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"Empowering Research, Innovation Ideas and Entrepreneurship Towards Sustainable Economy"

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STUDY USAHAWANRIA BOARD GAME AS EFFECTIVENESS TOOL IN ENTERPRENEURSHIP COURSE

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Abstract: Nowadays, games have become one of the useful tools in training. Many instructors choose to use games to enhance the way of delivering the subject. This study will focus on the effectiveness of board game as effectiveness tool in enterpreneurship course. Two methods are used in this study, pilot test, and post-test. These methods are chosen to analyze the effectiveness of using UsahawanRia Board Game as a teaching tool and the improvement of student's knowledge in entrepreneurship course. The result indicated that the use of UsahawanRia board game as a effectiveness tool for entrepreneurship course has a positive impact on students. It helps students to experience the situation of managing business. It is one of the easiest ways for improving time management, human resources and communication skill.

Keywords: Board Games, Teaching Tool, Effectiveness

INTRODUCTION

In area of globalization, education now is very challenging. More an effort and strategy to educate the young generation, various training tools have been used. These materials have been designed to facilitate student in develop their critical thinking in the course of entrepreneur. Previously in the conventional training method, most of instructors assumed that students will understand the whole teaching goal while the reality is a lot of students only achieve a part of the goals and the rest of them do not achieve any of the goals (Treher, 2011) Most of the instructors conduct a class using textbook classes and test (Huang & D. Levinson, 2012). Therefore, an effective approach should be used to inspire and encourage when used during teaching (Harris, 2009). The implementation of a tool like board provides a non-threatening, playful and competitive environment where a student can learn from the mistake (Karen, 2010). The board game is a game involving a counter or token that placed or moved on a board game provided by a set of instructions.

LITERATURE REVIEW

Board games can be classified into two categories that reflect the realities of life or vice versa (Cook & Olson 2006). *UsahawanRia* Board Game is also referring to a game or an exercise which incorporated elements of business. This game was built to enable the students to understand the concepts on how to manage the business. This edutainment game gives students an opportunity to experience how to deal with problems and challenges in managing a virtual business (Karen, 2010).

This indoor activity is simple and easy to be done. Game elements provide a competitive environment, discussion and problem-solving with fellow team members about the content as the way to educate students to work in teams (Wangenheim & Borgatto, 2012).These games are simulated from real project management scenario. It is used to impart the competencies, knowledge, skills and attitude to the students in time management, human resources and communication skill. This game has been successfully used for college students and executives to learn entrepreneur management techniques. However, it was never used as a training tool for polytechnic students. So, the purpose of this research is to study the effectiveness of using *UsahawanRia* as a tool in entrepreneurship course.

The effective module of teaching and learning for polytechnic and secondary school students should meet the needs of educational objectives in Bloom's Taxonomy. The cognitive level involved in Bloom's Taxonomy is Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation (Bloom, 1956). To make sure students achieve maximum learning outcome, the goals and rules of the game must be clear. The aim of using this game as a training tool for entrepreneurship is to train students about the importance of time management, thinking skills, human resource and communication skills.

RESEARCH METHOD

This research uses UsahawanRia board game as a tool in entrepreneurship for polytechnic students at Melaka. This research is done on 70 students of polytechnic Melaka. The goals of the game are to help students to increase knowledge of entrepreneurship skills. These studies used a pre-test and post-test design. UsahawanRia board game pre-test begins with the completion of survey by each player after the game ends. All comments were collected and identified to improve the existing module in accordance with the level of understanding Post-test game was to identify the effectiveness of board game as a training tool for entrepreneur skills. In this study, a questionnaire was chosen as the analysis the effectiveness of the board games. It consists of two subcomponents with 15 items of questions. They are user knowledge and satisfaction. Questionnaire are following Likert Scale from strongly disagree (1), disagree (2), neutral (3), agree (4), to strongly agree (5).

RESULT AND ANALYSIS

The data are analyzed to identify the level of knowledge and satisfaction of students towards UsahawanRia board game.

4.1 The level of knowledge of students in the entrepreneurship of the effectiveness of learning through innovation UsahawanRia

From the post –test that have been conducted, it was found that grade C is the minimum results of the level of student's knowledge which used the UsahawanRia board game while the minimum score of pre-test is grade E. This result shows an increase in the percentage of 100 compared to the previous results which used this innovation tool. This achievement prove that this innovation has made a positive impact and suitable for the purpose of teaching and learning.

- Table 4.1: Level of student knowledge through pre-test

Ujian Pre Test			
Range of Marks	Gred	Quantity	Percentage (%)
9 – 10	A	6	10
7 – 8	B	12	20
5 – 6	C	30	50
3 – 4	D	9	15
1 – 2	E	3	5

In view of the level of knowledge of students, scoring range 9-10 is A, 7-8 is B, 5-6 is C 3-4 D and 1-2 is E. Based on the data that has been analyzed for the pre-test, found a total of 6 students (10%) was obtained Grade A, 12 students (20%) was obtained grade B, 30 students (50%) achieved a grade C, 9 students (15%) have achieved a grade D and 3 students (5%) have achieved a grade E. refer to Table 4.1.

- Table 4.2: Level of student knowledge through post-test

Ujian Post Test			
Range of Marks	Gred	Quantity	Percentage (%)
9 – 10	A	15	25
7 – 8	B	30	50
5 – 6	C	15	25
3 – 4	D	-	-
1 – 2	E	-	-

As for the post-test found a total of 15 students (25%) achieved A grades, 30 students (50%) was obtained grade B and 15 students (25%) had grade C.Tiada students who obtained grade D and E of the post-test. Please refer to Table 4.2

4.2 The level of satisfaction of students and lecturers of the effectiveness learning through innovation UsahawanRia

According to the objectives of this study, two different data analysis was carried out on students and faculty who have used this innovation. From the chart 1, found 51% of students "agree (A)" and 34% "strongly agree (SA)" that they were satisfied with the effectiveness of

learning through innovation UsahawanRia, while the remaining 9%, 4% and 2% of the students each choose "not sure (NS)", "disagree (D)" and "strongly disagree (SD)".

Level of satisfaction of students of the effectiveness learning through innovation UsahawanRia

The level of satisfaction of lecturers of the effectiveness learning through innovation UsahawanRia
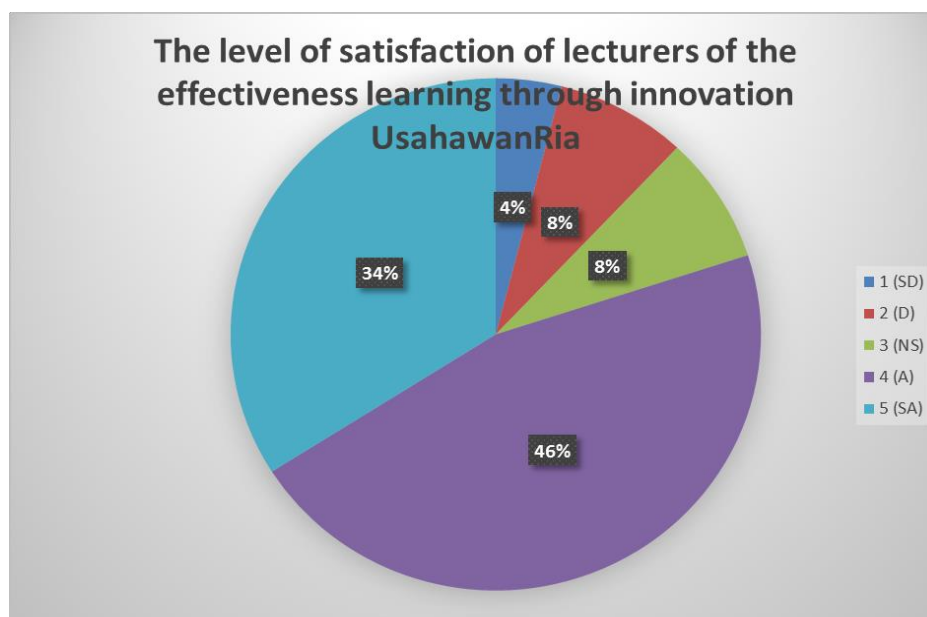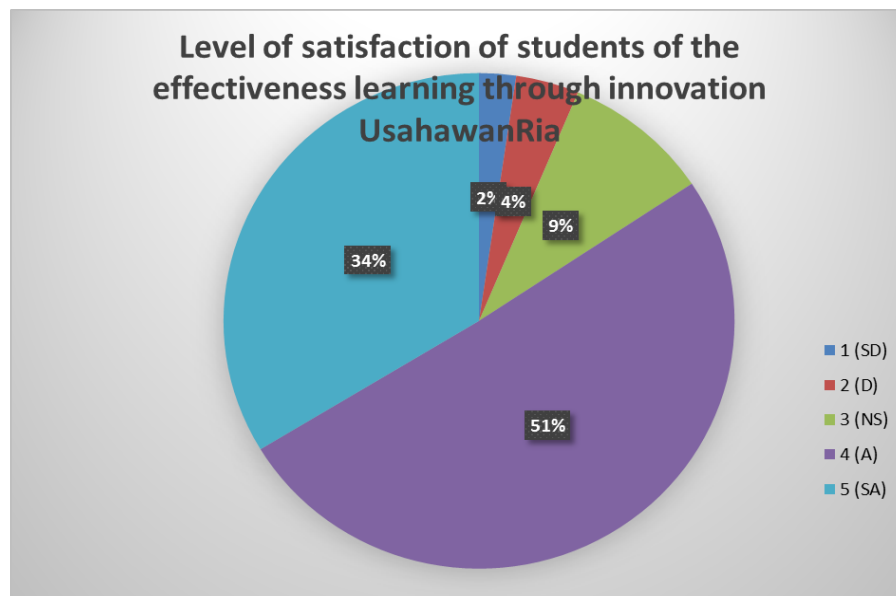
Based on the chart 2 shows the average score received 46% of lecturers "agree (A)", while 34% "strongly agree (SA)" that they were satisfied with the effectiveness of learning through innovation UsahawanRia. A total of 8% of lecturers was "not sure (TP)", 8% "disagree (D)" and only 4% of lecturers choose "strongly disagree (SD)".

CONCLUSION

This study proved that UsahawanRia board games are effective to be used as a training tool for entrepreneur skill. It gives a positive impression to students in learning while playing the playing game. Furthermore, the majority of the students said that they enjoyed playing the

game. In addition, this game helps in understanding through experiential learning. Based on the observation, students always focus on the game. The element of competition in this forcing students to communicate with each other and managed to get the involvement of all students in the game. On the other hand, based on our experience this game helps a lot in training students by easing the burden of the instructor during the explanation session. For the pretest, one student indicates that this game needs to have a brief about rules and guidance on the game process. As a reflection of this comment, the set of direction and allocation of time for each stage of the game is examined and modified to its suitability.

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HIGH PERFORMANCE SPORE INDUCTION LIQUID SPAWN OF GREY OYSTER MUSHROOM

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Abstract: In mushroom industry, grey oyster mushroom (*Pleurotus pulmonarius*) is commonly cultivated by using solid spawn. In the present study, liquid spawn is proposed as an alternative to replace solid spawn because solid spawn takes longer time for mycelium run in the bag and the final yield is low. Liquid spawn was prepared by culturing spawn in Potato Dextrose Broth while solid spawn was prepared by culturing spawn in grains. This study aims to investigate the growth kinetics and morphology of *P. pulmonarius* on sawdust substrate by liquid spawn and comparison was made with solid spawn which act as control. Screening of parameters variables was performed using OFAT to determine the effect of the parameters on the mycelial growth rate and morphology. The parameters studied were seed culture storage condition, seed culture storage period and liquid spawn inoculum volume. The storage condition was set at cold 4^{oo}C and ambient 25^{oo}C$\pm2^{\text{oo}}$C, while the storage period used was 1, 2 and 3 months. As for the inoculum volume used was 3ml, 5ml and 7ml. From these parameters, they were arranged into 18 combinations. From the findings, it was discovered that the seed culture stored at 4°C for 1 month with 7ml of liquid spawn inoculum volume demonstrated the highest mycelial growth rate (0.3946 cm/day) and highest average weight of fruiting bodies (123.0 g). Also, the average diameter of caps (12.6 cm) yield from this spawn is the highest. Besides, liquid spawn took only 48 days for complete spawn run while solid spawn took 57 days for complete spawn run. Hence, liquid spawn has the potential to be commercialized for the advantages it has over solid spawn, for instance, shorter spawn run period and higher yield.

***Keywords*:** Grey Oyster Mushroom, Liquid Spawn, Solid Spawn

INTRODUCTION

Demands for mushroom have shown a significant increment since 1990s due to the benefits it possesses. In a recent survey, it reported that the market for mushroom had a value of \$35 billion in 2015 and is expected to continue growing by 9.2% from 2016 to 2021 to achieve \$60 billion in 2021 (Rudolf, 2016). Among the mushrooms, *Pleurotus* or oyster mushrooms is one of the most popular edible mushrooms preferred by the consumers worldwide. It has been the second highly cultivated mushroom worldwide (27%) just after *Agaricus bisporus* (30%) in 2010 (Hoa, Wang, & Wang, 2015; Sánchez, 2010).

Commercially, the common mushroom spawn use for grey oyster mushroom cultivation is solid spawn and produce by using tissue culture technique (Abdullah, Ismail, Johari, & Annuar, 2013). However, solid spawn will require longer growth period and is easier to be contaminated (Abdullah et al., 2013; Confortin et al., 2008). The storage period for solid spawn in ambient condition is limited to a month only and has to discharge if exceeded this period. While, using tissue culture technique had also caused several problems to mushroom cultivators such as uncontrolled genetic variation during uncontrolled multiple subcultures obtain, time consuming, and high percentage of contamination.

Therefore, a solution is proposed, which is using combination of tissue culture technique and induce sporulation technique to produce induce sporulation liquid spawn cultivation for the production of *P. pulmonarius* liquid spawn. It is believed that induce sporulation liquid spawn would enable higher yield production, better or uniform mycelial biomass followed by uniform mycelial dispersion with low contamination, hence promoting higher growth rate. Also, liquid inoculum of the species would colonize the substrate easier and faster, reducing the risk of contamination.

Yet, there are still insufficient studies regarding the cultivation of *P. pulmonarius* from using induce sporulation liquid spawn on sawdust substrate. For instance, the parameters that will influence the liquid spawn growth on the sawdust substrate, such as the storage condition of seed culture, storage period of seed culture or the volume of induced liquid spawn use. Also, although previous study has investigated that spawn storing for shorter period will give higher yield, yet the exact period for maximum yield is unclearly stated. Apart from that, there are lacks of significant study regarding the suitable spawn volume of *P. pulmonarius* to be added to the sawdust substrate, which is going to be studied here.

METHODOLOGY

Media Preparation
Potato Dextrose Agar and Potato Dextrose Broth were used in this study. The stress media used was D-glucose soluble starch medium. D-glucose soluble starch media will be act as stress medium to induce spore in this study (Zakaria et al., 2018).

Substrate Bags Preparation
Sawdust was mixed with rice bran and calcium carbonate in the ratio of 100:10:1 [10], with the addition of water to moisten the mixture. The mixed medium was filled into autoclavable polypropylene bags of sizes 6 x 9 inch. The substrate bags were autoclaved for 15 minutes at 121°C under 101.5kPa prior to inoculation with liquid spawn.

Mycelium Culture Preparation by Tissue Culture Technique
Mature fruit bodies of grey oyster mushroom were harvested at day 2 after they emerged from the substrate bag. The freshly harvested fruit bodies were sterilized using 70% ethanol. The fruit bodies were dissected in aseptic condition to obtain its deep tissue by using a scalper which had been prior autoclaved. Tissue of fruit bodies of size around 2cm length and thickness was inoculated onto the prepared PDA medium. The petri dishes were incubated in dark at 27°C for about 2 weeks' time.

Hyphae Fragments Harvesting
After the complete colonization of mycelium on PDA agar, hyphae fragments were collected from the mycelium in a laminar flow hood. 5ml of sterile 0.85% saline containing 0.01% tween 80 as detergent was added to PDA medium. A pre-autoclaved loop was used to dislodge the hyphae fragments from the surface of PDA medium into the saline solution.

Inoculation of Hyphae Fragment in Stress Media
The hyphae fragment suspension was transferred into 100ml of the prepared stress media in a 250ml Erlenmeyer flask. Subsequently, the culture was incubated in the dark at 27°C for 1 week in an incubator with static condition.

Preparation of Liquid Spawn (Collection and Purification of chlamydospore)
10ml of the spore suspension in stress media was centrifuged at 3000rpm for 25 minutes. The precipitate was discarded and 5ml of the supernatant was pipetted into the 100ml of previously prepared PDB. The culture was incubated in the dark at 27°C for two weeks. The liquid spawn were inoculated onto the sawdust substrate bag prepared with 3 different volumes (3ml, 5ml, and 7ml). The inoculated bags were kept at 23-25°C in a dark air-conditioned room of 50-60% relative humidity until fully mycelium had been covered substrate. After this spawn run process, the bags were transferred into a mushroom house with the relative humidity of 85-90% at 28-30°C.

Preparation of Solid Spawn (Control)
For solid spawn, corn grain was used as substrate. The grain was filled into a sterilizable and autoclavable bag covered with plastic cork and was autoclaved for 15 minutes at 121°C under 101.5kPa. After that, the grain was allowed to cool overnight and was inoculated with mycelium culture grown on 8.5cm diameter of agar media. The solid spawn was stored under 27°C ambient condition until the grain was fully covered with mycelium within two weeks of incubation. The solid spawn was inoculated into the substrate bags that were prepared earlier.

Evaluation on the Kinetic Growth Rate of Mycelium
The mycelium growth kinetic was measured in terms of the mycelium growth length within the substrate bags. The mycelium growth length was measured every three days and the data was used in growth kinetic analysis of the performance of liquid spawn colonization on sawdust substrate under different factors combination. In this study, General Linear Model (GLM) was applied to investigate the growth rate for the parameters combination.

General Linear Model:
$$Y = mX + C. \quad (1)$$
where Y is the y-axis variable, X is the x-axis variable, m is the gradient of line and C is the y-intercept.

For GLM to be applied for mycelium growth from liquid spawn on substrate bags, a graph of length colonized by mycelium against time interval was plotted. Following, the reading from the log phase or exponential phase as shown from the growth curve plotted was linearized into the GLM and hence the gradient of the linear line depicted the growth rate (Guadarrama-Mendoza et al., 2014). The unit for y-axis was usually cm while the x-axis was the time interval usually in days.

Analyze on Growth Morphology of Grey Oyster Mushroom

Lastly, the growth morphology of grey oyster mushroom was studied. The fruit body morphology was analyzed 3 days after the fruit bodies emerged from the substrate bag opening. The studied morphology was the weight of fruiting bodies harvested.

FINDINGS

Evaluation on the Kinetic Growth Rate of Mycelium on Sawdust Substrate Bags

The mycelium growth shows standard growth curve which compose of lag phase, log phase or exponential phase, deceleration phase and stationary phase, showing remarkable change every three days. Lag phase took place during slow growth of mycelium, while exponential phase took place during rapid growth condition. As for deceleration phase, the growth slowed down and stationary phase showed no growth. From then, the growth rates are tabulated and compared critically between different combinations of conditions for the liquid spawn.

In overall, the liquid spawn prepared with seed culture stored at 4°C for 1 month had the shortest lag phase which was only 3 days and entered the exponential phase after day 3 upon inoculation. Conversely, liquid spawn of other conditions such as the seed culture stored at 4°C for 2 months as well as seed culture stored in ambient for 1 and 2 months took at least 6 days up to 15 days of slow growth in lag phase before entering exponential phase. For the seed culture stored at 4°C for 3 months, it took 9 to 24 days before entering the exponential phase while the seed culture stored in ambient for 3 months took 18 to 24 days before entering exponential phase, which is the longest out of all conditions.

In terms of the time used, seed culture stored at 4°C for 1 month with liquid spawn inoculum volume 7ml utilized 48 days to finish colonizing the substrate bags, which was the fastest compared to all other conditions. As compared to solid spawn, it utilized 57 days for the mycelium to complete colonizing the substrate bags. In order to harvest fruiting bodies, bags colonized by liquid spawn took 4 to 7 days to form fruiting bodies while bags colonized by solid spawn took 7 to 10 days to form fruiting bodies. This has validated the study of Roshita *et al* in 2015 where grey oyster mushroom takes around 59 to 97 days to fully colonize a standard substrate bag until fruiting since the mushroom species has larger pileus size and takes longer time to harvest (Ibrahim, Yasin, Arshad, & Hasan, 2015). Hence, it was studied that liquid spawn took shorter time for complete spawn run than solid spawn.

- Table 1. Tabulation of data for growth rates of solid and liquid spawns.

Conditions of Liquid Spawns	Mycelium Growth Rates (cm/day)
Seed Culture: 4°C, 1 month, 3ml	0.3838
Seed Culture: 4°C, 1 month, 5ml	0.3879
Seed Culture: 4°C, 1 month, 7ml	0.3946
Seed Culture: 4°C, 2 month, 3ml	0.3840
Seed Culture: 4°C, 2 month, 5ml	0.3859
Seed Culture: 4°C, 2 month, 7ml	0.3870
Seed Culture: Ambient, 1 month, 3ml	0.3617
Seed Culture: Ambient, 1 month, 5ml	0.3629
Seed Culture: Ambient, 1 month, 7ml	0.3661
Seed Culture: Ambient, 2 month, 3ml	0.3570
Seed Culture: Ambient, 2 month, 5ml	0.3608
Seed Culture: Ambient, 2 months, 7ml	0.3656
Seed Culture: Ambient, 3 months, 3ml	0.3790
Seed Culture: Ambient, 3 months, 5ml	0.3606

Seed Culture: Ambient, 3 months, 7ml	0.3624
Solid Spawn (Control)	0.3567

As reflected from Table 1, the range of the growth rates is within 0.3 to 0.4 cm/day. By using OFAT method to analyze the results of the findings, it is observed that the growth rates of the mycelium increases when the volume of liquid spawn used increases while keeping the storage temperature and storage period constant. This has verified the statement where low volume of inoculum is insufficient to initiate the growth or causes slow growth of mycelium in the substrate (Bellettini et al., 2015; Sabu, Pandey, Jaafar Daud, & Szakacs, 2005). However, concentration above limit will lead to rapid depletion of nutrients and reduce metabolic activity (Bellettini et al., 2015; Patel, Gupte, & Gupte, 2009). Yet, from the study, 7ml inoculum volume shows better growth rate than 3ml and 5ml, which means that 7ml is not the limit yet and is a suitable inoculum volume used to cultivate *P. pulmonarius* on sawdust substrate.

As in terms of the effect of storage period of seed culture, by keeping the storage temperature and volume constant, the seed culture kept for shorter period shows higher rate of mycelium growth. In contrast, seed culture kept for longer period such as 3 months shows lower mycelium growth rate. This has validated the finding of Sobieralski *et al*. (2007) where seed culture storing for shorter period will conserve the culture quality as long storage period will cause insufficient aeration in the culture and disturb the metabolic process of the culture.

For the effect of temperature, by keeping the storage period and inoculum volume at constant, seed culture stored at 4°C depicts higher growth rate in compare with the seed culture from ambient condition. This finding is compatible with the finding of Kaur *et al*. in 2011, where mushroom cultures of *Agaricus bisporus* and *Pleurotus florida*, discovering low temperature favored the fungal culture growth before spawning (Kaur, Dhanda, Sodhi, Kapoor, & Khanna, 2011). Study conducted by Sobieralski and Salwin (2006) also proved the statement where cold temperature allows the freshness quality of the culture while ambient condition will decrease the spawn quality over time.

Effect of Parameters on Fruiting Bodies
Overall, there are no certain parameters out of the three parameters studied being dominant in determining the morphology properties of fruiting bodies. Often, the highest mycelium growth rate and average weight of fruiting bodies are prioritizing in determining the efficiency of the spawning method. Hence, it could be stated that seed culture stored in 4°C for 1 month gave higher yield harvest than the other conditions and including the solid spawn.
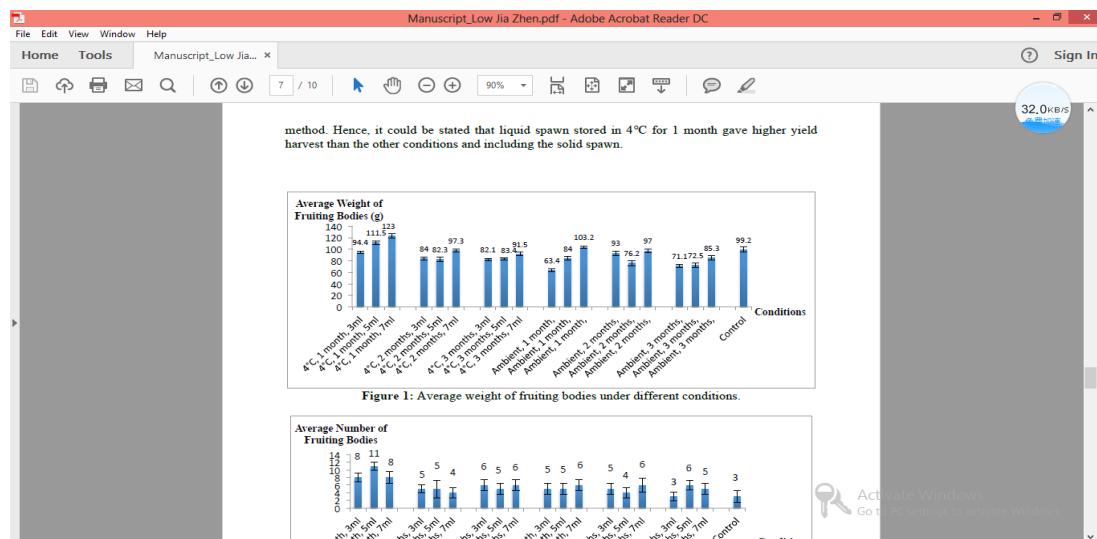
Manuscript_Low Jia Zhen.pdf - Adobe Acrobat Reader DC

method. Hence, it could be stated that liquid spawn stored in 4°C for 1 month gave higher yield harvest than the other conditions and including the solid spawn.

