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CREATIONS de UiTM
INTERNATIONAL MEGA INNOVATION CARNIVAL **2022**
For Humanity: Empowering Neoteric Knowledge

E-PROCEEDING

BOOK

24 MARCH - 8 APRIL 2022

CENTRE OF FOUNDATION STUDIES
UNIVERSITI TEKNOLOGI MARA (UiTM)
CAWANGAN SELANGOR, KAMPUS DENGKIL
MALAYSIA

CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2022

E-PROCEEDING BOOK

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Published by:

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil
2022

Publisher@ Pusat Asasi, UiTM Cawangan Selangor, Kampus Dengkil, 2022

UiTM CAWANGAN SELANGOR KAMPUS DENGKIL

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Foreword



Assalamualaikum wbt and good day.

Alhamdulillah. All praises are to Allah, the Merciful, the All – Beneficent, by whose Grace and Blessings have enabled us to gather here today.

On behalf of Universiti Teknologi MARA, first and foremost, I would like to extend our highest gratitude to our Vice-Chancellor, Yang Berbahagia Prof. Datuk Technologist Dr. Hajah Roziah Mohd Janor, the Vice-Chancellor of Universiti Teknologi MARA, for her willingness to officiate this event.

It is my great pleasure to welcome you to Creations de UiTM: International Mega Innovation Carnival 2022 with the theme “For Humanity: Empowering Neoteric Knowledge”. I am very proud to announce that UiTM Centre of Foundation Studies is organising its 2nd Mega Innovation Carnival. Apart from the innovation competition and exhibition, we also have fun, captivating activities and knowledge exchange sessions from various innovation agencies and partners.

I am also pleased to say that this will be the first time Creations de UiTM 2022 is opening its doors to participants from around the world. We are expecting more than 300 participants from various participating organisations and countries and this year; our Mega Innovation Carnival will take place on a virtual platform.

I would like to thank and congratulate Creations de UiTM 2022 Organising Committee, whose members have worked tirelessly to organise this event. Their tremendous support, cooperation, and hard work have enabled us to successfully organise this event, and we are grateful for that.

I feel honoured to be part of Creations de UiTM 2022 that plays a significant role in bringing together academicians, students, industry professionals and esteemed participants from various backgrounds all over the globe to showcase their creativity skills and the spirit of innovation.

Creations de UiTM aims to spur innovation by providing a platform for local and international academic and non-academic research groups to commercialise their innovations and ideas.

I believe Creations de UiTM is a great platform to nurture creative and innovative culture among lecturers, school teachers and students of higher education institutions, locally and internationally.

It is an extraordinary time for innovation. While much of the world came to a halt at times during the pandemic, innovation never stopped. What the 21st century has taught us so far is that crisis is a strong driver of creativity and innovation.

We have witnessed creativity and innovation within countries affected by the virus. We may not realise it, but our current technologies have already begun to shape the future of humanity and will define what our society looks like in the next few decades.

Our motto for this year is “For Humanity: Empowering Neoteric Knowledge”. With new knowledge, more new innovations can help to contribute to the betterment of humanity. As humans, we will always strive to find better ways to create things of value.

So, now is the time for innovation! No matter how small an idea you have, no matter how simple it seems, nurture it because ideas are useless until you get them out of your head and see what they can do!

Once again, thank you to the organising committee. I’m proud of the efforts in making this event possible despite the current pandemic situation that is affecting the country.

On behalf of the university, I would like to convey my humblest appreciation to everyone for your support and contribution. I hope many will grab this golden opportunity to showcase your brilliant, creative, and innovative ideas.

Thank you.

Professor Ts. Dr. Saifollah Abdullah

Director

Centre of Foundation Studies

University Teknologi MARA (UiTM)

Cawangan Selangor, Kampus Dengkil

Program Overview

CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2022 is a program by Pusat Asasi, UiTM Dengkil that provides the golden opportunity for innovators from all walks of life to showcase their creativity skills and the spirit of innovation. This program is open to both international and Malaysian innovators with the aim of providing exposure and experience with various academic content on innovation that are not only interesting but also useful.

CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2022 is particularly unique in that it offers a wide selection of educational and fun innovation-inspired content for all ages. This virtual presentation box will include not only competitions for innovation, but also exhibitions of innovative ideas/products/inventions from around the globe. Around 150 innovation projects will be showcased to compete virtually, with participation from school students, university students, and innovators from all over Malaysia and around the world.

A variety of innovation-themed academic and entertainment content has been prepared to enliven and provide exposure to visitors who participate online to further energize this virtual program.

