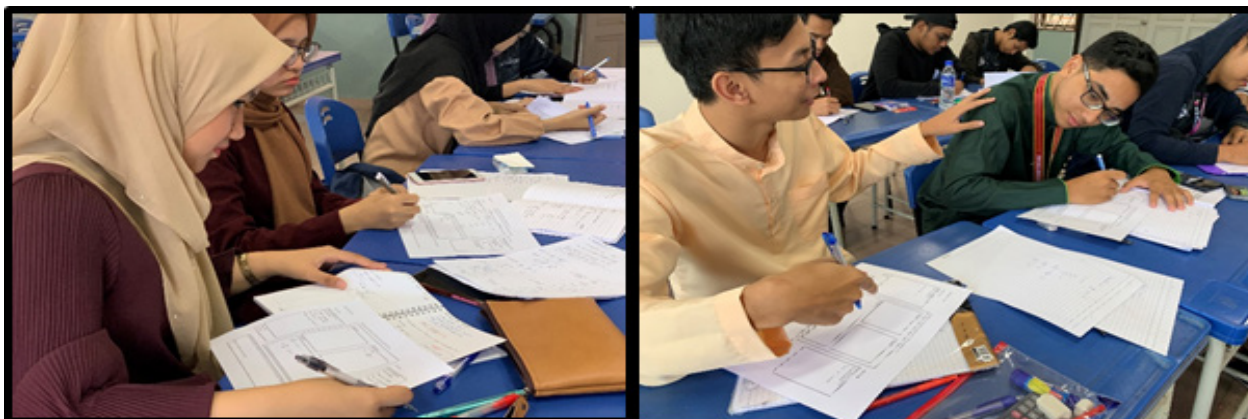
**Fig. 3. Students Written Answers in the Study History Sheet.**
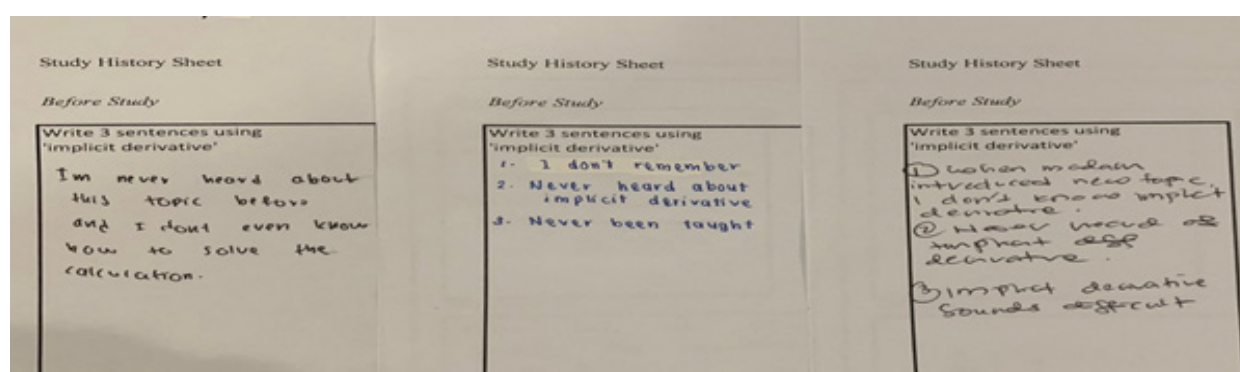
Students wrote:

|	Statement	Score
1.	I do not know what is implicit derivative	12
2.	Mathematics is difficult	10
3.	I have never heard about it	8
4.	I do not remember	2
5.	I am not sure	1
6.	I forgot	4
7.	I cannot imagine	1