Figure 1. Average weight of fruiting bodies under different conditions.

Comparison of Solid Spawn and Liquid Spawn

- Table 2. Comparison of solid and liquid spawn.

	Solid Spawn (4-5 g)	Liquid Spawn (Seed culture: 4C for 1 month with 7ml inoculum volume)
Mycelium Growth Rate	0.3567 cm/day	0.3946 cm/day
Average Weight of Fruiting Bodies	99.2 ± 4.413 g	123.0 ± 3.980g
Period for complete Spawn Run	57 ± 3 days	48 ± 3 days

Table 2 demonstrates the comparison between solid and liquid spawn in terms of the mycelium growth rate, average weight of fruiting bodies for morphology study and period for complete spawn run. The liquid spawn used for comparison was seed culture stored at 4°C for 1 month with 7ml inoculum volume of liquid spawn since it showed the highest performance among the liquid spawn under different conditions. Overall, liquid spawn was preferred over solid spawn since it had higher mycelium growth rate, higher average weight of fruiting bodies and shorter period for complete spawn run.

CONCLUSIONS

In conclusion, seed culture stored at 4°C for a month with 7ml inoculum volume of liquid spawn is the most influenced parameters and it depicted the highest growth rate and shortest lag phase in the growth curve. The time taken for complete spawn run was only 48 days, which was faster than the solid spawn run duration which took up to 57 days. In compare of the three parameters used, by depending on the growth rates of mycelium, the storage condition was the dominant parameter as it gave highest effect to the mycelium growth rate. This was followed by storage period and inoculum volume. For morphology study, seed culture stored at 4°C condition for 1 month with liquid spawn of 7ml inoculum volume had the highest yield harvested, which was 123g. Compared to the control, the average yield harvested was only 99.2g. Average yield was used to determine the efficiency of a parameters condition since the number of caps, cap diameter and length of stipe may differ upon fluctuation in the environment condition or in terms of the competition between the fruiting bodies.

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RASCA CALCULATOR FOR RAIL INFRASTRUCTURE PROJECT IN MALAYSIA

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Abstract: The Klang Valley Mass Rapid Transit (KVMRT) System is set to be one the most important and largest transport infrastructure projects in Malaysia. The other rail infrastructure project which is currently in construction progress is Light Rail Transit (LRT) Bandar Utama to Klang line or known as LRT 3. These projects as an Entry Point Project (EPP) under the Economic Transformation Programme's Greater Kuala Lumpur/Klang Valley National Key Economic Areas (NKEA) and will provide a major boost in the efficiency of urban public transport. On 15 December 2016, Malaysia and Singapore signed a consensual agreement to jointly develop the 350km HSR project between Kuala Lumpur and Singapore. Then in the 2017 Budget, the Malaysia Prime Minister announced the intention of the government to build the East Coast Rail Project (ECRL). With the vigorous development of the rail infrastructure project, fatalities, serious injuries and damage to properties at recent of this project sites occurred every year. Work injuries create significant economic and humanitarian consequences to our society especially to this project where they involve billion of Malaysian Ringgit (RM). The awareness of accident cost especially the payment cost is absent because the contractors, clients and the consultants leave the matters to the insurance company. They always ignorance on the cost of an accident without realizing the greatness of its impacts to the industry and the country. Therefore, a correctly developed Rail Safety Costs Allocation (RaSCA) Calculator is an essential part to come out the specific costs and calculations for each cost component. This calculator allows contractors to estimate, during the design phase and the safety costs that might occur in the execution phase of a construction project at the work site. The most logic amount of safety costs allocation can be achieved in the future project, as efficiency cost of doing this *infra-rakyat* project can be improved and creating the awareness of safety costs allocation to the client and contractors.

Keywords: Safety, Safety Cost, Design Phase, Construction Phase, Rail Infrastructure Project.

INTRODUCTION

Nowadays, the transport infrastructure is moving rapidly toward a modern service transportation industry. Investment in transport infrastructure requires a significant amount of public funds. In intercity transport, most of the corridors are already in operation and investments in large projects such as high- speed rail (HSR). High-speed rail (HSR) systems are already operating in many countries such as Japan, England, Italy, Germany and France. Further development of the whole European HSR network is planned. It can be viewed as a purpose to reduce the cost of travelling (time and cost savings, reliability, comfort and externalities) concerning the situation prevailing without project (De Rus, 2011).

In Malaysia, the construction of urban rail transport project was started operational since 2002 for Light Rapid Transport (LRT) and Kuala Lumpur (KL) Monorail services. This construction has been managed by Syarikat Prasarana Negara Berhad, who focuses on major public transport infrastructure projects in Malaysia. This project is expanding all over the time to enhance and integrate the urban public transportation services; one of the National Key Result Areas, which is a priority under the Government Transformation Program.

Recently, Malaysia continued to excel in the aspect of urban rail infrastructure with the completion of Mass Rapid Transit (MRT) 1 from Sungai Buloh to Kajang line in July 2017. The other rail infrastructure projects which are currently in construction progress such as MRT 2, from Serdang to Putrajaya line, Light Rail Transit (LRT) 3 and LRT Bandar Utama to Klang line. This development gives some signal that Malaysia is in line with other developed countries that have high-speed and modern public transportations.

On 15 December 2016, Malaysia and Singapore signed a consensual agreement to develop the 350km HSR project jointly. This project will reduce the travelling time between the two cities by two hours, to approximately 90 minutes. The HSR serves as an alternative mode of public transport travel between Kuala Lumpur and Singapore. Then in the 2017 Budget, the Malaysia Prime Minister announced the intention of the government to build the East Coast Rail Project (ECRL). ECRL identified as a high impact infrastructure project that will form the backbone of ECER's multimodal transport infrastructure. ECRL will connect many rural townships and is part of the larger plan to connect rural areas (Yong, 2017). This rail infrastructure projects would complement existing road/expressway infrastructure as the Lebuhraya Pantai Timur and the existing KTMB East Coast Line and ports.

With the rapid development of the rail infrastructure project, fatalities, serious injuries and damage to properties at recent of this project sites occurred every year. Derived from the MRT accident reports, almost thousand numbers of incident cases occurred for MRT 1 Project since the project started in 2011. Neither the worker's fatal nor nonfatal injuries, all of the accidents will create a significant economic burden to the stakeholders of the project.

Previous studies have shown that after the accident happened, a lots of losses have to be incurred by parties involved (Davies et al., 1994); (Jallon et al., 2011); (Goestsch, 2013); (Asan, n.d.); (Pellicer et al., 2014) and (Feng et al., 2015a). These losses costs may include victims, families, employers and society. In addition, it also affects construction company profit and loss statement due to damages to productivity, property, equipment and morale. Moreover, the accident occurrence may also raise the cost and reduce contractors` reputation and other losses as a result of delays in project completion. The costs that related to these accidents are both human (not directly measurable) and financial either to companies or society (sick leave, medical treatment and so on).

However, according to Feng et al. (2014), the quantification, evaluation and identification of many of the losses incurred in an accident were difficult as they were "hidden". These "hidden" costs may be significant, and some may be particularly prominent in the construction industry. Jallon et al. (2011) supported the same view about the "hidden" costs as being difficult to isolate, identify, evaluate and therefore quantify. These hidden costs are often difficult to calculate due to the difficulty in applying the existing models.

Moreover, López-Alonso et al. (2013) revealed that the application of existing model from the different sector is not easy to the suite with another sector. These models should tailor to each company according to its circumstances. There are several economic safety cost models from different countries such as Singapore, United Kingdom and Australia. However, those models not specific to the construction sector.

While in Malaysia, the Department of Occupational, Safety and Health (Dosh) developed Occupational Safety and Health (OSH) Calculator. Nevertheless, the limitation of OSH Calculator does not include the costs should be allocated by the client for the compliance with work health and safety regulations and safety cost prevention activities. The model just focused on the financial losses occurred by the contractor and victim. This is a significant gap that should highlight in improving these existing safety cost models.
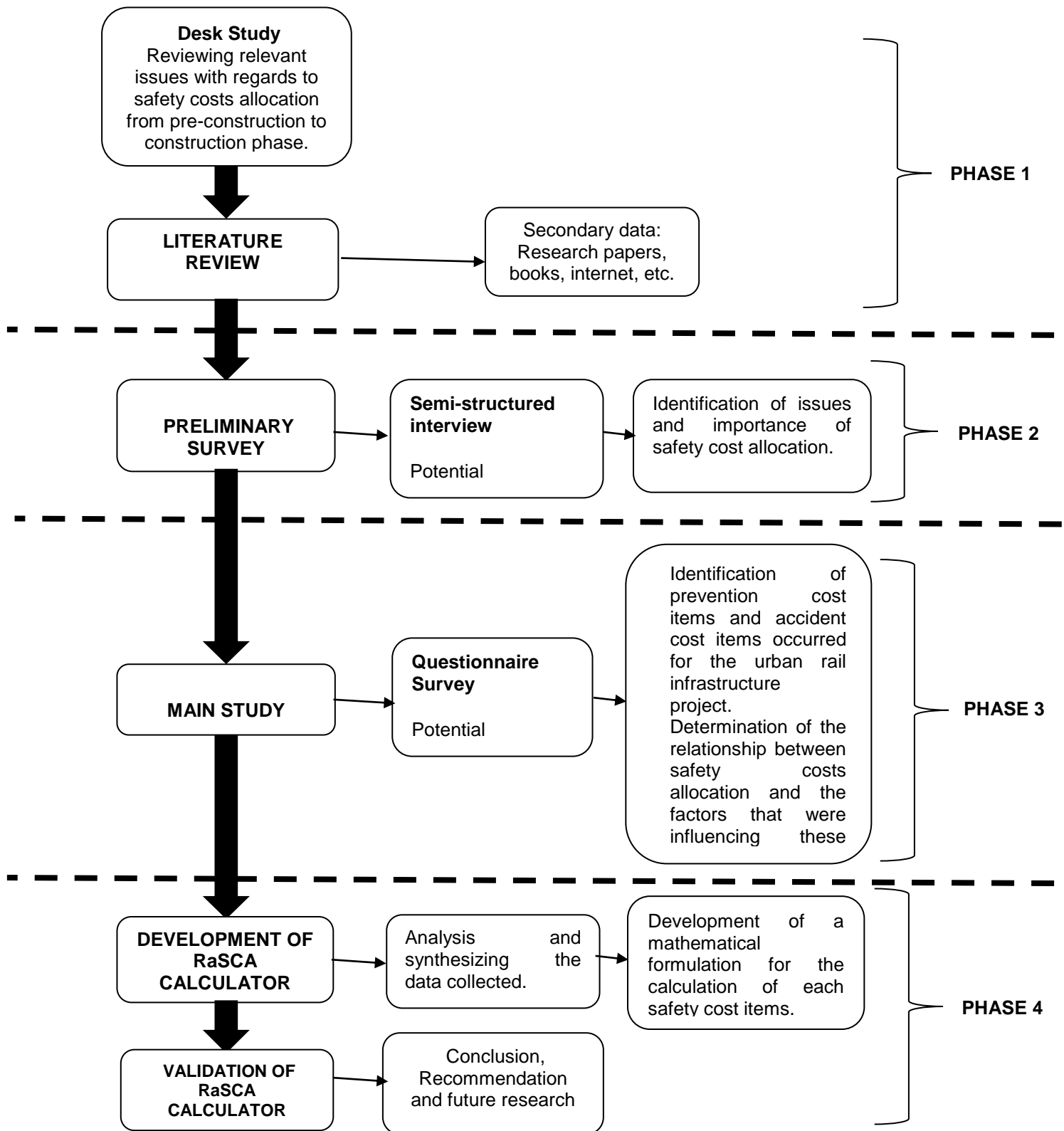
The objective of this study is to develop Rail Safety Costs Allocation (RaSCA) Calculator as a tool in calculating the safety costs allocation for urban rail infrastructure projects. The reliable evaluation of the safety costs allocation during the pre-construction phase and the costs of accidents incurred during the construction phase can help client, employers (contractors) and victims (workers) to internalise the importance of safety measures from an economic managerial perspective, and to locate the items that require investment in safety measures for strategic safety investment plan.

METHODOLOGY

Research methodology refers to the principles and procedures of logical thought processes applied to a scientific investigation. Methods concern the techniques which are available for data collection and analysis (Fellows & Liu, 2008). The research methodology for this study consists of the following phases.

- Desk study – the identification of safety research trends from the literature review.
- Preliminary survey – the establishment of safety costs estimation issues, problems and the evaluation of the relevant questionnaire.
- Main study – the identification of prevention cost items and the accident cost items occurred for the urban rail infrastructure project and the determination of the relationship between safety costs allocation and the factors that influencing these costs.
- Development and validation of model – the development of a mathematical formulation for the calculation of each safety cost items and validation of the proposed Rail Safety Costs Allocation (RaSCA) Calculator for urban rail infrastructure projects.

The proposed methodology for the development of Rail Safety Costs Allocation (RaSCA) Calculator shown in Figure 1.

Desk Study
Reviewing relevant issues with regards to safety costs allocation from pre-construction to construction phase.

PHASE 1

LITERATURE REVIEW

Secondary data: Research papers, books, internet, etc.

PRELIMINARY SURVEY

Semi-structured interview

Potential

Identification of issues and importance of safety cost allocation.

PHASE 2

MAIN STUDY

Questionnaire Survey

Potential

Identification of prevention cost items and accident cost items occurred for the urban rail infrastructure project.
Determination of the relationship between safety costs allocation and the factors that were influencing these

PHASE 3

DEVELOPMENT OF RaSCA CALCULATOR

Analysis and synthesizing the data collected.

Development of a mathematical formulation for the calculation of each safety cost items.

PHASE 4

VALIDATION OF RaSCA CALCULATOR

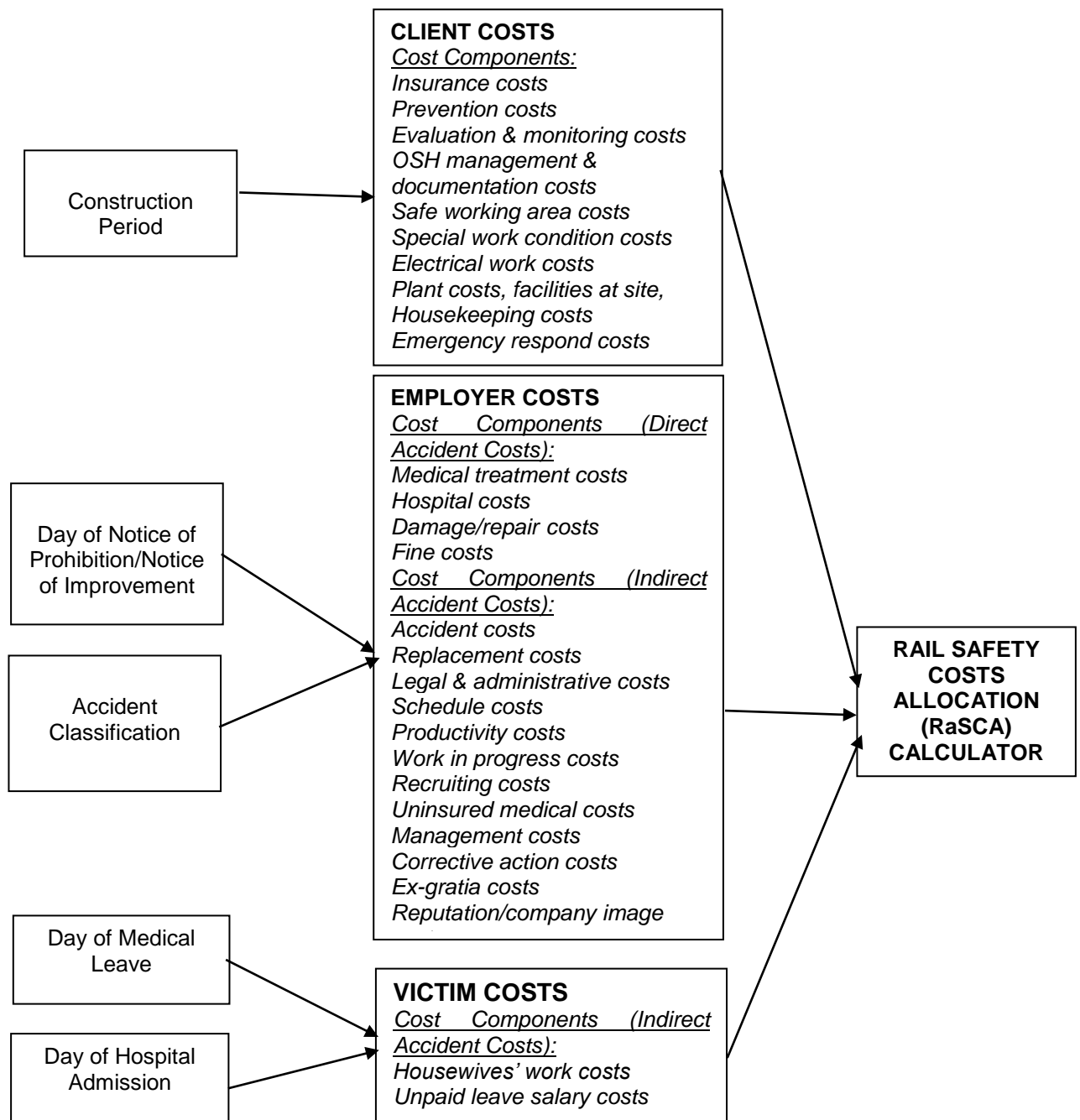Conclusion, Recommendation and future research

FINDINGS

i. Proposed model of Rail Safety Costs Allocation (RaSCA) Calculator

Figure 2 represents the proposed model of Rail Safety Costs Allocation (RaSCA) Calculator for urban rail infrastructure projects. This proposed model was developed based on refinement from the existing OSH Calculator Model in Malaysia. Three main stakeholders that have emerged for dealing with the safety cost allocation are client cost, employer (contractor) cost and victim (worker) cost. All these parties have the different types of safety components, items and sub-items, which are involved in different phases of construction. These cost components will specify according to the safety requirements for the construction of urban rail infrastructure projects, which differs from those of the building construction. The types of safety and health costs components, items and sub-items have emerged with the risk identification from the urban rail infrastructure construction.

There are eleven (11) cost components required by the client, which are insurance costs, prevention costs, evaluation & monitoring costs, OSH management and documentation costs, safe working area costs, special work condition costs, electrical work costs, plant costs, facilities at the site, housekeeping costs and emergency respond costs. For the employer costs, the costs were incurred during the construction when an accident occurred at the site. These costs divided into direct accident costs and indirect accident costs. The direct accident costs are the costs that incurred directly from the accident and tend to associate with the injury treatment and any workers compensation as consequences of being injured. Typically, this cost can be claimed by SOCSO and insurance company and quite easy to calculate. However, the indirect accident costs can be more costly than direct accident costs because it is difficult to calculate. Besides that, all indirect accident costs components are not covered by the worker`s compensation insurance and insurance company.

There are four (4) costs component involved in the direct accident costs, which are medical treatment costs, hospital costs, damage/repair costs and fine costs. While for the indirect accident costs, there are twelve (12) costs component such as accident costs, replacement costs, legal & administrative costs, schedule costs, productivity costs, work in progress costs, recruiting costs, uninsured medical costs, management costs, corrective action costs, ex-gratia costs and reputation/company image costs. For the victim (worker) costs, the costs of housewives work to take care of the injured worker, and the unpaid leave salary costs (foreign worker) considered as an effect to the victim costs.

The proposed model of Rail Safety Costs Allocation (RaSCA) Calculator indicates that the present research should includes scales dealing with construction period when estimating the client costs. While for the employer (contractor) costs, factors that influence the cost components are the day of Notice of Prohibition (NOP) or Notice of Improvement (NOI) and types of accident classification. Day of Medical Leave and day of Hospital Admission have the strong relationship that effects to the cost components for the victim costs. All these factors give effect to the estimating of safety costs allocation for the urban rail infrastructure projects.

The following boxes appear in the diagram:

Construction Period

CLIENT COSTS
Cost Components:
Insurance costs
Prevention costs
Evaluation & monitoring costs
OSH management & documentation costs
Safe working area costs
Special work condition costs
Electrical work costs
Plant costs, facilities at site,
Housekeeping costs
Emergency respond costs

Day of Notice of Prohibition/Notice of Improvement

Accident Classification

EMPLOYER COSTS
Cost Components (Direct Accident Costs):
Medical treatment costs
Hospital costs
Damage/repair costs
Fine costs
Cost Components (Indirect Accident Costs):
Accident costs
Replacement costs
Legal & administrative costs
Schedule costs
Productivity costs
Work in progress costs
Recruiting costs
Uninsured medical costs
Management costs
Corrective action costs
Ex-gratia costs
Reputation/company image

Day of Medical Leave

Day of Hospital Admission

VICTIM COSTS
Cost Components (Indirect Accident Costs):
Housewives' work costs
Unpaid leave salary costs

RAIL SAFETY COSTS ALLOCATION (RaSCA) CALCULATOR

- Figure 2. Proposed Model of Rail Safety Costs Allocation (RaSCA) Calculator
-

ii. Development of Rail Safety Costs Allocation (RaSCA) Calculator

Development of Rail Safety Costs Allocation (RaSCA) Calculator based on the proposed model developed in this research. The formulation of Rail Safety Costs Allocation (RaSCA) measured by the equation (1).

$$RaSCA_w = WSPC + WEC + WVC \qquad (1)$$

$RaSCA_w$ is weighted Rail Safety Costs Allocation

WSPC is weighted Safety Prevention Costs

WEC is weighted Employer Costs

WVC is weighted Victim Costs

Weighted Safety Prevention Costs (SPC_w) equation is given as:

$$PC_w = ASPC \, (W_1\alpha_1) \qquad (2)$$

Where:

ASPC is average safety prevention costs

$W_1\alpha_1$ is weighted construction period

The weighted Employer Costs (EC_w) equation is given as:

$$EC_w = AEC \, \frac{(W_1\alpha_1 + W_2\alpha_2)}{2} \qquad (3)$$

Where:

AEC is average employer costs

$W_1\alpha_1$ is weighted day of stop work order

$W_2\alpha_2$ is weighted accident classification

The weighted for Victim Costs (VC_w) equation is given as:

$$VC_w = AVC \, \frac{(W_1\alpha_1 + W_2\alpha_2)}{2} \qquad (4)$$

Where:

AVC is average victim costs

$W_1\alpha_1$ is weighted day of medical leave

$W_2\alpha_2$ is weighted day of hospital admission

CONCLUSIONS

This paper provides a safety cost estimation method to calculate the safety costs allocation required by the client and the accident costs incurred to the employer (contractor) and victim (worker) when an accident occurred at the site. It based on a theoretical approach that classifies these costs in two categories, i.e. direct and indirect costs based on the different cost bearers, which are employer and victim. The Rail Safety Costs Allocation (RaSCA) Calculator proposed as a method of estimating the cost components for each stakeholder involved in the urban rail infrastructure projects. The reliable method in estimation of those costs can help client, employers and victims to internalise the importance of safety measures from an economic managerial perspective, and to locate the items that require investment in safety measures for strategic safety investment plan.

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THE DEVELOPMENT OF MOBILE APPLICATION FOR UNDERGRADUATE DISSERTATION: `MYDISSERTPLANNER'

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Abstract: The research interest among undergraduate students are vital for their academic achievements. Research dissertation is important and leads towards development of knowledge. Undergraduate students are lacking structured application to assist them in planning their research journey and poor time management. Hence, contributes towards poor preparation for future task that lead to delay in submission of dissertation. This research aim is to establish mobile application for undergraduate students and supervisors in managing their research activities. In line with this aim, three research objectives had been established i) to explore the existing mobile application relating to research planner and dissertation (ii) to identify the key problem faced by the students during the dissertation process and (iii) to develop a mobile application that integrates planning and dissertation guideline. The data is gathered by analysing the existing mobile application used by university students. In addition, a pilot survey was also conducted among undergraduate students in UiTM Perak. The data were analysed using descriptive analysis. The finding reveals that majority students have difficulty in managing the research process and contribute to delay in submission of their dissertation. Therefore, there is a significant need in developing `myDISSERTplanner' as a mobile application to ease undergraduate students in planning their research activities.

Keywords: myDİSSERTplanner, mobile application, undergraduate students, research

INTRODUCTION

The research interests among undergraduates' students are vital for their achievements. Research is important and leads towards development of knowledge and products that can help improve issue arise. Research requires high level of skills, knowledge and critical thinking to produce the best research outcome. Katkin (2003) highlighted that the development of research skills is continuously being considered as "an underlying principle" of undergraduate programmes. Among important requirements for undergraduate is the production of the dissertation. In fact, the higher education has developed many courses including dissertations as one of the curriculum to enhance student's research skills. Previous studies emphasized the importance of research and supervising for embedding research skills among undergraduates' students (Kuh, 2008, Shanahan et al, 2015, Feldon et.al., 2015; Garg

& Passey, 2018). The issue is on students' effectiveness in managing their research time even though they have supervisor during the process. Students are struggling to complete their research and dissertation, due to lacking of the required skills for conducting effective research and produce the dissertation. At the same time, students tend to procrastinate due to other commitment in student life. Undergraduate students are also lacking structured application to assist them in planning their research journey and poor time management (Manathunga, 2007). Hence, contributes towards poor preparation for future task that lead to delay in submission of dissertation (Affero, 2011). Therefore, the research aim is to establish a mobile application for undergraduate students in managing their research activities. In line with this aim, three research objectives had been established (i) to explore the existing mobile application relating to research planner and dissertation, (ii) to identify the key problem faced by the students during the dissertation process, and (iii) to develop a mobile application that integrates planning and dissertation guideline.

AN ANALYSIS ON EXISTING MOBILE APPLICATIONS OF RESEARCH ACTIVITIES

An analysis base on the existing application was done via downloading application at website https://play.google.com/store/apps on January 16, 2018. Keywords such as 'PhD Planner' 'Master Planner' 'Dissertation Planner' 'Study Planner' 'Thesis Planner' has been used to search for related application that existed in the Google Play Store. The total of 10 applications has been acknowledged. Five applications were related to topic of study planner. Meanwhile, another five applications relating to the topic on dissertation have also been identified and discussed discretely in this research. Five applications that related to study planner are PhD Planner, My Study Life – School Planner, Smart Study Plan, Studies Planner and Study Manager: Smart Student.

a) PhD Planner

This application was design as organizer to achieve the completion of PhD thesis. This tool consists of ongoing and upcoming task, milestone, studies, conferences, workshop and holidays. The star rating is 5 with only 2 users

b) My Study Life – School Planner

My Study Life is a planner suitable for students and teachers designed to manage study task. It allows user to store classes' timetables, homework and exams which integrate activities of academic life. The rating is 4.3 stars with 46,047 users

c) Smart Study Plan

The Smart Study Plan is solid study schedule to ensure studying success. All the courses should be added to this application and the application will generate a study plan and will remind the student to when and what to study. The star rating is 4.5 with 319 users

d) Studies Planner

This application allows students to organize simple subject timetable and keep track of the studies. Students can save test results in order to keep track of the grades. The application is rated 4.0 stars with 121 users

e) Study Manager: Smart Student

Study manager could assist student to organize course information, notes, assignments, quizzes, homework, classes and examination. User can mark the task as complete or not complete with selection of ringer mode. The application is rated as 3.7 stars with 310 users

Four out of five existing planner focus on organizing study life at school such as classes, homework and assignment. Only one application specifically spells out PhD task and activities that related to research journey. It is discovered that is no existing study planner specifically created for managing undergraduate university students' activities. Additionally, the undergraduate student has no experience in managing research task and preparing dissertation as the university requirement.

The other 5 applications identified as related to dissertation or thesis are Writing Thesis, Help in Dissertation, How To Write A Thesis Statement, Your Thesis and How To Write A Thesis.

a) Writing Thesis

This application assist student to search thesis topic and generate essay statement that suits the research topic. The application has listed quite a number topic that can modify accordingly. The topics however are arranged according to faculties. The star ranking is not very high which are 3.8 with 208 users

b) Help in Dissertation

This application offers support for students in doing their dissertation and assignment. The student will get to communicate to a group of expert on any topic requested. Students can chat and communicate with experts by instant notification, updates and replies with certain charges. The application was rate as 5 star with only 2 users.

c) How to Write a Thesis Statement

This application could guide students in doing their thesis by providing samples of the complete bachelor's thesis. The students can download the samples such as the abbreviation page, abstract page as well as chapters. These samples are to ease the students by providing information in process of writing the academic content. This application rating is 4.6 with 19 users.

d) Your Thesis

This application allows student to share their publication and thesis through social media. This application forms a digital medical library where most of the topic is on medical issues that arranged according to specialism. The rating of this application is 4.5 with 14 users.

e) How to Write a Thesis

This application provides information on how to write a thesis. There are list of written articles and tips on how to start writing a thesis that students can refer such as writing an introduction and getting creative with the thesis. The star rating is 4.1 with 107 users.

All the five applications on dissertation or thesis focus on the guide of writing a dissertation or thesis. Three of the thesis applications have less than 20 users. The other two applications obtain more than 100 users but less than 250 which conclude that the existing application has a low number of users. None of the identified applications offer the service on planning and scheduling the related task to complete until the dissertation submission. These show the gap

on the need to create a new innovative dissertation planner that combine both planner and dissertation guideline for undergraduate students. Thus, `myDISSERTplanner' is developed to provide a comprehensive and efficient timeline for the undergraduate students.

METHODOLOGY

Generally, this research adopted three phases. Firstly, a literature review on the existing research mobile applications was analysed. This is to explore on the existing mobile applications used by the university students.

Secondly, a pilot survey to identify the key problem faced by the undergraduate students in Universiti Teknologi MARA (UiTM) Perak was conducted. A sample of approximately thirty undergraduates' students is identified. Stratified random sampling was used to select samples. This data obtained were than analysed by using descriptive analysis. The final research methodology is the development of `myDISSERTplanner' to ease the planning and tracking of research activities among undergraduate students.

FINDINGS

Data Analysis and Findings

Figure below represents the sampling of 30 respondents gathered in December 2017.
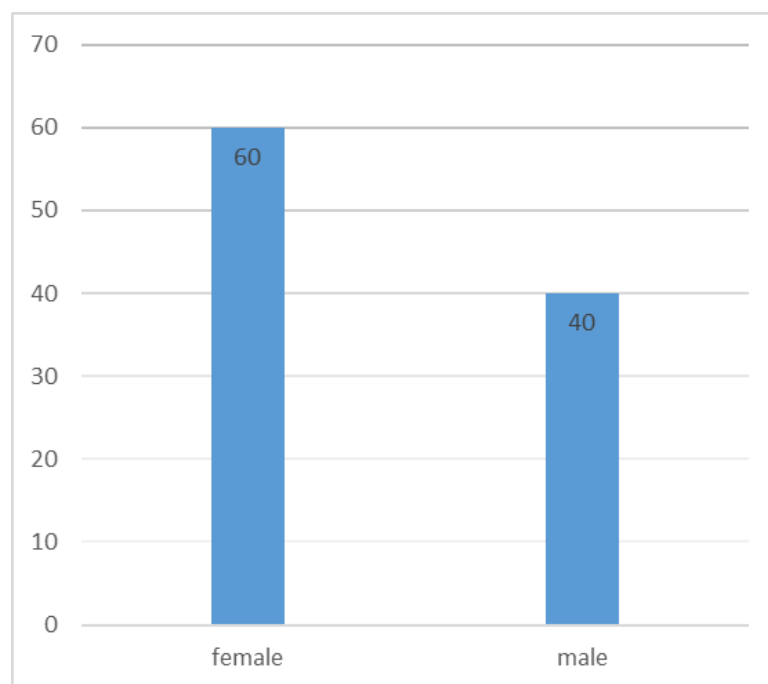
- Figure 1: Distribution of the research respondents

The respondents consist of 60% female and 40% male undergraduate students in UiTM Perak. Four main problems faced by the students in completing their dissertation were posted to the respondents. Among them are difficult to manage the process of preparing a dissertation, uncertain of the steps to be taken in progressing research, difficult to understand the dissertation manual and uncertain on the actual research timeline. In addition, the respondents were also asked to rank these problems.

- Table 1: Problems faced by the undergraduate students in completing dissertation

PROBLEM FACED BY UNDERGRADUATE STUDENTS	RANKING (N=30)
Difficult to manage the process of preparing a dissertation	1
Uncertain of the steps to be taken in progressing research	2
Difficult to understand the dissertation manual	3
Uncertain on the actual research timeline	4

Table 1 illustrates on the key problems faced by the students in completing their dissertation. The finding reveals that majority students ranked difficult to manage the process in preparing dissertation as the main problems, followed by students are unsure with the steps to be taken in progressing their research. Difficulty in understanding the dissertation manual is rank as the third main problem. Finally, uncertainty of the actual research timeline is rank as the least problem.

CONCLUSIONS

`MyDİSSERTplanner' is a mobile application that is easily accessible from any smart phone browser. There are many advantages to use mobile event applications. First and foremost it can be easy access to every single information that the students need to attend. It is a centralised information where the student can keep track with the activities and checklist that they need to comply with the deadline. Building the communication structure through technology has speed the flow of data and information resulted the ease of use, reach and content of accessible information about writing dissertation for UiTM's undergraduate students. It is envisioned that the development of `myDİSSERTplanner' will be a demanding tool for undergraduate students in the universities as well as to help the students graduate on time (GOT). GOT requirements become a policy in most universities in all over the globe as it reduced cost of operation to the universities.

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3D VISUAL MODEL FOR BUILDING QUANTITIES TAKE-OFF (3D-VIMO)

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Abstract: Quantifying building construction are normally based on two dimensional drawings (plan and section) and written specification. Based on students' feedback and lecturers experiences, students are having difficulties in visualizing the building elements that need to be quantified. Thus, the students are struggling in taking-off building quantities. Therefore, additional teaching aid are required to facilitate teaching and learning of the taking-off building quantities. The innovation of additional teaching aid will help the students in visualising the building elements and assist them in taking-off building quantities. The concept of this innovation involves multi-media tool which is 3D visual model and cooperative learning. The 3D visual model will be prepared for each buiding elements taught. During the learning session, students will be divided into small groups (3-5 students per group) and will learn the taking-off with close supervision and guidance from the lecturer. Students will be provided with this 3D visual model in addition to the two dimensional drawings and specification. The 3D visual model will assist the students in visualising the building elements that need to be quantified. Thus, understanding the taking-off process will be easier and faster. The combination of 3D visual model and the cooperative learning in groups is expected to enhance students interest in this subject. Thus increase their understanding in taking-off building quantities.

***Keywords*:** Building Construction, Taking-off, Quantities, 3D Visual Model

INTRODUCTION

Building quantities course is one of core course for built environment students. In this course, students are taught to quantify building materials for building element from the two-dimensional drawings (2-D Drawing) (plan and section) and written specification. The students will do the quantifying work or normally known as taking off based on the taking off list prepared. During the teaching and learning process, the lecturers often received feedbacks from students that they had difficulties in imagining or visualizing the building element from the 2-D drawing. Students need to 'read' construction drawings (Hodgson et al., 2010). But some students were unable to completely do taking-off the quantity due to "missing out" a few items which they unable to visualize from the 2-D drawing.

Generally, this course is conducted through lecture and tutorial. The source of learning difficulties in taking-off are lecturer, lecture and learning facilities (Tunji-Olayeni, 2016). Over the years, the lecturers had use powerpoint slides in their lecture. Meanwhile, guided exercise by the lecturer is conducted in tutorial session. However, insufficient of illustration in the examples given in class make comprehension difficult (Tunji-Olayeni, 2016). The traditional method of teaching and learning could be improved to enhance the students understanding. Therefore, there is a need to develop new teaching method to understand the basics of building elements and sequence of construction easier than the conventional method (Lee et al., 2014). Presently students are more interested with computer and mobile devices. For example, students are satisfied with the instructional video in addition to the traditional face-to-face method (Wong, 2016). The use of softwares would aid in visualizing and understanding the theories of construction process which is need for building quantities take-off (Tunji-Olayeni, 2016).

The new teaching aid and method for builders' quantity take off in this paper is proposed for the Diploma in Building program in Universiti Teknologi MARA, Seri Iskandar Campus, Perak. Performance of the Diploma in Building students for three consecutive years as in Figure 1 became the basis for the proposed 3D visual model (3D-ViMo). Majority of the students achieved grade C which is "Good".
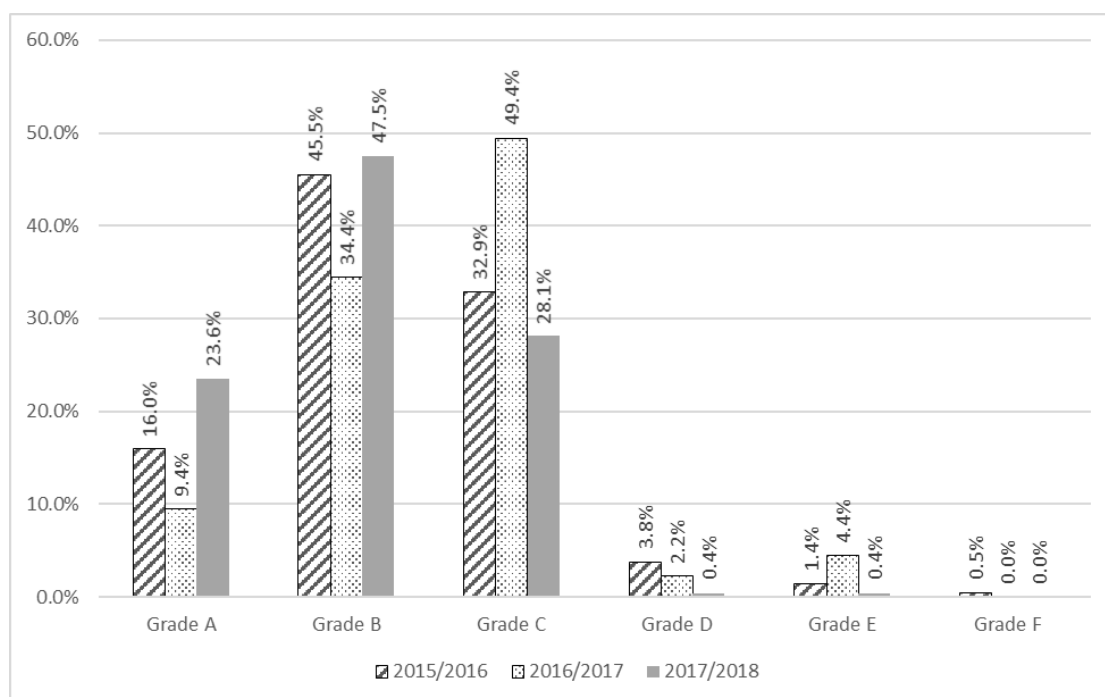
- Figure 1. Performance of students in building quantities take-off

The proposed 3D visual model (3D-ViMo) for each building element is an additional to the building plan and taking off list used in class. The taking off activities conducted during tutorial class will adapt cooperative learning concept and worksyop approaches. The small group of learning environment and the additional teaching aid, 3D-ViMo shall benefit both lecturers and students in the teaching and learning process.

METHODOLOGY

The trend of students results reflects their understanding of the course (Figure 1). Lecturers received numerous feedbacks (orally) from students on their difficulties in taking off building quantities. Therefore, the first step in preparing 3D-ViMo is the identification of problems and challenges faced in teaching and learning building quantity take-off. Questionnaire survey will be conducted to second year students who had taken this course. Inputs from lecturers involved in this course will be acquired too. The questionnaire survey will cover two research questions; "why students have difficulties to understand" and "how to boost students understanding the steps in quantity take-off". Next is the identification and documentation of the current style of teaching of building quantitiy take-off by the lecturers. The students' learning style will be identified too.

The results of the analysis of the questionaire survey will become the foundation for the proposal of new method of teaching building quantity take-off. The concept in the innovation of 3D-ViMo will involves multi-media tool which is 3D visual model and cooperative learning.

FINDINGS

Basically, the major challenge in understanding this course in difficulties in visualizing the building elements that need to be measured. A new teaching aid to minimize this challenge is needed. The 3D visual model will be prepared for each buiding elements taught. However, this innovation project will start with the development of 3D-ViMo of one building element only. The chosen building element will be "work below lowest floor finish" (pad foundation, stump and ground beam) as taught in Builders Quantity and Estimating I. The preparation of this 3D-ViMo will follow exactly as the 2-D drawing and taking-off list for the chosen building elements. Later, this 3D-ViMo will be distributed to students before their class. They may familiarize themselves with this 3D-ViMo and prepare for the next lessons.

During the learning session, students will be divided into small groups (3-5 students per group) and will learn the taking-off with close supervision and guidance from the lecturer. In addition to the 2-D drawing and specification, students will refer to the 3D-ViMo in their own laptop while doing the taking-off. This 3D-ViMo will assist the students in visualising the building elements that need to be quantified. The sequence of the 3D-ViMo will be similar as in the taking-off list. Therefore, students will be able to visualize the building elements as they measure the 2-D drawing. This exercise could minimize error in quantification of the building elements. The potential of students to get all items measured cound be increased.

CONCLUSIONS

The propose 3D-ViMo could ease the challenges faced by the lectures and students in mastering this course. The usage of 3D-ViMo has a potential to mimize error in quantity take-off. The preparation of 3D-ViMo require proper planning and time consuming. This 3D-ViMo will be prepared in stages and will regularly consider feedbacks and comments from the lecturers and students involved. The effectiveness of 3D-ViMo still have long way to be identified. However, the propose 3D-ViMo is expected to increase students' ability to visualize the building elements. As a result, this 3D-ViMo could increase students grade, from "Good" to "Very Good" level (grade C to Grade B).

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DECISION AID FOR LEAN TOOLS AND TECHNIQUES SELECTION (DEALS)

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Abstract: Decision Aid for lean tools and techniques (DEALS) was developed in order to help Malaysian manufacturing industries to select the right lean tools and techniques based on their context. There are more than 50 lean tools and techniques that can be used by the organisations to improve their quality, productivity and sustainability. The right tools and techniques to be used may vary depending on several factors, for instance, the current maturity level of the organisation, areas in which the tools and techniques are implemented, organisation type and size, and the capabilities and responsibilities of the workforce. To keep away from unnecessary waste and dissatisfaction, it would be better for individuals to choose the right lean tools and techniques that will fit with organization's situation and give benefits to the organization. In order to help organisations to select suitable lean production tools and techniques according to the contexts, therefore, a decision aid for lean tools and techniques selection (DEALS) was developed.

Keywords: Lean, tools and techniques, decision aid, manufactruing, productivity

INTRODUCTION

Lean production is known as manufacturing without waste. Waste can define as any activities that give non-added value to the product. There are seven common types of waste such as waiting time, overproduction, excessive inventory, inappropriate processing, excess motion, unnecessary transportation, and product defects (Melton, 2005; Ohno, 1988; Womack, 2003). Some of the lean tools and techniques that can help to reduce the waste include 5S, kanban, value stream mapping (VSM), total productive maintenance (TPM), single minutes exchange of dies (SMED), cellular manufacturing, kaizen, pull production system, and poka yoke (Abdulmalek, 2007; Doolen, 2005; Yahya, 2016). There are various lean production tools and techniques have been used by many industries depending on the size of the industries. (Yahya, 2016) in their studies shows, there are more than 50 lean tools and techniques available in the market with their own strength and limitation. Thus the selection and the implementation of the appropriate lean tools and techniques is very importance in order to avoid unnecessary waste and frustration. The right selection of the lean tools and techniques that fit to the organisation context expected to results in (Melton, 2005);
  i)   Reduce the lead time for customer.
  ii) Reduce the operation costs

iii) Reduce inventory levels
iv) Higher quality of product
v) Shorter throughput times

Organizations are facing problems in selecting appropriate lean tools and techniques due to more than fifty lean tools and techniques currently available in the market for example Kaizen, Value Stream Mapping (VSM), Total Productive Maintenance (TPM), Visual Management. The adoption of lean tools and techniques also requires time, financial, resources, and knowledge. To avoid unnecessary cost and complexity, DEALS will help people to choose the right lean tools and techniques that will fit with organization's situation and give benefits to the organization. Decision Aid for Lean Tools and Techniques Selection (DEALS) was developed in order to allow managers, practitioners, and/or consultants to make a rational and informed decision on the selection of appropriate lean tools and techniques to be used by industries based on their context. This decision aid using MS Excel as a platform, and this decision tool was designed to be intuitive and user friendly.

METHODOLOGY

DEALS can be considered as one of the first decision support tool for selecting lean tools and techniques based on Malaysian context. Two techniques of decision making were used which are: (1) Simple Average Weighted for simple or basic decision making and; (2) Analytical Hierarchical Process for comprehensive decision making. The steps of using this deal as follows:

Using Simple Average Weighted (SAW)

Using this method, first step user need to key- in their information such as name, position, and company name. After user key-in their information, users need to select if they want to diagnose their company waste because they don't know the current waste at their company. In this case, user can proceed to diagnose waste. User need to give weight for level of waste at their company (low/medium/high) based on their current situation. Then they will know which waste shows the highest level and need to solve first. After user know their waste to be reduced, then they will select or shortlisted 2 or 3 lean tools and techniques that can helps in reducing appropriate waste. Then, user need to select 2 or 3 the most important criteria that affect the decision of selecting lean tools and techniques based on their context. After that, user needs to give degree of importance for each selected criteria and give score for criteria versus lean tools and techniques. Lastly user can print the final results of lean tools and techniques selecting based on ranking calculated.

Using Analytical Hierarchical Process (AHP)

Firstly, user need to key- in their information such as name, position, and company name. The same method with SAW, after user key-in their information, users need to select if they want to diagnose their company waste because they don't know the current waste at their company. In this case, user can proceed to diagnose waste. Users need to give weight for level of waste at their company (low/medium/high) based on their current situation. Then they will know which waste shows the highest level and need to solve first. After user know their waste to be reduced, then they will select or shortlisted 2 or 3 lean tools and techniques that can helps in reducing appropriate waste. Then, users need to select 2 or 3 the most important criteria that affect the decision of selecting lean tools and techniques based on their context. After that, users need to give weight for pairwise comparison among criteria. Then they need check the consistency ratio that need to be less than 10%. If the consistency ratio more than 10%, user need to revised the weight until the result of consistency ratio less than 10%. After that, user

proceeds to next step which is give weight for pairwise comparison among lean tools and techniques related to criteria 1, criteria 2 and criteria 3. They also need to check the consistency ratio (<10%) before proceed to the next step. Lastly, users can print the final results of lean tools and techniques selection based on ranking calculated.

Sampling

The purposive sampling will be used in this research to validate the used of the proposed decision aid. Purposive sampling can be described as a "selection of individuals/groups based on specific questions/purposes of the research in lieu of random sampling and on the basis of information available about these individuals/groups (Tashakkori and Teddlie 1998). The reason of choosing this sample was due to their knowledge and/or experience in the selection and /or implementation of lean production tools and techniques. The semi-structured interviews will be conducted with selected CEOs, directors, managers or executives, academician in the area of lean production /operational improvement from organizations, and also consultants with specialism in lean and operational improvement.
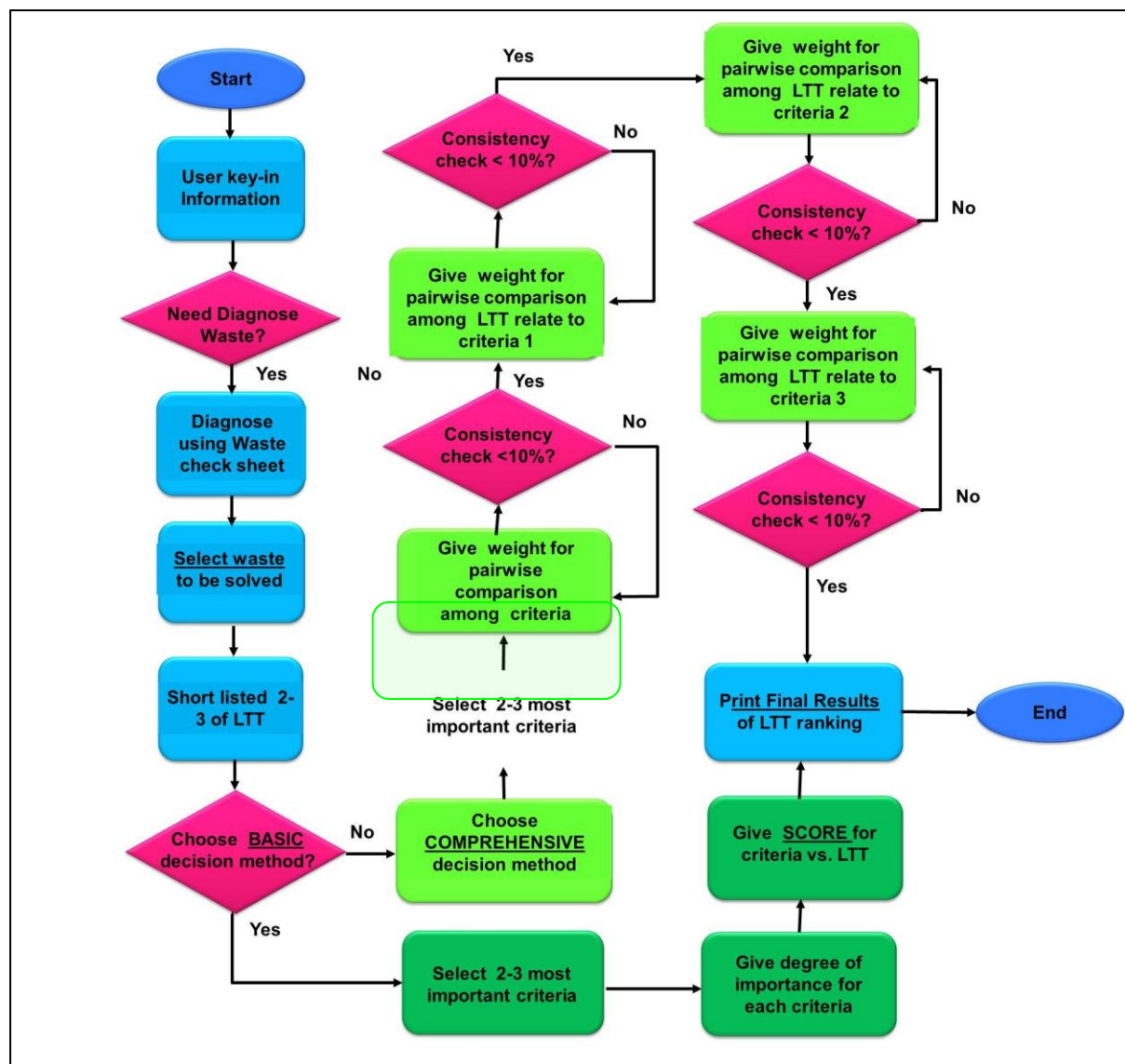
- Figure 1: Process flow of using DEALS

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FINDINGS

Interview

The respondents involved in this study were consists of one academician, two consultants and six lean practitioners from industries. The results from interview (Table 1) shows that most of the respondents agreed that this proposed decision aid were fulfilled the criteria that reflect to the evaluators' evaluation such as the purpose of the decision aid is clear (100%), possible to used (100%), the decision aid is useful (88.9%), interesting (100%), inspiring (88.9%), and accurate (100%). The others criteria also shows the high degree of agreement such as the key steps of selecting lean tools and techniques are relevant (100%), the decision aid provides a clear indication of what organisations should consider when selecting lean tools and techniques (88.9%), the decision / selection criteria proposed in the decision aid are relevant to be considered (100%) and the information given in the decision aid is valid (100%). Nevertheless, the criteria such as the description of the decision aid is easy to understand (77.8%), the key steps of selecting lean tools and techniques are clearly explained (66.7%) and the key steps of selecting lean tools and techniques are easy to follow (66.7%) shows the lower agreement.