4.2 After Study

Fig. 4. Students Discussing issues for the 'After Study' section in TEIKEI-bun inspired study history sheet
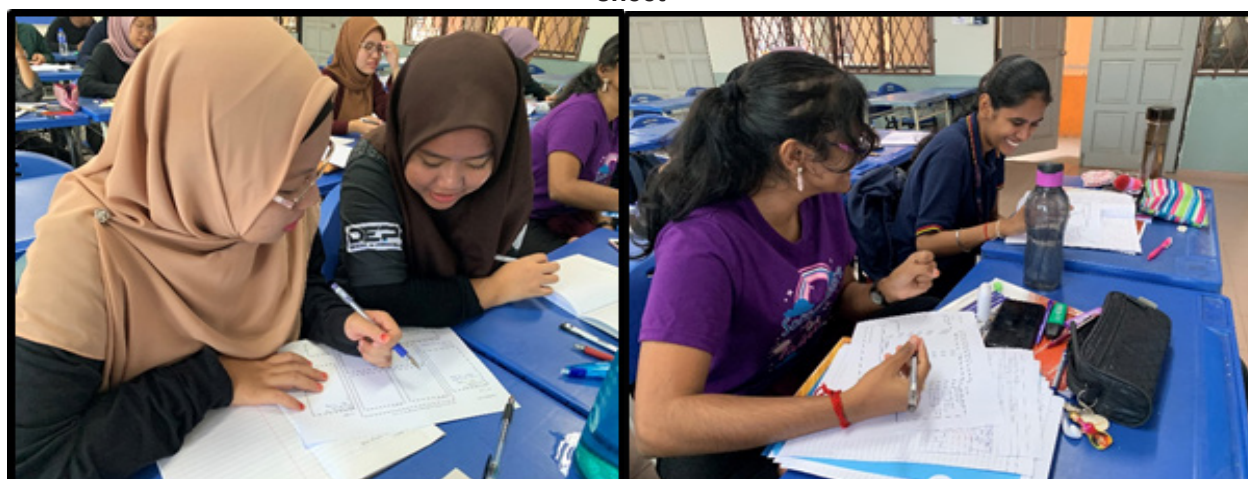
Fig. 5. Part of the student's response to the 'After Study' section in the history sheet.
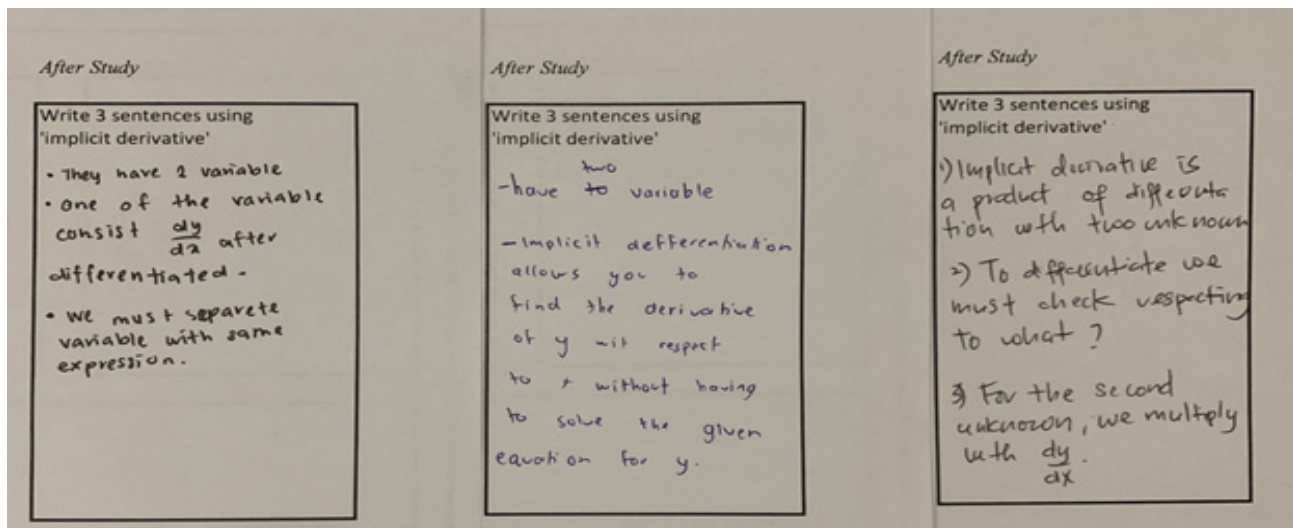
The purpose of the survey which was carried out by using the study history sheet is to assess the progress of the learning and teaching process and to show that there was an increase in knowledge after the lectures attended by students. Consider the following figure.