- Table 1: The evaluation results from the interview with experts

No.	Criteria for Evaluating the proposed decision aid	Degree of agreement for each criteria that reflects your evaluation of the decision aid (n=9)						Mean
		5	**4**	**3**	**2**	**1**	**0**	
		Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**	
1.	The purpose of the decision aid is clear.	**1 (11.1%)**	**8 (88.9%)**					4.11
2.	The decision aid is possible to be used.	**1 (11.1%)**	**8 (88.9%)**					4.11
3.	The decision aid is easy to be used.	**1 (11.1%)**	**6 (66.7%)**	2 (22.2%)				3.89
4.	The decision aid is useful.	**3 (33.3%)**	**5 (55.6%)**	1 (11.1%)				4.22
5.	The decision aid is interesting.	**2 (22.2%)**	**7 (77.8%)**					4.22
6.	The decision aid is inspiring.		**8 (88.9%)**	1 (11.1%)				3.89
7.	The decision aid is accurate.		**9 (100%)**					4.00
8.	The description of the decision aid is easy to understand.		**7 (77.8%)**	2 (22.2%)				3.78
9.	The key steps of selecting lean tools and techniques are clearly explained.	**1 (11.1%)**	**5 (55.6%)**	3 (33.3%)				3.78
10.	The key steps of selecting lean tools and techniques are easy to follow.	**2 (22.2%)**	**4 (44.5%)**	3 (33.3%)				3.89
11.	The key steps of selecting lean tools and techniques are relevant.		**9 (100%)**					4.00
12.	The decision aid provides a clear indication of what organisations should consider when selecting lean tools and		**8 (88.9%)**	1 (11.1%)				3.89

		3 (33.3%)	6 (66.7%)					4.33
	techniques.							
13.	The decision / selection criteria proposed in the decision aid are relevant to be considered.	3 (33.3%)	6 (66.7%)					4.33
14.	The information given in the decision aid is valid.		9 (100%)					4.00

COMMERCIALIZATION POTENTIAL

This decision aid has the potential to be commercialized to Malaysian Productivity Corporation (MPC), Federation of Malaysian Manufacturers (FMM), Small Medium Enterprise Corporation (SMECorp) and other interested organizations.It can be used for training, workshop, consultancy, mentoring, and competency development for managers, practitioners, consultants, researchers, academicians and/or students in the area of quality, productivity, industrial engineering, operations and business.

CONCLUSIONS

By using DEALS, it would help Malaysian organizations to select right lean tools and techniques based on their context. It also beneficial to consultants to provide consultancy services in proposing appropriate lean tools and techniques to be implemented by organizations. By developing this decision aid, Malaysian organizations would get enormous benefits in order to select the right lean tools and techniques based on their context and thus enhance their productivity by eliminating waste of time, resources and financial to the organizations because of inappropriate lean tools and techniques being used.

ACKNOWLEDGEMENT

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3D ANIMATION WORKSHOP: THE IMPLEMENTATION OF 3D PRINTING IN EDUCATION

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Abstract: A 3D animation workshop will be organized by the Animation Department from Faculty of Film Theater and Animation. The target participants will be primary and secondary school students between the ages of 10 to 17 years old. The participants of this workshop will work closely with the experts in 3D Animation industry to link the participants' imagination and creativity into tangible forms. The contents throughout the workshop will cover the basic knowledge of 3D animation software at the beginner level. The end result of this workshop will be physically manifested into a 3D model by using the provided 3D printing facilities. This workshop would offer the first-hand exposure on interactive experience by bringing creative imagination into reality. This approach will; in gist, expose the participants to the current technology in the animation industry. Thus, it will motivate them to be an active learner among their peers. This workshop aims to prepare the school students to enter the workforce since 3D industry is becoming a demand from various sectors.

Keywords: 3D Animation Workshop, 3D Printing, Education

INTRODUCTION

A 3D animation workshop will be organized by the animation department from faculty of film theater and animation. The contents of the workshop will cover the basic knowledge of 3D animation software at the beginner level. The end result of this workshop will be physically manifested into a 3d model by using the provided 3d printing facilities.

The concept of this 3D workshop is one of the many means to support our government's emphasis to nurture science, technology, engineering & mathematics (stem) in this country's education system. We believe the 3D industry can offer a rich way to enhance and reinforce the interest of stem within this young generation and the next. This program's primary objective is to at the tip of the iceberg, expose these children to the 'cogwheel' of today's 3D technology.

METHODOLOGY

This research will attempt to gain insight about whether 3D technology is effective enough to engage the students to remains active and tackle easily what has been taught in classroom by conducting a 3D workshop besides improving method of teaching. This 3D animation workshop will be organized by the researcher's team as a part of a test rollout in primary and secondary school within Bukit Jelutong and Puncak Perdana area. The contents of the workshop will cover the basic knowledge of 3d animation software at the beginner level and relate with the syllabus contents in classroom. The end result of this workshop will be physically manifested into a 3D model by using the provided 3D printing facilities.

Participant:

The target participants will be primary and secondary school students between the ages of 10 to 17 years old. The participants of this workshop will work closely with experts in the 3D animation industry to link the participants' imagination and creativity into tangible forms. The engagement of participants throughout the workshop will be examine.

Survey/ validation of questionnaires:

A survey shall be conducted at the beginning and at the end of the workshop for the participants to analyze their responds before-and-after the assimilation of 3d technologies been introduced. This data will be collected and analyze as a result for this research. The parent's responds also shall be analyzed for their responds on the new method of learning that will be introduce in education system.

Data will be analyzed using spss and represented by mean and standard deviation.

FINDINGS

This research and 3D workshop is useful for the development of children's problem solving ability, presentation of ideas, digestion of information and the promotion 3D Visual Presentation technology in the education system. Through this 3D Animation workshop, a general awareness of the 3D Animation industry in Malaysia among the children can be developed and learning process would be more interactive in classroom.

CONCLUSIONS

It is now common to see children at the spectator's seat 3D presentation technology; i.e. Children's Cartoon flicks, games and etc., they have yet to use this 3D technology to present ideas and imaginations of their own. This workshop and research will spark an interest among them and teach them what, why and how to use this platform.

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SATELLITE EVENT C

OUTSTANDING PERFORMANCE OF NOVEL CATHODE BUTTON CELL FOR INTERMEDIATE TEMPERATURE PROTON CONDUCTING FUEL CELL (PCFC)

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Abstract: A key obstacle to the practical operation of proton conducting fuel cell (PCFC) is the development of high-performance cathode materials at intermediate temperature of 500-800ºC. In this study, we report the fabrication and performance of LSCF|BCZY|LSCF prepared by two-step modification processes which are (a) microstructure modification of LSCF by application of ethylene glycol as a dispersing agent during the synthesizing process and (b) compositional modification by introducing a small amount of proton conducting phase to extend the triple phase boundary thus accelerate the electrochemical activity of the cathodes. The electrochemical performances of the LSCF-based cathode after each modification process were monitored by an electrochemical impedance spectroscopy (EIS). The area specific resistance (ASR) of pristine LSCF cathode, modified LSCF cathode (LSCF$_{EG}$) and composite cathode (LB30) measured at 600ºC in the humidified air are 9.74, 1.31 and 0.47 $\Omega.cm^2$, respectively. The LSCF-based button cell was found to exhibit a superior performance after undergoes the modification processes (LB30 > LSCF$_{EG}$ > pristine LSCF), thus proven its great potential as a promising PCFC cathode.

***Keywords*:** Cathode, button cell, proton-conducting fuel cell, electrochemical performance.

INTRODUCTION

Solid oxide fuel cell (SOFC) as a clean energy production technology has attracted extensive attention due to limited fossil fuel sources, increased oil prices, and environmental considerations. Main limitation of SOFC lies in their reliability and durability which is corresponding to its high operating temperature, typically between 800-1000ºC. This high

operating temperature allows fuel flexibility and internal hydrocarbon fuel reforming. However, it is also associated with undesirable outcomes such as material interaction and formation of insulating phases which results in unsatisfactory durability as well as high cost of fabrication materials and maintenances (Ortiz-Vitoriano et al., 2013). Proton conducting fuel cell (PCFC), which is based on proton conducting electrolyte, offers a promising alternative for SOFC. Featuring lower activation energy for proton conduction, PCFC allows a significant decrease in the operating temperature of the fuel cell. One of the prominent group of proton conductors is the $Ba(Ce,Zr)_{1-y}Y_yO_{3-\delta}$ (BCZY) which has been reported to represent a good compromise between ionic conductivity and stability (Zhong, 2007). At an intermediate temperature range of 500-800°C, cathode polarization resistance still contribute considerably to energy loss in PCFC operation. Therefore, the current PCFC research is focused on the development of suitable cathode materials that offers a good electrochemical performance in the intermediate temperature range.

In this study, $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\delta}$ (LSCF) which is commonly used cathode material for SOFC is applied as the cathode material for PCFC's application. Prior to the cathode development process, the microstructure of the LSCF cathode is improved by application of ethylene glycol as the dispersing agent during the sol-gel synthesizing process. In addition, the cathode composition of LSCF is modified by introduction of 30 wt.% protonic phase of $Ba(Ce_{0.6}, Zr_{0.4})_{0.9}Y_{0.1}O_{3-\delta}$ (BCZY64), forming a composite cathode of LSCF-BCZY64. The electrochemical performances of the modified cathodes are evaluated and compared to that of the pristine LSCF.

METHODOLOGY

LSCF cathode is synthesized by a dispersing agent sol-gel method. A stoichiometric amount of metal nitrate salts which are $La(NO_3)_3.6H_2O$, $Sr(NO_3)_2$, $Co(NO_3)_2.6H_2O$ and $Fe(NO_3)_3.9H_2O$ were first dissolved in 100 ml of deionized water. Next, citric acid monohydrate (CA) followed by ethylene diamine tetra-acetic acid (EDTA) were added into the solution. The solution was then heated in 70°C water bath under continuous stirring. Subsequently, ethylene glycol was added as a dispersing agent to promote dispersion and prevent the clumping of cathode particles. The black viscous gel obtained was solidified by pre-heating at 100°C for 12 hours and finally calcined at 700°C for 5 hours to obtain a pure phase of LSCF. BCZY64 powders were synthesized by a combined citrate-EDTA complexing sol-gel process (Abdullah, Hasan, & Osman, 2013). The composite cathode was formulated by addition of 30 wt.% of BCZY64 to the pure LSCF cathode. The LSCF cathode modified with ethylene glycol and introduced with the protonic phase were each denoted as $LSCF_{EG}$ and LB30, respectively. For fabrication of the symmetrical cell, dense BCZY64 pellets was obtained by uniaxial pressing and sintering in air at 1450 ^{o}C for 12 hours. Subsequently, the cathode slurry was deposited onto both surfaces of BCZY64 disk by spin-coating technique. The fabricated cathode symmetrical cells were then evaluated for its performances using electrochemical impedance spectroscopy (EIS). EIS measurement was conducted in humidified air over a temperature range of 500-800 ^{o}C. The frequency range of 10 mHz to 1 MHz with an AC signal amplitude of 10 mV was applied using a ZIVE SP2 Electrochemical Workstation. ZMAN™ 2.2 f3 (ZIVE LAB) software was used to analyze the impedance arcs obtained.

RESULTS AND DISCUSSIONS

Figure 1 presents the Nyquist plot of the cathode samples measured at 600°C in humidified air. The largest impedance arc is observed for pristine LSCF, which represent the highest polarization resistance among the sample measured. In contrast, the sample of LB30 demonstrated the smallest impedance arc which indicates the lowest value of the cathode polarization resistance. The area specific resistance (ASR) calculated for pristine LSCF, LSCF$_{EG}$ and LB30 are 9.74, 1.31 and 0.47 Ω cm^2, respectively. Lower ASR value is desirable for the cells operation as it signifies a better cathode performance. Based on the ASR value obtained, better cathode performance is observed for LSCF$_{EG}$ cathode as compared to the pristine sample. This is associated to the improvement of the cathode microstructure which results from the addition of the ethylene glycol as the synthesizing aid during the sample preparation process. Furthermore, when 30 wt.% of BCZY64 protonic phase was incorporated to the LSCF$_{EG}$ cathode (LB30), the ASR value is further reduced which implies the superior performance of LB30 as compared to the LSCF$_{EG}$ and LSCF pristine. The reason behind this is the addition of the protonic phase has increased the contact areas between cathode and electrolyte layer thus provide more active area for the cathode reaction. In summary, LSCF$_{EG}$ and LB30 cathode demonstrate about 7 and 16 folds higher performances as compared to the pristine sample of LSCF.
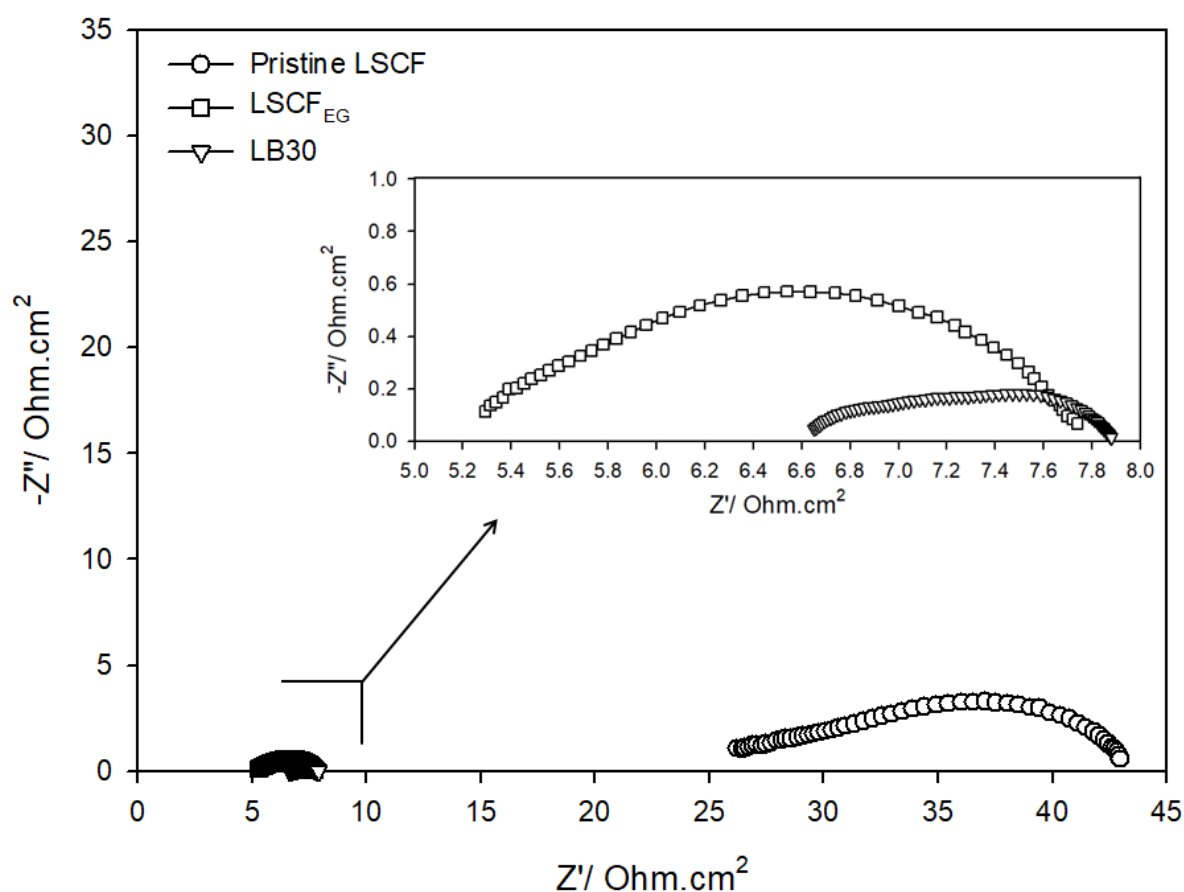
Figure 1. Nyquist plot of pristine LSCF, LSCF$_{EG}$ and LB30 cathodes measured at 600 °C in humidified air

CONCLUSION

The modification of the cathode microstructure and composition was found to significantly enhanced the performance of the pristine LSCF cathode. The improvement in the cathode performance is mainly attributed to the increased contact area between the cathode and electrolyte layer which results in the extension of the reaction site (triple phase boundary) and eventually increase the electrochemical activity of the cathode.

ACKNOWLEDGEMENT

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POP! POP! JAWI BOOK: FUN AND INTERESTING

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Abstract: Pop-up book can be defined as a book with pages rise when opened to simulate a three-dimensional form or movable book. With 3D illustrations, it encourages readers especially kids to read consistently. By reading frequently, it will strengthen the child's vocabulary, visualization and sensory. In this project, we focus on the development of a 'pop-pop' book which is the Jawi pop-up book. The selection of Jawi as a pop-up book is because there is no Jawi Pop-up book in the Malaysian market. Besides encouraging the kids to love Jawi, we hope that this POP! POP! Jawi Book will sustain the Arabic-based scripts in the Malay education and culture

Keywords: pop-up, kids, Jawi

INTRODUCTION

A book is a collection of paper materials bound together on one end and contains various kind of information. Books are an effective medium of knowledge for the readers. Many benefits can be obtained when reading a book such as adding new knowledge to the readers and filling their time with useful activities.

Pop-up comes from the word English which means "pops out" while pop-up books can be defined as a book containing three-dimensional drawing paper and interactive element (Sabuda, August 15, 2012). Pop-up books can provide a very interesting way of reading because of its visualization. Starting from images that appear to have a three-dimensional and kinetic display and images that can move when the page is opened. Some pop-up books also provide a button for listening to sounds or music.

Besides that, some of the pop-up books that are available in the market contains pieces of object which can be moved when opening or pulling the page, so it can formed according to the original object. This make the pop-up book more attractive because of its visual appearance on a story.

Pop-up book is very interesting and different from other ordinary illustration storybooks as the readers will feel amazed when opening the page of the book (Sabuda, August 15, 2012). This makes pop-up book fun and enjoyable to be read.

METHOD

The pop-up book has been designed using the flowchart below. The flowchart explained the overall process during the development of the pop-up book. Before we start developing the book, a pre-questionnaire have been distributed to kindergarten students, teachers and parents to help us in identifying the needs for the content of the pop-up book. The results have been discussed in the Results and Discussion section. From the results, we start designing a suitable content for the books. The books are designed in 6 editions to distribute the 36 JAWI letters. We completed the first edition which consist of the first 6 JAWI letters, alif-ha (ﺍ ﺡ). The content are planned and sent to be printed while for the pop-up part, we folded it ourserlves to make it three-dimensional and movable. A post questionnaire have also been done to get the users satisfaction of the book. Figure 2 shows the design of the cover page and few content of the book.
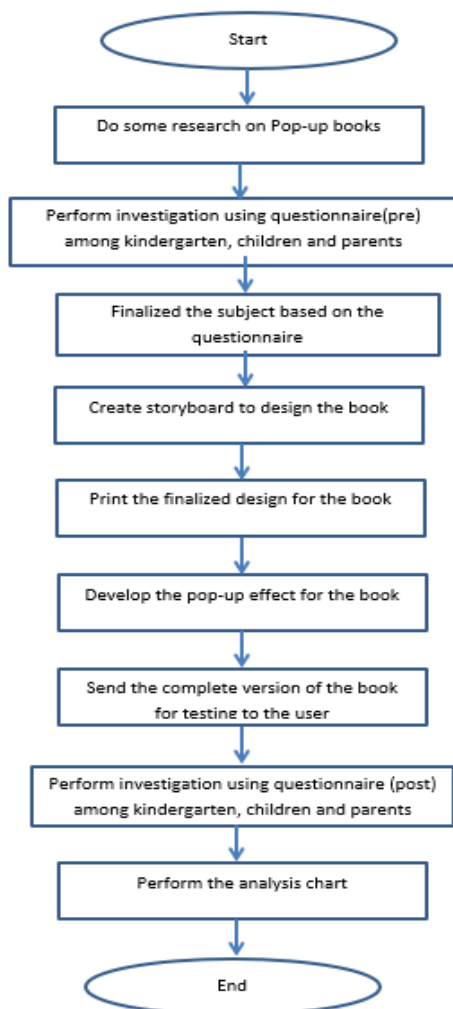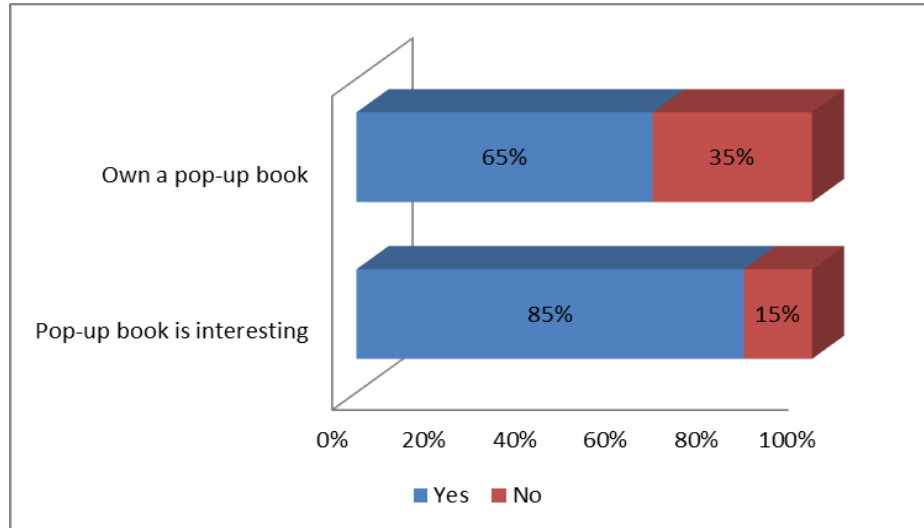

- Figure 1. Flowchart


- Figure 2. Book design

RESULTS AND DISCUSSION

A pre-questionnaire has been done to identify the childrens need and choose a suitable content for the pop-up Jawi book. Around 30 respondents are chosen from kindergarten teachers, children and even parents in Permatang Pauh, Pulau Pinang area.


- Figure 4. Respondents own a pop-up book and their feelings towards it

Figure 4 shows that 65% of the respondents own at least a pop-up book while 35% maybe not be interested in having one. However, 85% admitted that pop-up books are interesting and exciting for kindergarten children. This is because the three dimensional pictures in a pop-up book can stimulate the children mind while reading and making them enjoyed learning. Besides colourful pictures, some of the words can be touched and feel using fingers.
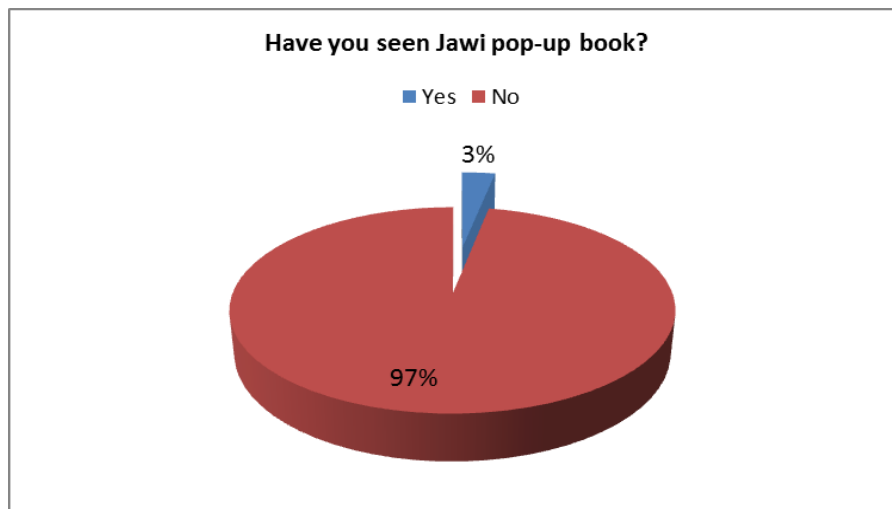
- Figure 5. Respondents familiarity with Jawi pop-up book
-

Aligned with our project, the respondents were asked whether they have ever seen a Jawi pop-up book before. Figure 5 shows that 97% of the respondents claimed that they have not seen one while 3% says they may have seen one. This is because in the Malaysian book store, we can only find pop-up books pulished by other countries and most of them are story books written in English.
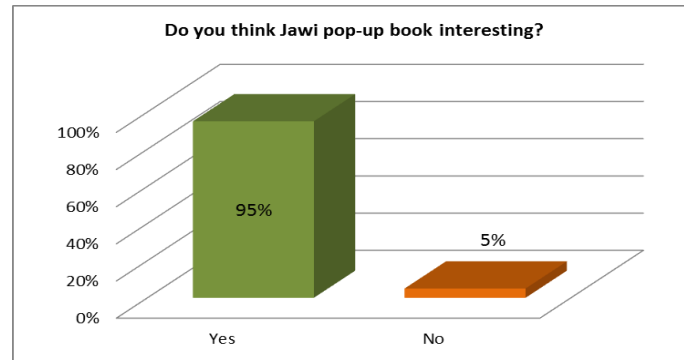
Figure 6. Respondents preference on the Jawi pop-up book

The Jawi pop-up book focused on creating interesting way of learning Jawi so that children will enjoy learning and can memorise Jawi alphabets fast and easily. Figure 6 shows respondents preference on the Jawi pop-up book. 95% of the respondents agree that Jawi pop-up book can be very interesting for children to learn Jawi. The way of representing the pop-up book is very interesting as the contents are colourful, three-dimensional, the words can be feel and touched and some of the pictures can be moved.

CONCLUSION

In Malaysia, pop-up books by international publishers can be found in any book stores. Unlikely, there are no pop-up books created by the Malaysian authors and publishers. Thus, our aimed is to focus on the development of a Malay-Jawi 'pop-pop' book which is the Jawi pop-up book. The selection of Jawi as a pop-up book is because there is no Malay or Jawi Pop-up book in the Malaysian market. This book is the first pop-up book in Malaysia developed by our owned. It is specially dedicated to kindergarten students and parents to encourage the children to learn JAWI in an fascinating way. We hope that this book will also help the kindergarten teachers to deliver the JAWI knowledge to their students in a new and interesting approach.

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LET'S JUMP AND THINK WITH KETINGTING

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Abstract: Today, smartphones and tablets are the latest fads among the younger generation to preoccupy them with learning entertainment, distraction, and technology to pass their time. Even in early education (kindergarten), kids have been exposed to gadgets more than they should. There is that one element that seems to be missing from most of those electronic learning gadgets - those physical and personal human interactions. The innovation of this game is designed to cater learning and physical game to incorporate both into becoming an effective learning. The game is a combination of cards game with Ketingting game (Malaysian cultural heritage). Ketingting game is not only entertaining but also beneficial for mental and physical development to the players. **'Let's Jump and Think with Ketingting'** is an innovation of a traditional game created to add vibrantly and creativity to this learning game. With a new compelling shape and colours, **'Let's Jump and Think with Ketingting'** is hoped to aroused curiosity and interest among the youngsters while learning.

Keywords: Kindergarten, learning game, Ketingting.

INTRODUCTION

Learning through play can help children develop cognitive, social, and physical skills as well as emotional health (Jantan, 2013). Most learning tools today are in the form of electronic devices. Parents think electronic devices can help their children in the study. While electronic learning devices may have benefited the children, some elements are, however, seem to be missing. Those elements are related to the physical and social development of a child. Kementerian Pendidikan Malaysia (2012) has listed four main elements, known as JERIS in Falsafah Pendidikan Kebangsaan. The philosophy aimed to produce a person who is balanced in four aspects, namely physical, emotional, spiritual, intellectual, and social (JERIS-*Jasmani, Emosi, Rohani, Intelektual, dan Sosial*). By considering this, a game is designed to incorporate both learning and physical game into effective learning tools that satisfy all the elements of *Falsafah Pendidikan Kebangsaan* (*Pelan Pembangunan Pendidikan Malaysia 2013-2025)*. It has commonly been assumed that the traditional games could help to promote good social life practice (Adriani, 2016), a traditional Ketingting game is innovated by giving a new compelling shape and colours to attract young generation, particularly pre-school children. The innovated Ketingting game called Let's Jump and Think with Ketingting is a combination of the game with educational flashcards. This project aims to help children in kindergarten aged between four and six years old in learning new vocabulary or drilling familiar words for the acquisition of pre-reading skills within an entertaining environment.

METHODOLOGY

The effectiveness of the game can only be evaluated when applied to real situation. Therefore, we have randomly selected a kindergarten to facilitate in using this game. The rule of the game was explained to the teachers so that they could assist in giving instruction while playing. The children were separated to three groups based on their age; four, five and six years old. The groups were evaluated based on five items which are physical, emotional, spiritual, intellectual, and social (Table 1).

- Table 1. Items used to evaluate children when playing the game

Item	Evaluation
Physical	Ability to jump from one hexagon to another hexagon
Emotional	Ability to express own feelings
Spiritual	Ability to obey the rule
Intellectual	Ability to motivate and encourage themselves and others
Social	Ability to interact with friends

One group played at a time with the help of teachers, while their ability was evaluated by observations. The children were given ID numbers in order to randomize selection to prevent biased in assessment. Before started, a teacher shows the children how to play which required them to jump on one foot from one hexagon to another hexagon. First group of four years children were asking to jump based on their preferred colour and number of hexagon. The second group of five years old were given a set of pictures for them to recognise in order for them to be granted to jump. The last group of six years old were asking to read a collection of word and the correct one can jump.

FINDINGS

This project has been applied to a kindergarten with children aged four to six years old. Thirty-eight percent of the children are female meanwhile another sixty-two percent is male (Figure 1). From that, result in Figure 2 was obtained.

For physical criteria, 15% of the kids were at average level because there were times where they only walking to move from one hexagon to another hexagon. On emotional criteria, it can be noticed that 38% of them showed very little feeling either happy or sad. They only did whatever have been told. This is perhaps due to their age that they were shy and afraid of the outsider. All the children did not have any problem to obey the rules. Perhaps their routine in the kindergarten make them well behave and follow instruction given by their teacher very well. For that reason, only 38% of the kids has enthusiasm to motivate their peer while playing this innovated Ketingting game. Most of them just play and focus on their playing turn. However, all the kids have no problem interacting with each other. Only 31% of them have an average communication skill because of their early age.
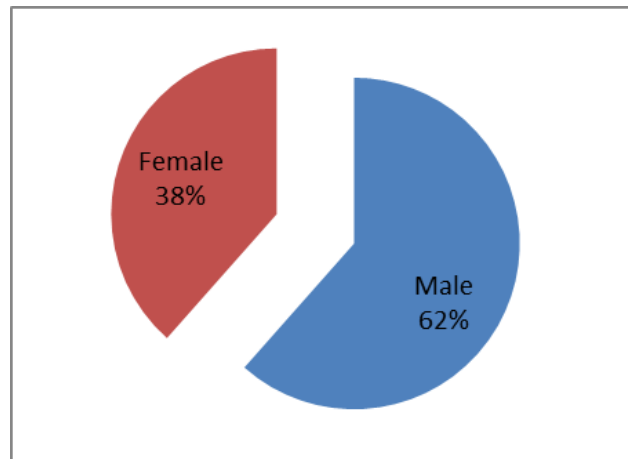
Figure 1. The children's gender
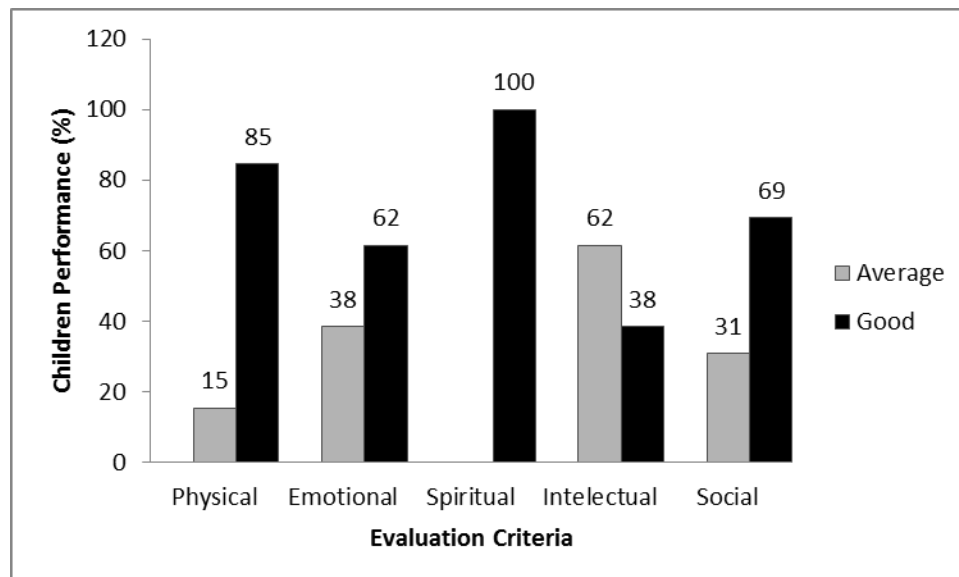
Figure 2. Children's performance based on criteria

Teachers who join this activity agreed that from this innovated Ketingting game, kids can jump, learn about colours and count at the same time. These will make learning more fun. The teachers also think that this activity is suitable for all ages and can be played either indoors or outdoors in kindergarten. In addition, according to the teachers, playing in a group is a good way in developing the children's social and communication skills. Besides, by following the game's rules, children will learn to develop their understanding values. This finding is in agreement with Mohamad Ashari, Mohd. Kosnin, & Yeo (2013) that teaching methods for children are not limited to the academic field, all kinds of experience should be provided by giving hands-on activities involving the materials is a good foundation of abstract thinking.

CONCLUSIONS

According to National Physical Activity Recommendations for Children 0-5 Years (Commonwealth of Australia, Department of Health and Ageing, 2010), physical activity for

children includes both structured activities and unstructured free play, which can be done indoors or outdoors. From the innovated Ketingting, children will physically learn to improve their balance, movement, and co-ordination skills by jumping from hexagon to another hexagon. They can promote their social skills through interactions with their peers. Besides, by calculating their steps, it can support their brain development. Therefore, this innovated Ketingting game is a very suitable learning method in cooperating physical and mental activities in kindergartens.

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MUMKIT

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Abstract: Pembangunan dan kepesatan ekonomi hari ini menyebabkan sumbangan wanita amat diperlukan dalam pelbagai bidang. Kesibukan dalam dunia kerjaya tidak menghalang wanita-wanita hebat ini untuk bergelar seorang ibu. Namun bergitu, disebabkan kekangan masa kerana sibuk dengan tugasan kerja serta kurang pengetahuan bagi wanita yang pertama kali bergelar ibu ramai antara mereka tidak dapat menyediakan kelengkapan yang lengkap ketika di bilik bersalin. Malahan, kajian berkenaan penggunaan alat bantuan kepada wanita mengandung dan persediaan mereka untuk melalui proses melahirkan kurang dijalankan. Bagi mengatasi masalah ini, kami telah mencipta beg "MuMKiT" yang mempunyai ruang khas untuk mengisi barang secara tersusun dan mudah digunakan. Bagi menambah nilai lagi, "MuMKiT" dilengkapi barang-barang keperluan ibu untuk digunakan semasa di bilik bersalin, sama ada sebelum atau selepas proses melahirkan. "MuMKiT" juga dilengkapi barang-barang asas bayi. "MuMKiT" boleh digunakan oleh para ibu untuk dibawa ke klinik atau ke taska. Malahan cantik dan selesa untuk digunakan semasa bersiar-siar bersama bayi. Dengan adanya "MuMKiT" ini, wanita-wanita yang akan bergelar ibu akan lebih tenang serta yakin untuk melalui hari bersejarah mereka.

Keywords: Beg, bersalin, ruang khas, tersusun, mudah.

PENGENALAN

Mengandung dan bersalin merupakan pengalaman yang penting dalam kehidupan seorang wanita. Semasa mengadung, rembesan hormon yang terhasil mempengaruhi emosi mereka dalam memilih dan membeli barang keperluan diri termasuk keperluan untuk persediaan bersalin. Hal ini juga dipengaruhi oleh pengukuhan dan peningkatan status sosial ekonomi dikalangan wanita dalam memilih barangan yang bukan sahaja mempunyai pelbagai fungsi malahan artistik(Yuting & Xiaoping, 2015). Namun bergitu, disebabkan kekangan masa kerana sibuk dengan tugasan kerja serta kurang pengetahuan bagi wanita yang pertama kali bergelar ibu ramai antara mereka tidak dapat menyediakan kelengkapan lengkap ketika di bilik bersalin. Malahan, ramai ibu mengandung kurang kesedaran tentang pentingnya persediaan bersalin dan komlikasinya (Akpan, Asibong, Ekott, Moko, & Etuk, 2017). Shweta, Tanvi, Poonam & Nilashree (2016) dalam kajian mereka menyatakan rekaan beg yang serbaguna amat diperlukan dalam masyarakat hari ini. Oleh hal yang demikian, kertas kerja ini akan membincangkan pembangunan rekaan beg "MuMKiT" iaitu beg bagi persediaan di bilik bersalin dan boleh juga diguna untuk kegunaan harian bagi menyimpan barangan ibu dan bayi. Rekaan beg ini dapat memudahkan bakal ibu membuat persediaan di bilik bersalin supaya emosi mereka lebih tenang dan yakin untuk melalui proses bersalin.

KAEDAH

Sebelum beg "MuMKiT" direka, kaedah pemerhatian digunakan bagi mengumpul data berkaitan pembangunan beg ini. Pemerhatian dilakukan di butik-butik yang menjual beg di pusat membeli belah dan di laman sesawang bagi merekod rekabentuk beg ibu dan anak yang ada dipasaran. Beberapa sampel beg diteliti bagi mengenal pasti kelebihan dan kekurangan beg tersebut. Pemerhatian juga dilakukan di hospital bagi merekod persediaan kumpulan sasaran iaitu ibu mengandung ketika hadir di bilik bersalin. Temubual antara pengkaji dan kumpulan sasaran juga dilakukan bagi mengenal pasti masalah yang dihadapi oleh mereka dan persepsi mereka terhadap beg sedia ada dan beg yang mereka inginkan. Hasil daripada pemerhatian dan temubual yang dijalankan, gambaran umum berkaitan persediaan bakal ibu dan beg yang dapat memenuhi kegunaan dan keperluan bakal ibu dan bayi yang bakal dilahirkan dibuat. Cadangan dan pendapat kumpulan sasaran juga dipertimbangkan dalam mereka bentuk beg "MuMKiT".

Pemilihan material bagi merekabentuk beg "MuMKiT" mengambil kira nilai artistik yang ada pada fabrik tersebut disamping berfungsi untuk kalis air. Oleh itu, fabrik velvet atau baldu yang bersifat kalis air dipilih untuk dijadikan struktur utama beg "MuMKiT". Fabrik baldu bersifat halus dan paling lembut dibandingkan dengan fabrik-fabrik lain. Ianya memerlukan kurang penyelengaraan kerana mudah dicuci dan dikeringkan (Textile School, 2018). Bahagian dalam beg "MuMKiT" pula dilapisi oleh fabrik kapas. Fabrik kapas bersifat mesra pengguna dan sesuai dengan pelbagai jenis iklim (Textile School, 2018). Bahagian poket pula menggunakan kain berbentuk jaring yang bersifat lut cahaya bagi memudahkan pengguna melihat label dan barang yang disimpan. Kain berbentuk jaring juga bersifat anjal bagi memberi regangan semasa penyimpanan barang. Bahagian luar beg "MuMKiT" dihias dengan gambar diperbuat daripada kain felt yang berwarna-warni bagi memberi nilai artistik dan juga membantu perkembangan sensori dan merangsang penglihatan bayi serta bayi serta kanak-kanak.
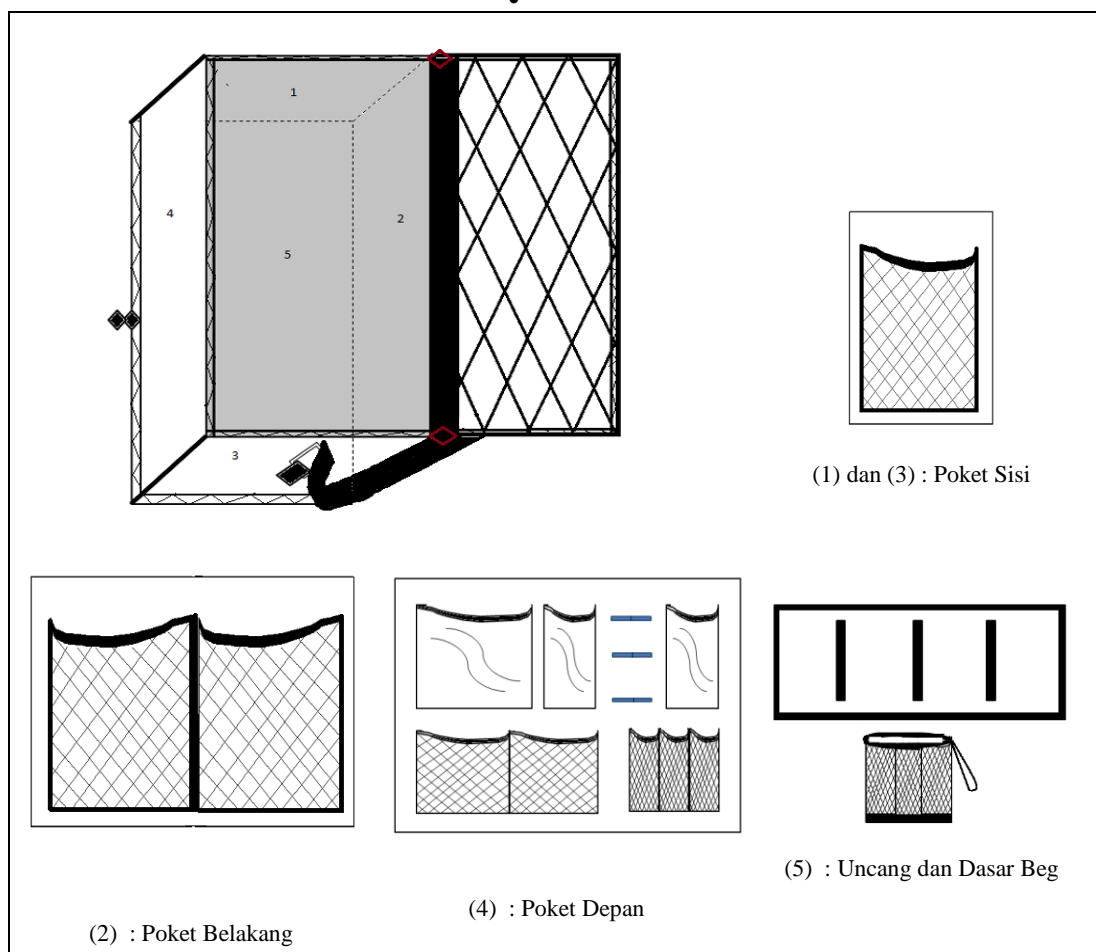
HASIL & PERBINCANGAN

Beg "MuMKiT" menampilkan struktur dan gaya rekaan beg ibu dan bayi yang boleh disandang tepi. Tali beg boleh diselaras dan dipendekkan bagi membolehkan pengguna menjinjing beg tersebut. Bahagian bawah beg ini boleh dipisah dan disambung semula menggunakan zip yang tersedia ada. Rekabentuk beg "MuMKiT"mengambil kira penggunaannya secara optimum dimana beg ini boleh digunakan semasa membuat persediaan ke bilik bersalin dan digunakan untuk menyimpan barangan ibu dan bayi selepas kelahiran. Rekaan beg ini memudahkan pengguna yang mempunyai bayi atau anak kecil agar segala kelengkapan boleh di bawa bersama dalam satu beg sahaja. Di bahagian dasar beg disediakan uncang yang boleh dipisahkan supaya dapat memberi kebebasan kepada pengguna untuk meletak barang secara tersusun di dalam uncang atau tidak. Setiap poket bahagian dalam beg dilabel perkataan atau gambar. Kelebihan kaedah label ini memudahkan pengguna untuk menyusun barang. Malahan kaedah ini sangat praktikal kepada pengguna yang sering mengalami masalah daya ingatan yang lemah atau perlupa untuk menyimpan barang ke dalam beg mereka supaya tidak tertinggal barang yang penting. Pada masa yang sama, kaedah label bergambar menjadi nilai tambah kepada beg "MuMKiT" kerana dapat membantu ibu dalam mendidik anak-anak mereka untuk mengemas barang dan menyimpannya di dalam beg. Para suami juga dapat mengemas barang dengan mudah tanpa bantuan isteri kerana kaedah label ini dapat memberi panduan kepada mereka. Walaupun, kerja-kerja mengemas dan menyimpan barang ke dalam beg kelihatan remeh tetapi dengan adanya kaedah label yang menjadi panduan ini akan menjimatkan masa dan tenaga para isteri atau ibu dalam mengurus

diri serta keluarga. Rajah 1 dan 2 menunjukkan lakaran bahagian luar dan dalam beg "MuMKiT".

| Pandangan Depan | Pandangan Belakang | Pandangan Sisi |
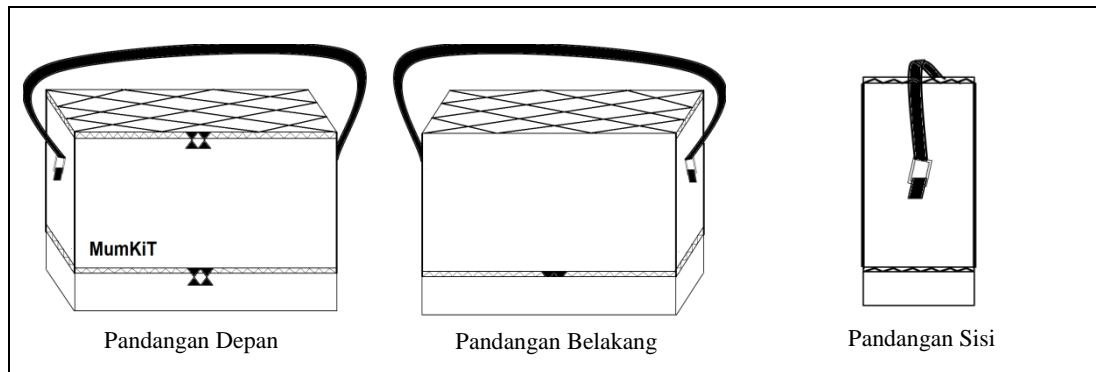
Rajah 1. Lakaran Bahagian Luar Beg "MuMKiT"

(1) dan (3) : Poket Sisi

(5) : Uncang dan Dasar Beg

(4) : Poket Depan

(2) : Poket Belakang

Rajah 2. Lakaran Bahagian Dalam Beg "MuMKiT"

Jadual 1 menunjukkan perbandingan beg "MuMKiT" dan beg sedia ada dipasaran.

- Jadual 1. Perbandingan beg MuMKiT dan beg dipasaran

	MuMKiT	Produk X	Produk Y
Saiz	40cm x 19cm x 33cm	59cm x 33cm x	41cm x 16cm x
Berat	0.5kg	1.2kg	0.6kg
Material utama	Baldu	Kulit	Polyester
Rekabentuk	Beg ibu dan bayi disandang tepi atau dibimbit	Beg bimbit	Beg bayi disandang tepi atau dibimbit
Kandungan dalam beg	Barangan keperluan ibu dan bayi	Barangan keperluan ibu sahaja	Tiada barang keperluan

Berdasarkan perbandingan yang dibuat, didapati beg "MuMKiT" lebih praktikal dan serbaguna kerana mempunyai kelebihan berbanding beg sedia ada di pasaran.

KESIMPULAN

Beg "MuMKiT" boleh dipasarkan bersama barang keperluan untuk ibu bersalin dan kegunaan bayi yang dilahirkan atau dipasarkan tanpa barang keperluan ibu dan bayi. Kelebihan ini akan memberi kebebasan kepada pengguna untuk memiliki beg sahaja atau beg yang telah lengkap dengan barang keperluan bagi memudahkan dan menjimatkan masa mereka. Aswad Yahya (2016) melaporkan bahawa peratus pekerja wanita di Malaysia ialah 57.2%. Peratus yang tinggi ini menjadikan kebolehpasaran beg ini tinggi memandangkan golongan pekerja wanita inilah yang memerlukan beg serbaguna yang dapat membantu mereka mengurus keluarga disamping menyumbang tenaga kepada kemajuan negara.

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KEBERKESANAN E-PENGKALIAN BAGI MENGATASI MASALAH LEMAH OPERASI DARAB DALAM KALANGAN PELAJAR PERINGKAT AWAL PERSEKOLAHAN

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Abstract: Kajian tindakan ini dijalankan untuk menilai keberkesanan "E-Pengkalian". E-Pengkalian dicipta untuk membantu pelajar yang lemah sifir agar dapat menguasainya dengan cara yang lebih mudah dan berkesan. "E-Pengkalian" dibangunkan dengan gabungan dua aplikasi iaitu video scribe dan powtooon. Melalui video, muzik dan kartun, "E-Pengkalian" dapat menarik minat dan mempercepatkan pelajar mahir sifir dalam masa yang singkat berbanding dengan teknik konvensional. Teknik ini diperkenalkan bagi mengatasi masalah pelajar lemah matematik asas iaitu operasi darab. Sehubungan dengan itu, kajian ke atas 30 orang pelajar tahun 4 penghuni Rumah Kebajikan Anak Yatim Dan Dhuafa Siti Aminah, Kelantan telah dijalankan untuk menilai skor bagi operasi darab dan minat mereka terhadap matematik dan operasi darab pada pra dan pasca E-Pengkalian. Data diperolehi melalui skor operasi darab bagi ujian Pra dan Pasca iaitu sebelum dan selepas pengajaran dan pembelajaran E-Pengkalian. Penemuan menunjukkan pelajar mendapat skor yang lebih tinggi bagi ujian Pasca berbanding ujian Pra E-Pengkalian bagi sifir 4, 5, 6, 7, 8 dan 9. Namun begitu, untuk sifir 1, 2 dan 3, skor ujian pasca adalah lebih rendah berbanding ujian pra dengan perbezaan yang amat kecil. Pelajar mendapat skor yang lebih tinggi pada Pasca berbanding Pra E-Pengkalian untuk minat terhadap matematik dan operasi darab. Kajian ini memberi implikasi kepada pelajar, ibu bapa, guru dan kementerian Pelajaran di mana untuk memupuk minat pelajar dalam matematik dan operasi darab; "E-PEngkalian" perlu dijadikan teknik dalam aktiviti pengajaran dan pembelajaran. Ironinya, teknik ini diharap dapat melahirkan pelajar bijak matematik seiring dengan aspirasi negara untuk melahirkan modal ihsan yang cemerlang bukan sahaja di peringkat awal persekolahan malah terbilang di peringkat negara juga di persada antara bangsa.