Fig. 6. Comments from students regarding their reflection on the lesson
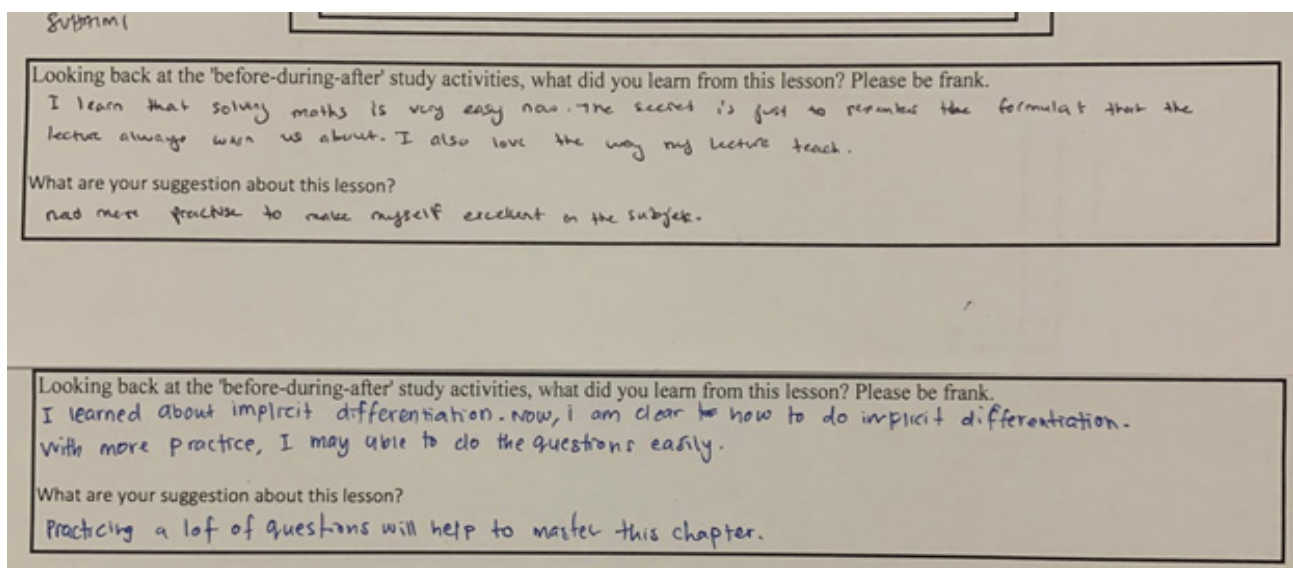
5. DISCUSSION

Generally, active learning is defined as any instructional method that gets students to participate in the learning process. This definition includes activities such as homework and any other activities that are introduced to students. In short, active students need to do meaningful learning activities and think about what they are doing. The key elements of active learning are student activity and their engagement in the learning process. Active learning is often contrasted to the traditional lecture where students passively receive information from the instructor. Students today are intensely social and interactive learners. Those surveyed by (Willms, Friesen, and Milton (2009)) stated that they want to interact with people both within and beyond the classroom and school environment. The results of this study show that the TEIKEI-bun inspired study history sheet can contribute to improving the participation of students in the class. It also shows that when the teaching method engages students in the learning process, they have to think about what they are doing. Therefore, there was a significant improvement in respondent knowledge in 'before study' and 'after study' in the study history sheets. The application of study history sheet was observed to be a feasible tool for the student to be actively involved in class and also the assessment of the students is done more effectively. The students can also develop their writing skills by using the study history sheets.

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