Kata kunci: e-pengkalian, operasi darab, lemah, matematik

PENDAHULUAN

Matematik ialah suatu bidang ilmu yang berkaitan dengan nombor yang menjadi asas kepada pelbagai bidang ilmu yang amat penting dalam setiap aspek kehidupan manusia. Kepentingan matematik secara umumnya diakui umum, di mana ianya diajar di semua peringkat, bermula dari prasekolah sehingga ke universiti. Kebolehan menguasai matematik akan membantu pelajar cemerlang bukan sahaja dalam akademik juga kehidupan seharian. Namun begitu tidak semua pelajar cemerlang dalam matematik, melainkan mereka yang mempunyai minat dan menganggap ilmu ini menyeronokan (CheLah, 2012). Secara amnya, masih ada sebahagian pelajar di peringkat awal persekolahan, sekolah menengah dan peringkat tinggi yang kurang menguasai bidang ini terutamanya kemahiran asas matematik seperti operasi darab.

Justeru, pengajaran yang lebih kreatif dan inovatif perlu diperkenalkan supaya pembelajaran matematik akan lebih menyeronokkan bersesuaian dengan kehendak generasi di era milinium. Anjakan paradigma perlu dilakukan dalam konteks pengajaran supaya pembelajaran matematik tidak dianggap sukar dan membosankan malah ditakuti oleh pelajar. Teknik yang dapat merangsang minat dan keseronokan pelajar supaya mereka menguasai matematik dengan lebih berkesan perlu diperkenalkan terutamanya kepada mereka yang lemah penguasaan terhadap kemahiran asas seperti operasi darab.

Kini, terdapat beberapa teknik yang diperkenalkan untuk membantu penguasaan operasi darab dengan lebih mudah, antaranya menggunakan kotak sifir, nyanyian, dan jarimatika (Zakaria, 2014). Kajian telah dijalankan bagi mengenalpasti keberkesanan kepelbagaian teknik bagi operasi tambah dan tolak di mana penemuan menunjukkan peningkatan penguasaan matematik dalam kalangan pelajar (Hock, 2007). Kajian lepas juga mendapati minat terhadap matematik asas operasi darab meningkat selepas pelajar dapat menguasai sifir (Carr, 1986). Kini teknik ini telah diterjemahkan secara e-learning.

Hakikatnya, penggunaan kepelbagaian teknik untuk kemahiran matematik asas seperti operasi asas tolak dan tambah telah terbukti. Namun keberkesanannya untuk operasi darab masih diragui, Ramai beranggapan teknik ini rumit dan tidak memberikan kesan yang menyeluruh dalam pembelajaran (Ing, 2011). Walau bagaimanapun menurut Henry (2004), menggunakan teknik secara e-learning dapat menyelesaikan permasalahan matematik kerana melalui gambar, muzik dapat menarik minat pelajar untuk menguasai sifir dengan lebih mudah dan berkesan.. Teknik sifir secara e-learning telah diperakui menunjukkan perkembangan positif dalam pengajaran dan pembelajaran matematik (Westreich, 2002). Teknik e-learning agak mudah dan menarik, walaubagaimanapun, e-pengkalian perlu dikaji keberkesanannya sebelum ia diaplikasikan ke atas pelajar di peringkat awal persekolahan.

KAJIAN TINDAKAN

Kajian tindakan telah dijalankan di Rumah Anak Yatim Dan Dhuafa Siti Aminah. Penghuni rumah ini merupakan anak yatim berumur dari 5 tahun sehingga 17 tahun dengan jumlah 46 orang kesemuanya. Kesemuanya mereka beragama Islam dan daripada golongan miskin asnaf. 30 orang pelajar Tahun 4 telah dipilih untuk kajian. Melalui permerhatian penyelidik, kemahiran matematik asas untuk operasi darab pelajar agak lemah. Mereka juga lemah menghafal sifir dan kurang yakin untuk menyelesaikan operasi darab.

OBJEKTIF KAJIAN

1. Untuk menilai skor pelajar pada ujian pra dan pasca operasi darab selepas didedahkan teknik e-pengkalian.
2. Untuk menilai minat pelajar terhadap matematik dan operasi darab pada pra dan pasca e- pengkalian.

ULASAN KARYAWAN TEKNIK OPERASI DARAB

Menurut Foley (2008), penguasaan sifir secara hafalan memerlukan masa yang panjang untuk dikuasai. Ing (2011) pula berpendapat, pengajaran matematik berasaskan jadual adalah tidak tepat. Pendekatan ini menyebabkan pelajar terkebelakang dan lemah matematik (Gardner, 1983). Pembelajaran operasi darab secara e-learning dapat membantu mengatasi kelemahan menguasai sifir secara hafalan yang mana ia membantu pelajar untuk operasi darab dari sifir1hingga ke rumah juta (Hock, 2007).

Banyak kajian tindakan telah dijalankan untuk menilai keberkesanan e-learning untuk operasi darab (Westreich, 2002; Gardner, 1983). Teknik ini dapat menarik minat belajar dan membantu mereka menguasai sifir dengan cepat (Kilpatrick, 2000).

METODOLOGI

Responden Kajian

Responden kajian terdiri daripada 30 murid dari Rumah Kebajikan Anak Yatim Dan Dhuafa Siti Aminah, Kelantan. Mereka berusia dalam lingkungan10 tahun dan kesemuanya perempuan. Pencapaian matematik mereka bagi operasi darab adalah di bawah tahap sederhana.

Metodologi Kajian

Dalam kajian tindakan ini, pelajar diberi ujian pra dan pasca operasi darab. Mereka diminta mengisi jadual sifir 1 hingga 9 dengan lima soalan untuk setiap jadual. Ujian pra dijalankan pada pertemuan pertama. Ujian ini untuk mengukur tahap prestasi pelajar dalam operasi darab sebelum pengajaran dan pembelajaran teknik e-pengkalian. Ujian pasca pula dijalankan di akhir pertemuan iaitu selepas pelajar diajar e-pengkalian. Kedua-dua ujian ujian tersebut mengandungi 45 soalan yang sama. Tujuan kedua-dua ujian tersebut adalah untuk membandingkan hasil ujian pra dan pasca e-pengkalian.

Di samping itu, pelajar juga diminta untuk menyatakan minat mereka terhadap matematik dan operasi darab untuk pra dan pasca jarimatika. Tujuannya untuk mengukur perbezaannya bagi 2 tempoh masa yang berlainan.
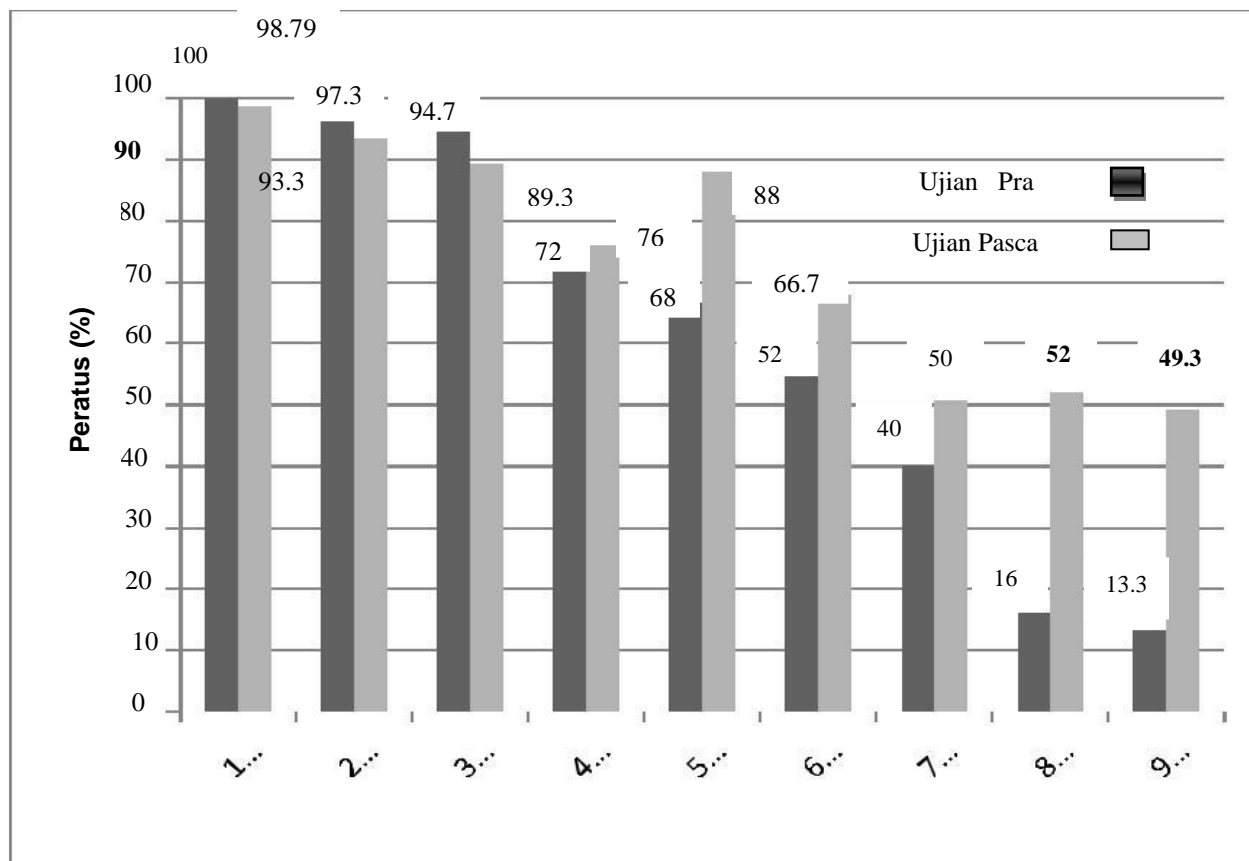
HASIL DAPATAN KAJIAN

Ujian Pra dan Pasca Pelajar

Penemuan menunjukkan untuk operasi darab Sifir 1, skor pelajar menurun dari 100% hingga 98.7%. Bagi Sifir 2, skor pelajar juga menurun dari 97.3% kepada 93.3% dan Sifir 3, menurun dari 94.7% hingga 89.3. Manakala untuk Sifir 4, skor pelajar meningkat dari 72% hingga 76%. Begitu juga dengan Sifir 5, skor meningkat dengan ketara dari 66.7% hingga 88%. Bagi Sifir 6, terdapat sedikit peningkatan daripada 54.7% kepada 68%. Untuk Sifir 7, skor juga meningkat daripada 40% kepada 50.7%. Peningkatan drastik untuk Sifir 8 dan 9

iaitu dari 16% ke 52%, dan 13.3% kepada 49.3% setiap satu. Keseluruhannya semua skor untuk jadual operasi darab bertambah baik dalam ujian pasca berbanding ujian pra kecuali untuk Sifir 1, 2 dan 3. Sila rujuk Rajah 1 di bawah.
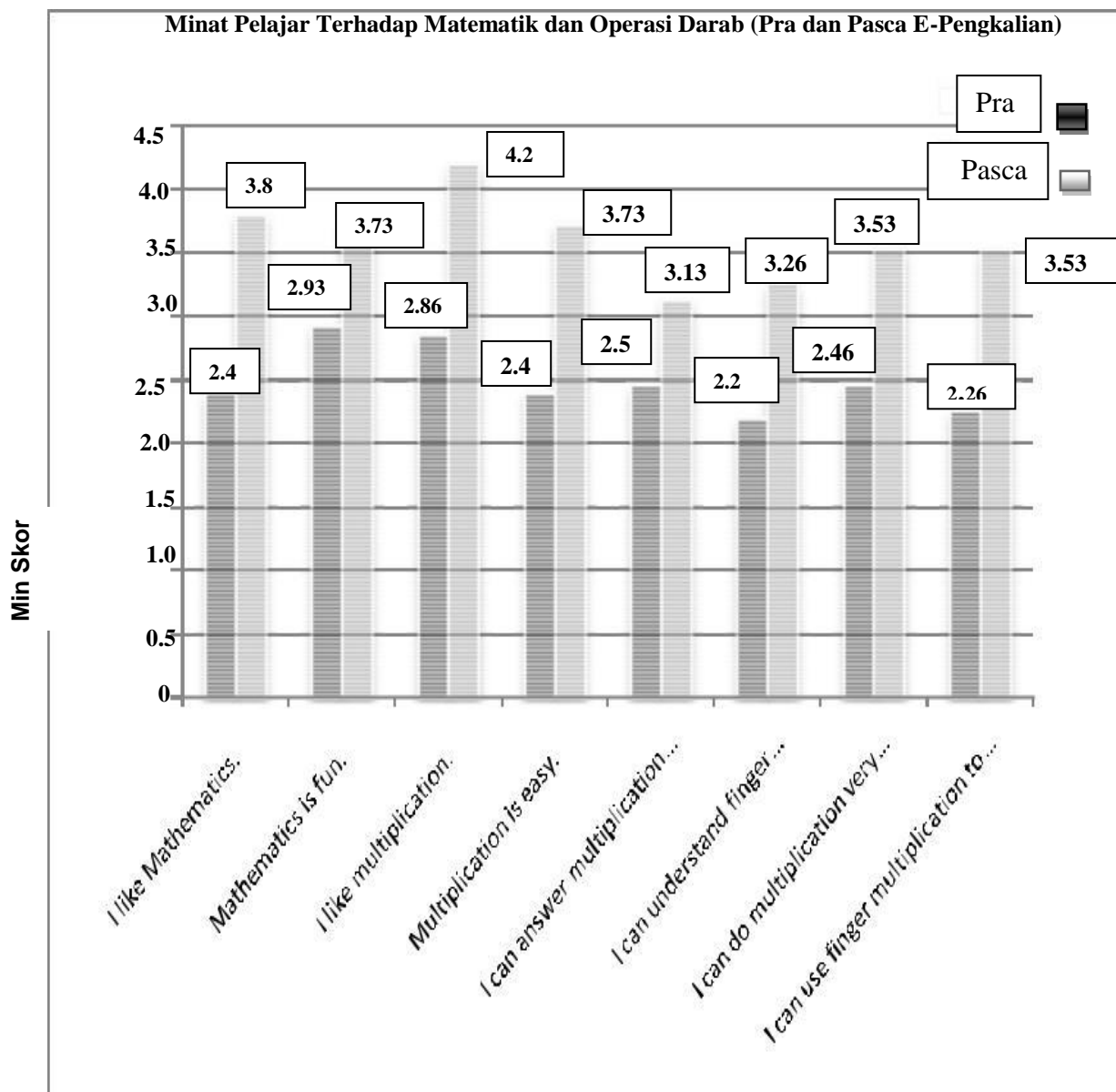
Skor Ujian Pra dan Pasca Operasi Darab

Minat Pelajar terhadap Matematik dan Operasi Darab (Pra dan Pasca Jarimatika)
Penemuan mendapati skor pelajar untuk kesemua soalan berkaitan dengan minat terhadap matematik dan operasi darab adalah lebih tinggi pada pasca berbanding dengan pra jarimatika.   Secara terperinci, untuk soalan 1 (saya suka matematik), purata skor meningkat dari 2.40 ke 3.80. Untuk soalan 2 (matematik menyeronokkan), purata skor meningkat dari 2.93 ke 3.73. Untuk soalan 3 (saya suka operasi darab), skor meningkat dari 2.86 ke 4.20. Untuk soalan 4 (operasi darab mudah), purata skor meningkat dari 2.40 kepada 3.73. Untuk soalan 5 (saya boleh menyelesaikan operasi darab), purata skor meningkat daripada 2.46 kepada 3.13. Untuk soalan 6 (saya memahami jari), purata skor meningkat dari 2.20 hingga 3.26. Untuk soalan 7 (saya boleh buat operasi darab), purata telah meningkat daripada 2.46 kepada 3.53. Akhirnya, untuk soalan 8 (saya boleh kira operasi darab dengan tangan), purata telah meningkat dari 2.26 ke 3.53. Sila rujuk Rajah 2 di bawah untuk keseluruhan skor minat pelajar terhadap matematik dan operasi darab untuk pra dan pasca e-pengkalian.

Rajah 2. Minat pelajar terhahap matematik dan operasi darab (Pra dan Pasca jarimatika)

PERBINCANGAN

Analisa menunjukkan skor yang lebih tinggi untuk enam jadual sifir iaitu 4, 5, 6 ,7, 8 dan 9 pada paca jarimatika . Hal ini kerana pelajar telah menguasai operasi darab dengan mudah berbanding semasa mereka di pra e-pengkalian. E-pengkalian membantu pelajar menguasai operasi darab dengan mudah dan cepat. Namun begitu, penurunan dilihat pada jadual sifir yang lebih kecil iaitu sifir 1, 2 dan 3. Ini disebabkan terdapat beberapa orang murid telah membuat kesilapan semasa menjawab soalan mudah. Walau bagaimanapun peratus jawapan betul untuk tiga jadual operasi darab untuk pasca e-pengkalian masih sangat tinggi iaitu melebihi 80%.

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Bagi menjawab objektif kedua, pelajar telah diminta untuk menyatakan skor minat mereka terhadap pembelajaran matematik dan operasi darab untuk pra dan pasca jarimatika. Penemuan menunjukkan skor yang lebih tinggi pada pasca berbanding pra jarimatika. Dengan kata lain, peningkatan minat pelajar yang ketara terhadap matematik dan operasi darab selepas pengajaran dan pembelajaran jarimatika. Selama ini, pelajar sukar untuk menjawab dan melengkapkan jadual sifir disebabkan mereka tidak memahami konsep. Mereka lemah menghafal dan membaca tanpa memahami konsep nombor dan kira mengira.

Akibatnya, pelajar tidak menguasai sifir, mereka kurang minat untuk belajar matematik dan menganggap subjek ini membosankan. Apatah lagi bila menghadapi masalah matematik yang lebih sukar. Perkara ini menyebabkan mereka takut dan benci bila berdepan dengan nombor atau apa-apa yang berkaitan dengan matematik. Hal ini tidak boleh dipandang ringan kerana ia akan merugikan masyarakat dan negara. Minat terhadap matematik perlu dipupuk supaya pelajar seronok dan selesa mengamalkan ilmu matematik bukan sahaja untuk akademik dan kerjaya tetapi juga untuk kehidupan seharian.

KESIMPULAN

Prestasi pelajar dalam kemahiran asas operasi darab menunjukkan skor yang lebih baik pada pasca berbanding pra e-pengkalian. E-pengkalian adalah teknik yang sangat praktikal kerana tidak mengambil masa panjang untuk pengajaran dan pembelajaran. Teknik ini sesuai untuk generasi sekarang yang terdedah dengan teknologi. Peruntukan masa yang diperlukan hanya mengambil masa selama 5 hingga 10 minit, bergantung kepada kecekapan pelajar untuk melatih diri mereka. Ia juga boleh diulangtayang tanpa had. E-pengkalian amat sesuai bagi pelajar peringkat awal persekolahan, yang gagal menguasai sifir walaupun berada pada peringkat tinggi juga golongan dewasa yang mengalami masalah yang sama. Keseronokan belajar juga timbul kerana secara tidak langsung pelajar akan mendengar muzik dan melihat gambar yang berwarna warni. Keyakinang diri pelajar juga meningkat kerana dibekalkan kemahiran asas operasi darab yang mantap. Selain itu, kajian tindakan ini dapat membantu para guru matematik, ibu-bapa, pelajar dan kementerian pelajaran dalam meningkatkan alternatif teknik pengajaran dan pembelajaran. Pembelajaran secara e-pengkalian iaitu belajar secara e-learning akan memudahkan mereka memahami dan menjadi bijak matematik. Justeru, e-pengkalian mendokong dan seiring dengan hasrat negara untuk melahirkan modal ihsan yang bijak dan cemerlang dalam matematik bukan sahaja di peringkat awal persekolahan malah di persada antarabangsa.

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ADSORPTION FROM NON AQUEOUS SOLUTION BY RAW SUGARCANE BAGASSE AND TARO STEM

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Abstract: One of the major sources of water pollution is oil spills or oily waste waters and removing this pollution is a global concern. Nowadays natural sorbents are applied as single solution for oil spills since this technique is effective, rapid and cost saving for cleaning these pollutions and reduce environmental effects. Adsorption are promising choice of treatment for its simplicity, effectiveness, and feasibility when appropriate sorbent is used. The used of bagasse as adsorbent especially when structural component of bagasse which is made up of carbon material is suitable as adsorbent and the fact that, adsorbent bagasse further reduce solid waste disposal and hence reducing one source of environmental pollution. In this paper, raw sugarcane bagasse and taro leaves in different particle sizes was used for the sorption of layer of crude oil from lubricating oil get from motorcycle workshop. Mineral fluid lubricants are based on mineral oils. Mineral oils (petroleum derived) are product of refining crude oil. There are three types of mineral oil such as paraffinic, naphtenic and aromatic. In this experiment, we are use paraffinic oil. paraffinic oil are used for manufacturing engine oils, industrial lubricants and as processing oils in rubber, textile and paper industries. The adsorption process is on going, found that organic waste such as taro stem and sugarcane bagasse can adsorb lubricating oil waste quickly by using a reagent, N-BromoSuccinimide (NBS) as an additive for adsorption. The result showed that máximum adsorption capacity of raw sugarcane bagasse for dry system was about 40% to 50% and for taro stem was about 30% to 45% depends on their mass, size and time taken. In this study, it can be concluded that using taro stem and sugarcane bagasse with NBS probably can remove the oily layer in drainage system.

Keywords: natural sorbents, non aqueous, sugarcane bagasse, taro stem, adsorption, lubricating oil, pollution

INTRODUCTION

Water that being used everyday comes from multiple sources such as streams, rivers and lakes. Human tend to have clean water but at the same time contribute to the interest rate of pollution water. Many rivers, lakes and streams becoming increasingly polluted by oil and grease that thrown by restaurant, industrial and agricultural activities and most frequent by domestic waste that are being produce and discharged without proper treatment.

PROBLEM STATEMENT

Modernization and industrialization has greatly affected our river and waste water stream. Plus, we can see that much of the domestic activities from the residential area and restaurant, much of them just throw and wash their oily dishes and discharges to water stream without thinking about it causes to the environment. They also produce a lot of adverse upon the water system at the same time enhance pollution in water thus contribute to the poor surface water quality.One of the major sources of water pollution is oil spills or oily waste waters and removing this pollution is a global concern. or Natural sorbents are applied as single solution for oil spills since this technique is effective, rapid and cost saving for cleaning these pollutions and reduce environmental effects.

SOLUTION TO THE PROBLEM

In this study, the severe pollutants of wastewater slaughter can be identified. Besides, we can also examine the capabilities of TCL as a coagulant and study the efficiency of combination TCL and H_2O_2 intreating slaughter wastewater.

PLANNING STRUCTURE

The apparatus that we have used in the projects are knife, beaker, sieve, stirrer, dropper, weight balance and laboratory oven. The materials that we have used are distilled water, raw sugarcane bagasse, taro stems, lubricating oil, N-Bromosuccinimide (NBS)

KNOWLEDGE IMPACT

We have used the existing knowledge to further enhance the use of raw sugarcane bagasse and taro stem to function as a cheaper and conveniently-handled natural sorbents

CONTRIBUTION TO SOCIETY AND COUNTRY

Natural sorbents are applied as single solution for oil spills since this technique is effective, rapid and cost saving for cleaning these pollutions and reduce environmental effects. It can reduce health problems like cancer, reproductive problems, typhoid fever and stomach sickness in humans and reduce water pollution.

COST IMPACT

We have estimated that the cost needed for the experiment can be divided into two parts which are household cost and industry cost. For households, the total cost is zero. For industries, the total cost is RM30 which is spent on buying materials and apparatus.

COMMERCIALIZATION POTENTIAL

TCL extract can be used to treat wastewater but only for some parameters such as ph, BOD, DO and turbidity. However, it cannot be commercial yet because it still has weakness.There should be further study on *TCL* extract because of positive result obtained. There are certain improvements that can be done to improve the study for better result.The improvements and modifications can be carried out from times to times and keep abreast technologies available.

I-STOP@PETROL PUMP

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Abstract: Drivers nowdays often take for granted on the safety precautions when refuel at petrol station.Commom behaviours of drivers is not to switch off the car engine when refuel at petrol station.This is actually the major cause of some severe accidents which may lead to jeopardize as it will assume explosion and fire. Despite many advertisement to remind the drivers to switch off the car engine while refueling, there are still drivers who ignored this problem even though they are aware of bad consequences with our I – STOP @ PETROL PUMP the car engine will switch off automatically when the lever to open the oil filling is pulled. Based on the problem,we make an innovation named I – STOP @ PETROL PUMP. This innovation is created specially to solve the problem .When the drivers or any person pull the lever to open the oil filling hole,the car engine will switch off automatically.So,the risk of jeopardize that will assume explosion and fire can be reduce. With this,it is clear that our product I –STOP @ PETROL PUMP is able to overcome the problem of drivers who refuse to switch off the car engine while refueling.This will also increase the safety standard of car besides improving safety of all people as this product will reduce the risk for explosion and fire to happen when refuel at petrol station.

INTRODUCTION

The problem highlights regarding intractability to follow the safety precaution when refuel at petrol station. The safety precaution is not to use phone while refuel, no smoking and most important is to switch off the car engine when refuel. The objective is to make a system that will be the solution for the problem. As the drives pulled the lever to open the oil filling the car circuit will be cut and the engine will be automatically switch off. So, this project is actually for safety.

PROBLEM STATEMENT

Drivers nowdays always did not switch off their car engine when refuel at petrol station. Actually, this problem may lead to jeopardize that will assume explosion and fire.

SOLUTION TO THE PROBLEM

In this research, we create a system name I-Stop @ Petrol Pump to an actions for solve this problem.

PLANNING STRUCTURE

The apparatus and materials that we used is motor, car model, battery 9A, battery 9V, push start button, micro switch, circuit casing, wiring, oil filling hole opener lever.

KNOWLEDGE IMPACT

We have used the existing knowledge and imagination to create a system that safety for everyone when refueling.

CONTRIBUTION TO SOCIETY AND COUNTRY

This product is very economical, higher safety level and low risk of jeopardize that assume explosion and fire.

COST IMPACT

We have estimated that the cost needed for the experiment can be divided into two parts which are project cost and Add-on in car cost. For project, the total cost is RM49. For Add-on in car, the total cost is RM11.50.

COMMERCIALIZATION POTENTIAL

In the model, the motor will switch off automatically when the lever is pulled. The micro switch attached to the lever act to cut the circuit as the lever is pulled. This type of circuit is used as a system in cars which will switch off the car engine as the oil filling hole opener lever is pulled. Without switch off the car engine while refueling at petrol station, may cause jeopardize that assume fire and explosion. Therefore, it is proven that our product, I-STOP@PETROL PUMP will ensure that people do not take for granted on switching off car engine while refueling. Thus, their safety is promised

MULTI-FUNCTION STICK

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Abstract: Mountain climbers, jungle trekkers and even blind people that uses a white cane will use a long pole or stick as a common accessory to assist them with their rhythm and provide stability on rough terrain. It is well – known as a trekking stick and provide limited usage to the users. It is inconvenient for the user to load them with essential equipment or tool with them. A research has been made to overcome this problem which is by developing a multiple function stick that integrates essential equipment either for mount climbing or jungle trekking. Visually impaired people also can use it replacing their white cane according to the function provided. This enable those to not just carry a one functioning trekking stick along. The researchers aim is to help by providing a multiple function trekking stick that is fully equipped with their requirement.

Keywords: trekking stick, multiple usage

INTRODUCTION

The Multi-Function Stick is a trekking stick that was improvise and consist of essential equipment. Our product is divided into three according to the user requirement. The first is adjustable with a security sensor. The second consist of a security sensor, compass, barometer, knife, torchlight and a power bank attached to it. The third is a fully equipped set which consist of a security sensor, barometer, knife, torchlight, power bank, gripper, fishing set and a lighter.

PROBLEM STATEMENT

Common mount climbers need to bring a hiking stick mainly for their stability due to the rough terrain. The trekking stick just provide one function, so the jungle trekkers need to bring extra necessary tools. The jungle trekkers also often being threat by dangerous and venomous animal beyond the woods. The percentage of fatal accident increases and lost of direction during navigation.

SOLUTION TO THE PROBLEM

In this research, a gripper and a knife is added to act as a defense system. The security sensor makes it safer for the users. The compass and barometer help them to know their direction

and surrounding temperature. This ensures their life to be less threatened and always fully prepared and equipped with tools.

PLANNING STRUCTURE

The equipment that was integrated into the trekking stick are barometer, compass, security sensor, knife, torchlight, power bank, gripper, fishing set and a lighter.

KNOWLEDGE IMPACT

We have used the existing knowledge and integrated other essential equipment to provide a multiple function trekking stick.

CONTRIBUTION TO SOCIETY AND COUNTRY

This product is very useful for users in order to ensure their life during jungle trekking or mount climbing. With this product users will not encounter problem like forgetting basic necessary tool. The percentage of fatal accident also could decrease by preparing themselves with the challenges around the woods.

COST IMPACT

We have estimated that the cost needed for the product can be divided into three parts according to the equipment that was integrated. The total range cost approximately between RM 85-RM 150.

COMMERCIALIZATION POTENTIAL

This multiple function stick is very useful according to the type of equipment buyers are interested. The targeted potential buyers are mount climbers, jungle trekkers and visually impaired people. This product has a great potential in the market as the number of people exploring the outdoor world increases.

MULTI-FUNCTION UMBRELLA

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Abstract: Pedestrian that uses an umbrella as a protection and shelter from the direct sunlight still encounter several problems that could be prevented. The usage of an umbrella only provide several benefits to the users which is protection from rain and direct sunlight. Users will still feel hot due to the atmospheric temperature. A research have been made to work as a solution. In this research, there are several additional parts that we install to the umbrella to provide multiple function for the users but still with an optimum weight range. In this research, the researchers aim is to show that several additional parts like small fan, led lights, solar panel and reflective material could be combine into an umbrella.

Keywords: umbrella, multiple usage

INTRODUCTION

Umbrella is commonly used by pedestrian because it is hand-held portable devices size for personal use. The Multi-Function Umbrella provides multiple function like shelter from direct sunlight, cool temperature, shelter from rain and usage of renewable energy sources. During the day, users can use it as a protection from direct heat and receive a cool breeze or temperature provided by the small fan. During the rain and night time, users will be protected by the rain, the LED lights attached provide lights and not to forget the reflective material to provide signals to the motoric users. The additional parts is connected with a battery supply source and solar panel as a renewable energy.

PROBLEM STATEMENT

Pedestrian will use an umbrella to a specific destination but will not be protected fully by the heat from the direct sun. The atmospheric temperature contributes to the hotness that a normal umbrella could not help to overcome. Users during the night cannot totally ensure that their life could not be threatened by the reckless motoric users especially when it comes to streets that does not provide street light.

SOLUTION TO THE PROBLEM

In this research, small fan, led lights, solar panel, reflective material and battery supply is tested and installed to provide multiple function for the users. This ensures that users can totally be safe and protected due to the rain and direct sunlight but still use renewable and natural sources of energy which is sunlight.

PLANNING STRUCTURE

The additional tools or material that was used are small fan, led lights, solar panel, reflective material, battery supply, cables and switch.

KNOWLEDGE IMPACT

We have used the existing knowledge and integrated the additional material to provide an umbrella that provides multiple function for users.

CONTRIBUTION TO SOCIETY AND COUNTRY

This product is very useful for users in order to have a cool and safer environment. It uses medium range cost material and renewable energy that is safe for the human race. The percentage of pedestrian involve in night accidents could decrease that makes them not to worry about the dangers that could happen.

COST IMPACT

We have estimated total range cost of our product is between RM 120 – RM 150.

COMMERCIALIZATION POTENTIAL

This multiple function umbrella is very useful to help pedestrian and other users so that they can walk in a safer and more conducive way. This product has a great potential in the market because the amount of pedestrian and accident happens to them especially night time increases rapidly.

MULTI PURPOSED ROLLER

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Abstract: Multi purposed roller are used to clean thing that have two side such as ceiling fan as it have two sticky roller which can remove any loose or stray particles and extensible pole. The common way to clean the fan are hard and not convenient as it take a long time and a wasteful of energy. After some research and reading, it was found that majority of housewives use a pole and a rug to clean ceiling fan and climb higher surface to reach the fan. Our aim is to reduce the use of time and energy. At the same time it will not risk the safety of the consumer.

INTRODUCTION

We use reusable material as the roller which is melamine foam with a cleaning agent inside as the outer surface of the roller .In addition the roller can wipe both blade side as the roller are put in double position and the distance of one roller to another roller can be adjusted . The pole can be extend to suit the height that the consumer wants.

PROBLEM STATEMENT

Most people use a chair, table and anything to reach the ceiling fan and clearly it is unsafe. Furthermore, it use a lot of energy and will take and extra time to clean the fan. It is also hard to reach the other blade side of the fan when using rug and pole and we cannot guarantee the cleanliness of the fan.

SOLUTION TO THE PROBLEM

In this research, we invent a tool that can make people work easier as it have double roller which can reach the both sides of the blade's fan and the distance of the roller are adjustable. It also have extensible pole which can be extend as the height that the consumer wanted.

PLANNING STRUCTURE

We use polypropylene as the pole and use the monopod stick concept as it can be longer or shorter. As the outer surface of the roller we use melamine foam with cleaning agent inside that can be reusable. The distance of one roller to another roller can be control by a screw as we use pulley concept.

KNOWLEDGE IMPACT

We have do research by analysing the common way people clean the fan and commercialize our invention.

CONTRIBUTION TO COUNTRY AND SOCIETY

This invention is very productive and convenient for the society to use and it will be economical invention as it make people work easier.

COST IMPACT

We have estimated that the cost needed for the experiment can be divided into two parts which are household cost and industry cost. For households, the total cost is zero. For industries, the total cost is RM 80 – RM 100 which is spent on buying materials.

COMMERCIALIZATION POTENTIAL

This invention are very helpful to reduce the energy using and will have big potential in the market as people getting busy everyday.

DARK PHOSPHORESCENT POWDER

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Abstract: In a titrimetric analysis, there are other materials that can replace the LED and incandescent lamps as decorative lights. These are Strontium Nitrate and Aluminum Nitrate as the base material. LED lamps and incandescent lamps cost much compared to Strontium Nitrate and Aluminum Nitrate which are much lower. After several tests run Strontium Nitrate and Aluminum Nitrate last longer. This means that the duration of use of Strontium Nitrate and Aluminum Nitrate is longer than LED lights and Incandescent incandescent lamps that are easily damaged and do not last long.

INTRODUCTION

Strontium nitrate is an inorganic compound made of the elements strontium and nitrogen with the formula $Sr(NO_3)_2$. This colorless solid is used as a colorant (red) in pyrotechnics and is also used as an oxidizer in pyrotechnics.Like many other strontium salts, strontium nitrate is used to produce a rich red flame in fireworks and road flares. The oxidizing properties of this salt are advantageous in such applications.Strontium nitrate can aid in eliminating and lessening skin irritations. When mixed with glycolic acid, strontium nitrate reduces the sensation of skin irritation significantly better than using glycolic acid alone.

Aluminum nitrate is a white, water-soluble salt of aluminum and nitric acid, most commonly existing as the crystalline hydrate, aluminum nitrate nonahydrate, $Al(NO_3)_3 \cdot 9H_2O$.Aluminum nitrate is a strong oxidizing agent. It is used in tanning leather, antiperspirants, corrosion inhibitors, extraction of uranium, petroleum refining, and as a nitrating agent.The nonahydrate and other hydrated aluminum nitrates have many applications. These salts are used to produce alumina for preparation of insulating papers, in cathode ray tube heating elements, and on transformer core laminates. The hydrated salts are also used for the extraction of actinide elements.

PROBLEM STATEMENT

In a study conducted, it is found that most Malaysians use LED lights or incandescent lamps as decorative lights in their homes. Decorative lighting commonly used everywhere, using many electrical energy. For example, the power used by an LED light is usually 5 Watts while ordinary incandescent lamps use electricity between 60 ~ 100 Watts. Furthermore the cost for these two lamps is high at RM30 to RM50 and there are even hundreds of ringgit.

SOLUTION TO THE PROBLEM

In the research, dark phosphorescent powder can replace LED and incandescent lamps as an ornament. This is due to the unique design of dark phosphorescent powder and is easy to carry where it is convenient for consumers. It is also much better quality than cheap

PLANNING STRUCTURE

The apparatus that we have used in the projects are a beaker, box furnace, 1.875g of aluminum nitrate nonahydrate with 530mg of strontium nitrate, 10.7mg of europium nitrate pentahydrate, 21.9mg of dysprosium nitrate pentahydrate and 30.9mg of boric acid are dissolved in 3ml of distilled water. 3.9g of pure urea is added and shaken until dissolved. The mixture is heated in a 1000watt microwave for 4 minutes. Eventually it'll ignite and combust. The white "ash" is the glow powder.

KNOWLEDGE IMPACT

We have used existing knowledge to continue to increase the use of Dark Phosphorescent Powder to function as cheaper and easy to handle decorative lights

CONTRIBUTION TO SOCIETY AND COUNTRY

This product is very economical and easy to use. It is an ornamental material that is not easily available but is worth it. It is suitable for all ages as an ornament wherever it is. It is also capable of contributing to the economy of the self and the country.

COST IMPACT

We have estimated that the cost needed for the experiment can be divided into two parts which are household cost and industry cost. For households, the total cost is zero. For industries, the total cost is RM50 which is spent on buying materials and apparatus.

COMMERCIALIZATION POTENTIAL

This product is very useful to the public because it can save energy and reduce the pollution of the environment that is the effect of using the LED lamp and the incandescent lamp. With the Dark Phosphorescent Powder it is able to help consumers save their money for low income people.

CALCIUM CARBONATE SUPPLEMENTS TO COMBAT OSTEOPOROSIS

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Abstract: In our modern age, people now do not care about their health. Health is one of the important values in people's lives. At the age of 30s, there are a lot of people who suffer osteoporosis disease without realizing it. Osteoporosis means a condition of fragile bone with an increase susceptibility to fracture. In our study, we found that egg shells wealths in calcium carbonate. Due to this situation, we take awise step to create pills that contain calcium to elixir the disease of osteoporosis. Hence, we choose pills as our method to achieve our goal. We blended the egg shells to become powder. Then, we stored the egg shells powder into pills. Based on the results from previous researches we found that calcium carbonate had positive effects in piglets which was an the bones and cartilage. In addition, this brilliant powder was tested to 54 postmenopausal Vietnamese women. The result was marvelous because the egg shells calcium was very efficient to gain bone mass. This product will reduce the probability of osteoporosis from happening. Therefore, the population of humans will not be effect to this disease.

Keywords: Osteoporosis, Calcium, Egg shells

INTRODUCTION

In our life,there are many problems that we faced.We try to find the best solution for our problems.In this situation,we found a great solution to prevent Osteoporosis from taking place in human beings.We used eggshells.Eggshells is the solver for Osteoporosis and in addition,it also gives many advantages to all humans and animals.

PROBLEM STATEMENT

Based on our research,we found that the Osteoporosis is a chronic problem to the Malaysian people. Known as silent killer, Osteoprosis have caused only 25% to the Malaysian and women resume normal activity after hip fracture.This is an evidence that Osteoporosis is not a joke. Other than that, it is very a loss to people because not using eggshells in daily life.

SOLUTION TO THE PROBLEM

So, we came up with a solution by making supplements made up of calcium using eggshells as our main ingredient. By only preventing Osteoporosis, we also can stop the wastage of eggshells and in the meantime clear our landfills.

PLANNING STRUCTURE

The materials that we used are eggshells and capsule pills size type 1 which can fill up to 500 mg of calcium from eggshell powder and 100 mg of salmon powder, blender machine and container.

KNOWLEDGE IMPACT

By carrying out this experiment,we could encourage the society about the awareness of wasting.In this situation,not all waste are basically waste. There will be benefits in most of our waste.We have prove that the concept of 'waste to wealth' is true when we chose eggshells as our alternative to treat the osteoporosis.

CONTRIBUTION TO COUNTRY AND SOCIETY

This project is not an ordinary project.It could be prove by using the eggshells which are very beneficial to the people out there.The society will be able to live a healthier lifestyle when they choose pills which are eco-friendly.In addition, the osteoporosis disease could be prevented from time to time.For country perspective,the people will be more aware about how dangerous is osteoporosis by knowing the symptoms of it.They could also prevent from this disease starting from the childhood age.

COST IMPACT

For this project,we estimated that the cost needed is about RM0-RM15.We can use the used the eggshells to run this project.

COMERCIALIZATION POTENTIAL

Eggs are feasibily found abundantly in our daily delicacies and the eggshells collected will be more and easier.

FRACHET TO PREVENT WEEVILS IN ORYZA SATIVA

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Abstract: In the titrimetry analysis, weevils are always found in rice containers because rice is the main weevil food. People are always light-weighted with weevils but it turns out that weevils are very dangerous and can harm human health. After making some experiments, weevils can be eliminated by using a high scent material. Although the material is favoured by humans, weevils hates highly aromatic material. Aromatic ingredients consist of pandanus, dried chillies and lemon leaves. These materials can cause weevil to be uncomfortable with the surroundings and will go away from rice. In this study, we intend to reduce or better eliminate weevils in the rice.

INTRODUCTION

The objective of the project is to produce a fragrant sachet (Frachet) to prevent weevils in the rice storage container. This sachet also can provide many advantages especially to decrease the presence of weevils in rice container, without ruining the rice it also can make the rice more fragrant and bacteria free.

PROBLEM STATEMENT

Weevils is a type of pest that attacks food especially rice. Weevils are black beetles that are always found in a container of rice. Weevils can get in your rice container through the packed food from outside. This will cause a health impact on the community.

SOLUTION TO THE PROBLEM

Any aromatic smell can repel them from the rice storage container. That is why, we have found a way to pack a very aromatic smell in a very conveniently sized bag. With that, we have come up with 'Frachet'. It is an aromatic sachet containing dried aromas. This includes aromatic ingredients such as citrus hystrix (lime leaves), Capsicum annuum (dry chilli), pandanus (pandan leaves).

PLANNING STRUCTURE

The main material is a sachet. The sachet is a small net made by cotton. The sachet had a length of 10 cm, width 5cm and high 2 cm. First, fry all the ingredients without oil until the ingredients turn dry. Make sure to fry all the ingredients one by one. Then, blend all the

ingredients into small pieces. Then, insert all the ingredients one by one into the sachet slowly. After inserting all the ingredients in the sachet, keep the sachet at a room temperature for a while to let the aromatic smell diffuse into the air.

KNOWLEDGE IMPACT

We have used an existing knowledge to further enhance the use of citrus hystrix (lime leaves), Capsicum annuum (dry chilli), pandanus (pandan leaves). This function as a natural ingredients which will not cause any health effect in the community.

CONTRIBUTION TO SOCIETY AND COUNTRY

This product is economical for the use of community with fast results. It is non-commercial and easily available aromatic smell indicator that can be used by households to determine the existence of weevils in order to produce healthy rice for their family members.

COST IMPACT

We have estimate the cost needed for the experiment. For households, the total cost is RM50 that is spent from buying the materials and the apparatus.

COMMERCIALIZATION POTENTIAL

This fragrant sachet is very useful to prevent weevils in the rice. This is suitable for households to keep their rice in a healthy and good condition. This product can give a big potential for the marketing as the number of people with stomach ache increases because of the weevils.

THE EFFECT OF *ANNONA MURICATA* ON *RATTUS RATTUS*

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Abstract: *Annona muricota* (soursop) can be used as a deterrent to avoid pest species like *Rattus rattus* (house rat). *Rattus rattus* is a common pest animal that lives alongside with humans. *Rattus* sp.has continuously been a problem for human as they are the vectors for many diseases and can also cause many instrumental damages. *Annona muricata* has been used for deterrent purposes in two different physical states, which are fresh leaves, and as agar made from blending *A. muricata* leaves. *Rattus rattus* was released into a Y-maze to study their behaviour towards the deterrent. This finding has proved that blended A. muricata leaves in agar are more efficient in repelling R. rattus compared to fresh leaves. This is due to the strong and faulty odor emitted by the agar. In comparison of agar and fresh leaves of *A. muricata*, agar shows significant difference in efficacy of rendering *R. rattus*. This finding determines that the best product in repelling R. rattus is blended *A. muricata* leaves in agar.

Keywords: *Annona muricata*, *Rattus rattus*, pest control, plant based deterrent, animal behavior.

INTRODUCTION

Rattus, a widely known genus of rodents come in different sizes and colours. In general terms, *Rattus* is slender with a pointed head, have large eyes and prominent, thinly furred ears. The most common *Rattus* is *Rattus rattus* (black rat) and *Rattus norvegicus (brown rat),* which are closely associated with human beings. These *Rattus* have their origins in Asia and are generally known as true rats or the Old World rats. *R. rattus* or best known as house rats are predominant in warmer climates while *R. norvegicus* dominates in temperate climates. *Anona muricata* comes from the second largest genus of the family, Annonaceae. This evergreen plant is mostly distributed in tropical and subtropical region, and is most commonly found in Caribbean islands. The spiky fruit of *A. muricata* comes with white flesh and sweet flavour that attracts people to use it in juice and ice cream. It also has hermaphrodite flowers that easily grow in warm climates such as in Malaysia or Indonesia. *Annona muricata* plant contributes a lot to health care such as curing cancer, boosting immune system, relieving respiratory diseases, treating insomnia and many more.

PROBLEM STATEMENT

The increase in population of *Rattus* has caused a lot of risks and problems to humans in numerous ways. Human and animal health, contamination and damage to the property are threatened by *Rattus*. Due to their incisors designed for gnawing, structural, electrical and building systems might get damaged, which causes a lot of maintenance works to be done. One female *Rattus* tend to have up to 15000 babies in just one year, leading to a large amount of outlay to human beings. Standing as pests, *Rattus* also cause severe damage to agricultural lands and products. Householders and farmers have used myriad of pests' repellents to drive *Rattus* away from their houses and lands. The most popular way that has been used widely in Malaysia is citronella grass (*Cymbopogan nardus*), a plant-based pests repellent.

SOLUTION TO THE PROBLEM

In this study, the leaves of *Annona muricata* or more commonly known as soursop are used as a plant-based pest repellent. *Annona muricata* comes from the second largest genus of the family, Annonaceae. The leaves of *A. muricata* plant give out its own intolerable odour against *Rattus*. This method is typically used in countryside areas of Malaysia at their houses and farms as a natural deterrent for chasing away the house rats.

PLANNING STRUCTURE

By using the Y-maze trap (a Y shaped trap that act as a maze with two arms (arm 1 and arm 2) specially built for trapping the rats to the baits), the tied 16 fresh leaves of *Anona muricata* and palm shoots as baits were placed below the ending of arm 1. The palm shoots were placed just below the ending of arm 2. Rat A was released into the centre arm. The video camera was started. The wild rat was then timed 5 minutes after it was released. The aim of the video was to observe the behaviour of the rats to avoid the secluded area. These steps were repeated by switching the side of fresh leaves and the baits, by randomly switching the sides of the repellent and the baits in the arm of the Y-maze during the second replica. Before switching the sides, it was made sure that there was no residual odour of *Anonna muricata* from the previous place by applying odour-absorbing wood shavings and leaving it for a minimum of 30 minutes. All the above steps were repeated for rat A, rat B, rat C, rat D, rat E and rat F.

After conducting the fresh leaves experiment with all the sample sizes, the deterrent was switched and replaced with agar blocks made with extraction of *A. muricata* leaves. The odour removing method was used again but with the switch of agar it was applied for a minimum of 24 hours.

KNOWLEDGE IMPACT

We have used the existing knowledge to determine the efficacy of *Anona muricata* as a deterrent against the wild rodents (*Rattus rattus),* to document the behaviour of wild rodents *(Rattus rattus)* against potential deterrents and to develop plant-based pest repellent product with the leaves of *Annona muricata* plant.

CONTRIBUTION TO SOCIETY AND COUNTRY

Rattus are one of the most common rodents closely associated with humans and have caused risks and problems to humans in several ways. These pests are mostly found in the streets or

houses. The leaves of *Annona muricata* were used to test the effect on *Rattus* as a plant-based pest repellant to reduce the number of problems caused by *Rattus*.

COST IMPACT

We have estimated that the total cost needed for the experiment is not more than RM5, which will be spent in buying materials and apparatus.

COMMERCIALIZATION POTENTIAL

As of now, there are some commercial rat deterrents available in the market. However, most of them are non-environmentally friendly and can cause health problems in human if they mishandle it. Blended leaves of *Annona muricata* in agar is the most effective deterrent material for repelling the wild rats compared to the fresh leaves. This organic product is a more effective and human-friendly deterrent and is believed to have a great potential in the market to solve the annoyance of *Rattus rattus* or house rats from interfering with human activities around the world.

WOUND HEALING ACTIVITY OF RAW *ALOCASIA DENUDATA* STEM JUICE ON CHICKEN DERMAL FIBROBLAST CELLS

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Abstract: Among most essential factors in wound healing pathways is transforming the vascular endothelial growth factor. Fibroblasts are the main cells in all stages of wound closure. In this research, the raw stem juice of Alocasia denudata which was extracted using a squeezer, is used in the treatment of chicken fibroblasts as they were also adherent similar to human fibroblasts. Cytotoxic effects of the raw stem juice Alocasia denudata were assessed on chicken skin fibroblasts cells using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay or commonly known as MTT assay. We conducted migration assays to assess migration properties of chicken skin fibroblasts cells in response to the raw stem juice. Changes in the process of cell migration were monitored. Raw Alocasia denudata stem juice had proved to promote the migration of chicken fibroblast cells in vitro. Based on research conducted, the raw stem juice of Alocasia denudata might be effective in wound healing, through the improvement in the migration of chicken dermal fibroblast cells.

Keywords: *Alocasia denudata* stem juice, fibroblast cells, in vitro, wound healing

INTRODUCTION

Alocasia denudata or also known as 'keladi candik' or 'keladi canek' has large cordate or sagittate leaves grow to a length of 20 to 90 cm on long petioles. Their araceous flowers grow at the end of a short stalk, but are not conspicuous; often hidden behind the leaf petioles. The stem (a corm) is edible, but contains raphid or raphide crystals of Calcium oxalate along with other irritants (possibly a protease) that can numb and swell the tongue and pharynx resulting in difficult breathing, and sharp throat pain according to Bradbury et. al., 2012. The lower parts contain more of the poison. Prolonged boiling before serving or processing may reduce the risks but acidic fruit such as tamarind may dissolve them.

This plant has a long history of traditional use in wound healing. There has been a research carried out in vivo on real life mouse by Abdul Latif, M et al., 2015. This shows that the local administration of *Alocasia denudata* can heal wounds.

PROBLEM STATEMENT

Healing process of wounds have always been a major problem of the society. Nowadays, the main reason behind this is the formation of the black scarring or known as keloid of the skin due to slow wound healing process as it would affect an individual appearance. Besides, keloid may result in itchiness and tenderness which could last long. Moreover, when the opening of the wound is exposed for a long period, there are high chances for pathogens to enter it and cause skin infection that will only worsen the wound. Without further medication, the period of a wound to recover would increase, and even more if it is lack of fibroblast and exposed to an unpredictable surrounding which may cause the wound to reopen or secrete pus.

SOLUTION TO THE PROBLEM

We believe that using the stem juice of *Alocasia denudata* on the wound, the skin is able to speed up the progress of wound closure and will be able to solve the problems of wound healing. However, the suitable concentration of this plant has to be determined in order to be used towards the chicken dermal fibroblast cells and to achieve optimum rate of cell migration.

PLANNING STRUCTURE

The apparatus that we used in this project are Schott Duran bottle, Bijou bottles, hot plate stirrer, mixer, hand gloves, heat resistance glove, alcohol swab SATwipes, PANASONIC MJ7OM squeezer, micropipette, 1000mL beaker, ruler, analytical balance, laminar flow, CO_2 incubator, autoclave, 96 well microtiter plate, 12 well microtiter plate, falcon tubes, CENTRIFUGE 5810R, T25 culture flasks, IKA MS3 Digital, 0.2μm nylon filter, syringe. The chemicals and reagents which we have used are Dulbecco's Modified Eagle's Medium (DMEM), Trypsin-EDTA solution, MTT Solution, Phosphate Buffered Saline (PBS) solution, Fetal Bovine Serum (FBS), penicillin, streptomycin. Moreover, the organism that we have experimented on is chicken dermal fibroblast cell ATCC® CRL-12203. Finally, the only raw material we have used is the *Alocasia denudata Engler var. elongata* plant.

KNOWLEDGE IMPACT

Based on this basis of knowledge, the researchers conducted an experimental study to determine the fibroblastic proliferation of *Alocasia denudata*. This study is targeted to reach further knowledge on fibroblastic proliferation so that it can be used as an alternative to treat certain skin diseases in our community.

CONTRIBUTION TO THE SOCIETY

This product is non-commercial and widely found in Malaysia especially in rural areas. This stem juice of the plant can be readily used by anyone to treat open wounds. Furthermore, this

study is to promote the use of medicinal plants which are commonly used in the traditional community as there are so many plants available in Malaysia which could be used as healers.

COST IMPACT

We have estimated that the cost needed for the experiment can be divided in two. The household cost to do this experiment in total is zero and the clinical cost to do this experiment is approximately RM500.00 when spent on buying materials, chemicals and reagents and the apparatus used are already available.

COMMERCIALIZATION POTENTIAL

As the *Alocasia denudata* could be used in wound healing creams, it would be very inexpensive to produce the creams compared to commercialized creams which are made from chemicals due to the fact that this plant is abundant in tropical countries which includes Malaysia. This product has a great potential in the society itself as more people have been going back to using natural products as their preferred choice.

SATELLITE EVENT H

REAL TIME ROAD ACCIDENT ANALYSIS (RTRAA) WEB BASED

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Abstract: Accident analysis plays the important part in order to decrease the road accident cases. In the past, the main analysis tools available to the road safety engineer were paper maps allied to databases like Excel spreadsheets. This was very time consuming process and some of the data was missing and uncompleted. The aim of this study is to improve road accident data storage and accessibility the use of WebGIS by creating a real time road accident analysis data management system. Selection of study area was Kedah. The use of analyses tools such as hotspot area of road accident, spatial temporal pattern of road accident, ordinary least square (OLS) analysis. RTRAA Web based develop through PostgreSQL and a webserver. By making use of RTRAA the police would be control and manage whole accident events as a real-time monitoring analysis system.
Keywords: road accident, real time, web based, WebGIS.

INTRODUCTION

Road accident is a serious problem in Malaysia. According to the Traffic Enforcement Investigation Department (JSPT) Bukit Aman (2016), there were 489,606 road accidents cases that lead to 6,193 fatalities in year 2015. The number fatalities caused by road accidents in Malaysia has consistently been above 6,000 cases since year 2010. Due to this critical figure, the government has launch the Road Safety Plan 2015-2020 with the objectives to reduce the incidences of road accidents and improve the delivery of emergency services to be on par with international standards ((Economic Planning Unit, 2015).

Besides that, the advancements in Geographical Information System (GIS) can be put to effective use in accident analysis. Although GIS has been used for over thirty years, however it has only been recently used in the field of transportation (Selvasofia & Arulraj.G, 2016). The development of a GIS to analysis traffic accidents has been pursued towards improving the efficiency and effectiveness of traffic accident counter measures. GIS also would make analysis less time consuming and less tedious which otherwise would become very labor sensitive (Nayak, 2014). Hence, GIS will offer a platform to maintain and update accident record database and use it for further analysis. For example are spatial-temporal analysis, hotspots area analysis, shortest path analysis and emergency response analysis.

Nowadays, the advancement capabilities in GIS lead production of web application. It will be produced easily using Web AppBuilder for ArcGIS. Web AppBuilder is a medium to produce

web application using existing template that provided by ESRI. This is the latest product that produces by ESRI. One of benefit of web AppBuilder application is users can simply manage their geospatial content, such as data, maps, images, applications, and other geographic information. Hence, web application of road accidents using GIS will be more interactive and informative in order to expand more analysis in road accidents.

PROBLEM STATEMENT

Currently, road traffic accident related data is managed by various players (Munyendo, Kuria, & Mubea, 2015) such Traffic Police Department, National Transport and Safety Authority. Accident data in Malaysia is recorded by Police on standard forms and then transferred to MIROS (Malaysian Institute of Road Safety Research) for digitization and development of accident database (Ahmed, Sadullah, & Yahya, 2014) and (Oxley, Ravi, Yuen, & Hashim, 2013). However, there is no consistency in crash data formatting and storage among divisions or departments (Paz et al., 2015). The implication is the data available in variety of data formats and that accessibility regimes are different for each organization. Manner of storage is mainly in analogue publications, meaning that retrieval is cumbersome and at worst inaccessible for cases of lost data. Furthermore abundance of accident data is critical to manage and evaluate. Even though, police department in Malaysia had existing system to manage road accident but they still maintain individual database (Hashim & Allyana, 2009). Hence, it is important to create new database system to solve this issue and synchronized the data.

SOLUTION TO THE PROBLEM

In this study, real time road accident analysis web based develop to manage the accident data and carried out the analysis on the spot. It will synchronize the data and up to date the database. It will be one stop center database of road accident.

PLANNING STRUCTURE

Through this study, there are several methods that carried out by ArcGIS software. There are about four stages in order to complete this study. The phase of project planning is about selection of study area and software used in the project. Meanwhile, data collection phase includes the types of data acquired and their sources. During the data processing phase, all data that had been acquired will be processed. The steps for data processing are defined projection of data editing, attribute data entry and others. Besides that, data analysis described the analysis that used in this study in order to obtain the result. The overall detail methodology shows in Figure 1.
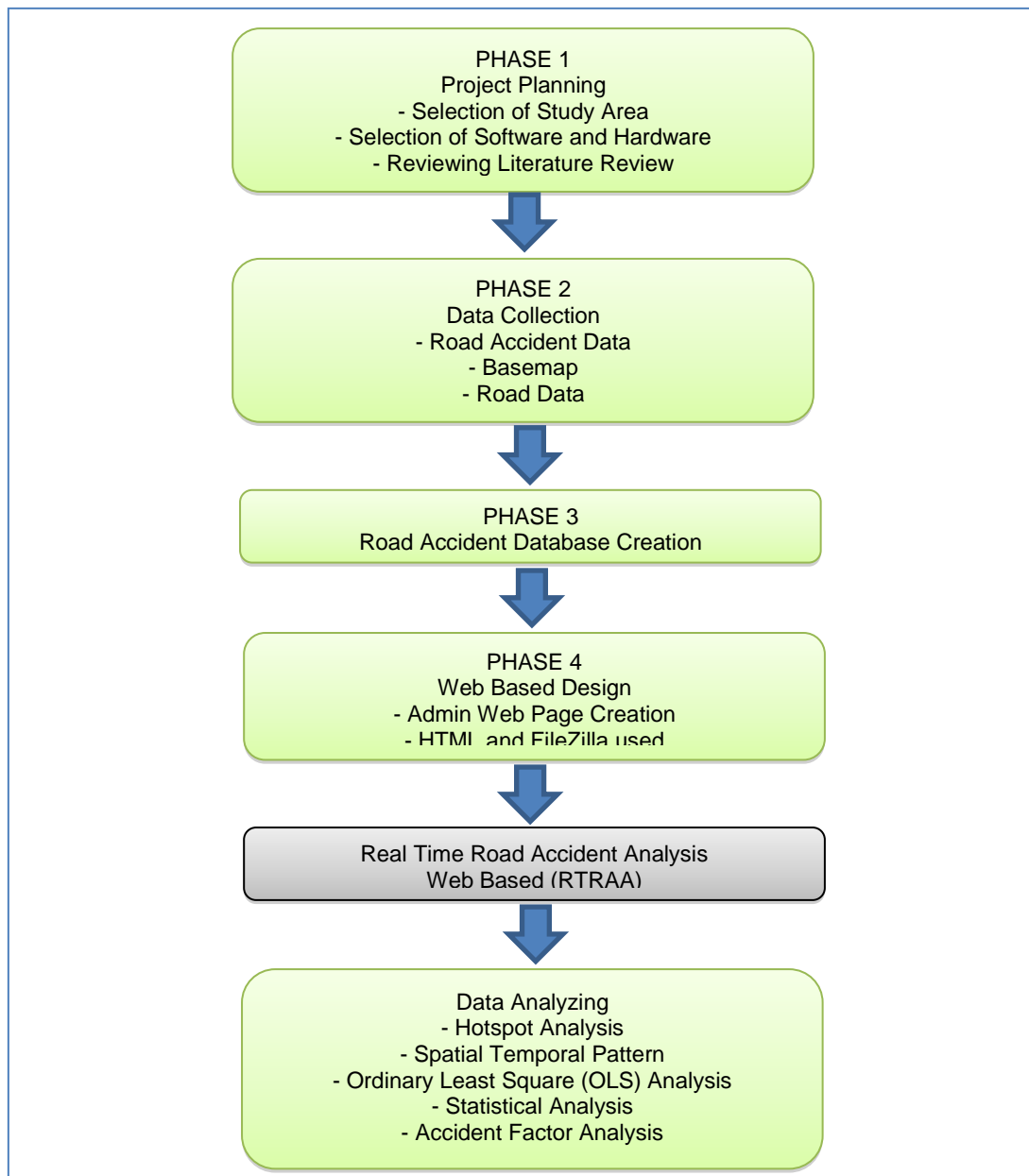
Figure 1 Proposed Methodology

Figure 2 provides with an overview of the various components and how these provide a seamless data flow for analysis and publication on the web portal. The data from accidents and traffic monitoring is stored in Postgresql, a relational Database Management System (DBMS), as well as related spatial data which is stored in Postgis format inside Postgresql tables. Postgis also provides several spatial functions which are used to correlate data with spatial objects as illustrated in the next sections.
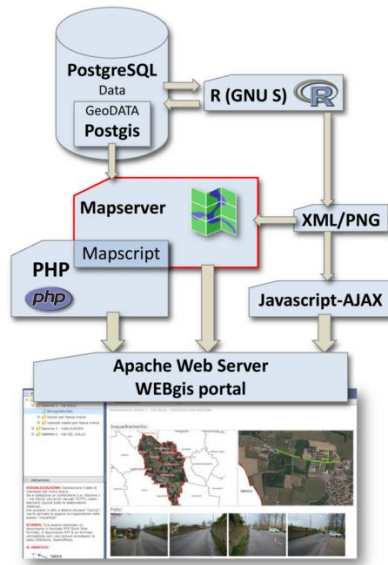
Figure 2 Proposed data flow and overall information system structure
Source: Pirotti et al. (2015)

KNOWLEDGE IMPACT

We have used the existing knowledge to further enhance of WebGIS through Web AppBuilder to develop real time analysis of road accident which is to help police department upgrade their existing database.

CONTRIBUTION TO SOCIETY AND COUNTRY

The road accident data management system has the following benefit:-
Identification design problems on the transportation network.
Improving inaccuracies and incompleteness of current traffic accident data.
Helping the government to decide on Safety Policy supported by scientific evidence such as the night travel ban.
Guide national and county government authorities to reach appropriate decisions such as campaigns on drink-driving and child safety education.
One stop center for road accident related data and it also would help determine the true burden of road accidents.

COST IMPACT

This is required minimal financial commitment considering the availability of a wide array of open source tools to implement its operation while its usage does not require specialized training as is the case for GIS programs. The acquisition of data required to populate the system does not entail extraneous efforts and resources as institutions are already in place with clear mandates and responsibilities.

COMMERCIALIZATION POTENTIAL

Real Time Road Accident Analysis Web Based is very useful to help police department upgrade existing their database in various aspect such as synchronized the format of road accident data. The road accident data also will up to date and all detail the cases complete. It will be one stop center road accident database. Based on the complete information of road accident, authority will carried out analysis such as hotspot area of road accident, spatial temporal pattern of road accident, pattern of factor contributed to road accident and so on. Hence, it is easier for authority to take action based on the analysis carried out. This product has a great potential in the market as the number of road accident increase and focus government action to decrease the road accident cases in Road Safety Plan 2015-2020.

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IOT BASED REAL TIME MONITORING USING QUEUE MACHINE SYSTEM AND ESP8266

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Abstract: Nowadays, Internet of Things (IoT) play a big role in people daily activities and time management is one of very crucial for the people in order to manage their life. The aim of this project is to develop a real-time monitoring application for public services waiting time using Android application. The proposed system is utilize the Android mobile application that can check which is the nearest post office available, with shortest waiting time that satisfies the user schedule. By using this application, the user can plan their time and daily activities easily. The proposed solution is a system which combination of ESP8266 as a main board, queue machine to capture the real-time of individual waiting time, and Android application. The captured data will be analyzed to estimate the waiting time. This process is developed by using Arduino IDE for ESP8266. Both simulation and experimental work will be carried out to prove of concept (PoC). In this project, BLYNK is used as cloud platform, data storage and customize mobile phone interface/application. The developed application will be further tested on its functionality. The final phase of the project is the integration of data shared on BLYNK with the developed Android application.

INTRODUCTION

The purpose of this project is to develop a real-time monitoring application for public services waiting time using Android application. The motivation of this project is to let the people examine the queue time for the nearby service centers such as post offices, clinics and immigration offices. However, in this project, post office is chosen as prove of concepts. To achieve this goal the system will develop which combination of Wi-Fi microchip with microcontroller capability of ESP8266, queue machine to capture the real-time of individual waiting time, and Android application. The captured data from queue machine will be analyzed to estimate the waiting time. Then, it will be upload to the cloud platform, BLYNK. Besides that, BLYNK is used to customize mobile phone interface/application. Later, people are able to decide their own path from the analysis done through the mobile application and proceed their journey to the selected destination.

PROBLEM STATEMENT

Nowadays, people are too busy with daily task, thus time management are crucial. Typically, services at the post office, clinic, or immigration, should be done within office hours.

However, people are usually not interested in spending time with queue. So some people may prefer to pay the bill online. But not all the services have online capability such as post office. People need to go there to post their thing. But they didn't know how many people or waiting time they need to wait.

SOLUTION TO THE PROBLEM

The proposed solution is a system which combination of ESP8266, queue machine, and Android application, that will be integrated using BLYNK.

ESP8266; is a low-cost Wi-Fi microchip with microcontroller capability and used as a main board for this project.

Queue machine; there are several available queue machine used by post office, such as queue machine system (QMS), that able to show the queue and counter number.

Android application; in this propose system, this Android application will be develop using BLYNK.

BLYNK; is as cloud platform, data storage and customize mobile phone interface/application.

PLANNING STRUCTURE

The system is consist of esp8266 as a microcontroller, internet connection, BLYNK account as server, jumper wire and button to act as queue machine.

KNOWLEDGE IMPACT

The existing technology are used and adapt the technology with the real time monitoring for the social need. That provide useful function such as the location of the place and their waiting time. So it enhance the existing technology to next level.

CONTRIBUTION TO SOCIETY AND COUNTRY

This system is very economic for real monitoring. It will reduce society time consuming for waiting the queue in the service center. The system also provide much more convenient for user because it shown multiple post office or clinic with it estimated waiting time. So consumer can choose the place by them self whether they want to wait or not. In term of contribution to the country, this system may help many people to choose service center with

less number of people, thus it can reduce carbon footprint. Thus, the carbon footprint will not concentrate only in one area.

COST IMPACT

The estimated cost for the system is around RM90. The proposed system will use existing system that available in the service center, which is queue machine system. Thus, this system will be integrate with the existing service center system. So the total cost of this system become cheaper, due to it only use microcontroller with Wi-Fi chip for real time monitoring.

COMMERCIALIZATION POTENTIAL

This system will help society in term of time management and it's able to monitor the nearest location or services center/department that they want to go. So it a huge benefit for commercialize the system because it will help many people.

MULTIPURPOSE POLE FOR FRUIT HARVESTING

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Abstract: In fruit plantation, wrapping and harvesting of fruit was done manually by worker by means of a ladder to reach a fruit more than 2 meters high. This job is tedious and can endanger the worker if the ladder collapsed. A multipurpose pole was designed to help the worker reach the high fruit in order to wrap or harvesting it. The pole is made from a lightweight aluminum with adjustable height up to 15 foot. The wrapping and harvesting mechanism is attached on top of the pole and manually operated by means of a cable. The mechanism consists of a round aluminum loop on which a wrapper sheet(plastic/paper) is attached. The pole can be extended to cover the fruit and the cable will be pulled to tie the wrapper around the fruit. For harvesting purpose, the wrapper is replaced with a bag or chute. Once the bag is placed under the fruit, a cable is pulled to cut the fruit stem and collected in the bag or sliding down the chute to be collected in the basket on the ground.

Keywords: harvesting; pole; fruits; wrapping, aluminum.

INTRODUCTION

In fruit plantation, wrapping and harvesting of fruit was done manually by worker by means of a ladder to reach a fruit more than 2 meters high. This job is tedious and can endanger the worker if the ladder collapsed.

PROBLEM STATEMENT

Fruit plantation such as Mango, Guava, star fruit and others needed a proper care from planting up to harvesting. From planting up to when the tree is matured, most of the work done on the ground with help from several machines and tools. However, when the tree starts to bear a fruit, the worker need to stand or using ladder to take care of the fruit and the tree itself. The work is ranging from pruning, cutting off the low quality fruit, covering the good fruit and finally harvesting the fruit. Using a ladder is burdensome and can also endanger the worker.

SOLUTION TO THE PROBLEM

In this project, a multipurpose pole was designed to help the worker in doing their job without using a ladder. It was intended to be used manually since those fruit might be cut-off if

motorized mechanism was used. This also will make the pole lightweight to be carried as well as the selling price can be minimized.

PLANNING STRUCTURE

The pole will be made of from an aluminum to make it lightweight and preventing from corrosion. The pole can be extended easily up to 5 meter to reach a high fruit and can be retracted to 2 meter for storing purpose. The wrapping or harvesting job can be performed just by extending the pole to cover the fruit and pulling a cable provided with the pole.

KNOWLEDGE IMPACT

We have used the engineering knowledge and transform it into a practical device to ease the fruit harvesting process.

CONTRIBUTION TO SOCIETY AND COUNTRY

This product is very economical and easy to handle. It is lightweight and can reduce fatigue and burden of the worker thus increase productivity and increase their safety. It is a cheap device and can be easily available after the mass production.

COST IMPACT

We have estimated that the cost needed to produce the device not more than RM100. After added with production, transportation and retail cost, it can be sold in hardware store for less than RM250.

COMMERCIALIZATION POTENTIAL

The target customer is a plantation owner or their worker. With a wide fruit plantation and each plantation may need 10-20 unit (depends on its size or numbers of worker). Apart from plantation, it can also be sold to the individual farmer or gardener as well as for domestic use which has several fruit trees in their yard.

PERCEPTUALLY ADAPTIVE IMAGE WATERMARKING APPLICATION

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Abstract: Watermarking in image and video has a grown interest during last decade due to wide spread of digital media through the internet. Watermarking can be used for copy right protection, copy protection, authentication, channel quality measurement and many other applications. In this poster, an efficient watermarking algorithm is proposed based on simplified perceptual mapping model that combines three factors, texture mapping factor that is implemented using a simplified method referred as ALD (Accumulative Lifting Differences), simplified edge detection technique, and luminance mask. The perceptual model which is consists of new texture map called Accumulative Lifting Differences (ALD), simplified edge extraction method, and luminance mask; is utilized to find the severity of watermark embedding in a new blind image watermarking application that relies on simple and fast calculations which make the design suitable to be implemented on real time systems. Also, the proposed watermarking algorithm shows high robustness against different geometric and nongeometric attacks, high perceptual quality and friendly graphical user interface.

Keywords: Watermarking; LWT; Perceptual Mapping; Texture Mapping; ALD

INTRODUCTION

Image tracking service "Pixsy" stated that 64 percent from photographers had their work stolen in 2016, and 49 percent from the misusing was by social media users and bloggers, i.e. digital images, along with commercial businesses and other fields that digital images have major participation in them. As a consequence, finding a way to protect the copyrights of these images is a very demanding challenge for researchers and developers. Digital watermarking is a good tool for copyright protection as well as other image and video applications, as copy protection and authentication. It is achieved by embedding a piece of data like proprietary information and intellectual property rights inside digital media.

In this poster we considered invisible watermark, that is, no visual affect will be on the image. It is known that watermarking algorithm performance is a trade of between imperceptibility and robustness. Since higher intensity in watermark embedding, the better robustness results but less invisibility, similarly, low intensity in embedding reduces the robustness of watermark. Watermark is considered as an additive noise that should not affect the perceptual quality of cover image.

Human Visual System (HVS) has different perceptual evaluation for the same amount of noise if that noise is applied to different images or applied to the same image in different places. Researchers had analyzed such cases and concluded that HVS can perceive visual alerts if it pass a certain threshold called Just Noticeable Distortion (JND). In this work, JND model is created and utilized for best invisibility and highest robustness for a perceptual adaptive image watermarking system with the ability of blind extraction where no need for the existing of original image or original watermark in extraction phase. A perceptual adaptive, robust and user friendly watermarking application is introduced based on new perceptual mapping model where HVS is simulated using efficient perceptual algorithms. It is used to find the most suitable regions where watermark is hidden with high robustness and best visual appearance.

In this research, Lifting wavelet transform (LWT) which is characterized by simplicity, on location processing, and filter similarity have been used to create a fast and low complexity texture model by exploiting the variety of details band in first LWT decomposition. Since details band has higher coefficients values in areas where the changes are unexpected, So, finding the variety of that change and accumulate it produces the proposed texture mapping model, referred as Accumulative Lifting Differences (ALD). In addition, a simplified implementation of edge detection algorithm based on Sobel operator is presented to be extracted from texture area. Finally the luminance mask is added to the equation for a model that overcomes current ones in terms of noise resistance and speed of execution.

The proposed watermarking algorithm shows a great robustness for geometric and geometric attacks, for instance Normalized Correlated Coefficient (NCC) for 50% jpg compression equal to one. For perceptual quality, subjective measurements shows high quality and the watermark is completely invisible, while the subjective metric Structural Similarity Index (SSIM) values are more than 0.97 for tested images. Also, the watermarking system is presented using user friendly graphical user interface as shown in Figure 1. The presented watermarking system is a comprehensive one that characterized by Simplicity, adaptability, efficiency, real time executing ability with user friendly interface.

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- Figure 1 . GUI User Interface

PROBLEM STATEMENT

Tradeoff between invisibility and robustness watermarking is a serious issue in image/video watermarking systems, and literature attempts to combine perceptual mapping models in watermarking systems for high robustness and perceptuality involves complex and time consuming operations that are unsuitable for limited processor and real time systems.

SOLUTION TO THE PROBLEM

In this research, a simplified perceptual mapping model is designed and implemented based on basic and simple arithmetic operations. Lifting wavelet transform based algorithm shows high performance, simplicity and fast execution in compare with current perceptual models, as a consequence, involving it with watermarking produces efficient watermarking system.

PLANNING STRUCTURE

Lifting wavelet transform has been utilized in this project for transforming images from time domain to frequency domain. LWT coefficients have been utilized in creating the ALD texture model by taking advantage of the differences in details band values and combining them. Another LWT utilization is achieved by using the approximation band for hiding watermark bits for high robustness evaluation. Equivalent masks for edges detection and luminance are also estimated by approximation band.

KNOWLEDGE IMPACT

Since details band of Lifting wavelet transform has higher coefficients values in areas where the changes are unexpected, we proposed a system for finding the variety of that change and accumulate to create our texture mapping model that referred as Accumulative Lifting Differences (ALD). In addition, a simplified implementation of edge detection algorithm based on Sobel operator is presented to be extracted from texture area. Finally the luminance mask is added to the equation. These three factors are combined for a perceptual model that overcomes current ones in terms of noise resistance and speed of execution.

CONTRIBUTION TO SOCIETY AND COUNTRY

The proposed watermarking algorithm can be used for any watermarking system, for tracking images through the web, copy right protection, embedding meta data and many other applications of watermarking systems with high invisibility and in real time manner. Since video is set of consecutive frames, the algorithm can also be implemented on video watermarking.

COST IMPACT

The proposed method is totally based on simple arithmetic operations, so no certain programming tools or specific off shelf functions are required. The system can be implemented using any programming language over any platform which make it suitable to be implemented with the available programming tools without extra cost.

COMMERCIALIZATION POTENTIAL

The proposed watermarking algorithm may be adopted by any camera phone or any system with embedded cameras with the ability of real time of perceptual analyzing, watermark embedding and extracting. Also, the fast and efficient perceptual mapping model may be utilized in many other applications as image/video compression along with different watermarking applications.