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CATEGORY A
Professional

NARTsPLAATe: A Biomimicry Study of Nature Pattern and Colour of Pahang's National Park Kitchenware

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ABSTRACT

Nature plants are often used in indoor environments as part of a design to support sustainable and green architecture and to improve the health and wellbeing of occupants. Nowadays, a sustainable design is becoming a more foreseeable perspective of viewing products. Besides, biomimicry is a science work that studies nature's ways (nature as a model, nature as a measure, and nature as a mentor) and then imitates designs for human problem-solving. Concerning the number of nature plants, many studies were conducted by focusing on scientific review rather than arts view. Besides, patterns in nature plants from arts sight are visible in form of colors. Hence, this study is carried out through A Qualitative Colour Pattern Analysis (QCPA) Frameworks focuses on ascertaining how nature's masterpieces pattern and colour visually and biologically could be effectively used for product design that further illuminates a destination brand identity. This practice-based research study revealed the set of patterns, colours, and forms that accumulated from plants, fish, and flora which visibly significantly defines the relationship of nature, and can be applied to the practical design to enhance and support visual communication.

Keywords: Arts; biomimicry; nature; sustainable design

INTRODUCTION

Biomimicry is a science work that studies nature's ways and then imitates these designs for human problem-solving. Biomimicry also can be categorized into three different levels: Nature as a model, Nature as a measure, and Nature as a mentor. From these three categories, nature as a mentor was chosen as a basic study for the research on design patterns and colour from nature [1]. Moreover, concerning the number of natural plants, many studies were conducted by just focusing on scientific assessment rather than arts and design analysis.

Accordingly, in the mother nature of National Park Pahang, there is a limited number of biomimicry studies conducted in terms of nature as a mentor and in-depth study on the pattern and color of the rainforest. By exploring how colour patterns that identified from animals and plants in the area of Kuala Keniam at Pahang's National Park, this interdisciplinary research study was carried out to enlighten how nature's masterpieces pattern and colour would be used as an image brand identity for the Pahang's National Park. Furthermore, this study also attempted to combine natural patterns and colour with the form of design through scientific techniques that can be applied to practical design to enhance and support visual communication.

Educationally, patterns in nature exist in the natural world. There are naturally split into two types of patterns of nature which are spiral patterns that are revealed from animals and insects and radial (fractals) patterns that are regularly exposed from plants [2]. A spirals pattern is the most beautiful pattern in which animals are shown the extremes of the spots and stripes pattern. For example, leopards and ladybugs are full of spots, zebras and angelfish have distinctive stripes, and butterflies blend spots beautifully (Figure 1). On the other hand, the radial (fractals) pattern found from plants has infinite self-similarity. For example, branches, and leaves fractals have widespread (Figure 2).



Figure 1: Examples of Symmetry patterns from animals



Figure 2: Examples of Radial Symmetry pattern from plants

Yet, these natural patterns normally recur in different contexts and can sometimes be modeled mathematically. Moreover, a pattern exists when a set of numbers, colors, shapes, or sounds are repeated over and over again.

The full spectrum of colour is a naturally occurring phenomenon, as any colour in all its shades and hues can be found in our natural environment. As claimed by [3], colour is produced only when a molecule absorbs light and its electrons resonate with the frequency of the incoming wavelengths and when other wavelengths are reflected back.

Moreover, animals and plants come in a variety of shades and colour hues. The palette of visible colours varies from animals and plants in nature have 3 main colour basic: red, blue, and green. Consequently, both animals and plants have additional colour spectrums such as the green of chlorophyll, the iridescent blue from a beetle's wing, and the pink and white stripe from hedge bindweed. And all those colours are play a different role in nature. Accordingly, colour in animals is determined by pigment groups [4]. In example, melanin produces browns and blacks, haemoglobin produces reds and carotenoids produce yellow or oranges and pink. Moreover, the colours and patterns of animal in nature have evolved in harmony with behaviour and is used for signalling to others. In facts, male birds for example are more brightly coloured than female birds in order to have a higher visual contrast to their surrounding environment.

On the other hand, there are three colour pigments in the realm of plants in nature. These include the green of chlorophyll found in leaves and stems, the yellows to reddish orange, red and blue found in floras and fruits. In referring to wildflowers in the rainforest, their colour is so hilarious because they have displaying certain colours that can attracting insects or others. For example, butterflies prefer red flowers that have a platform for landing and bees are attracted to yellow marked flowers [1,3].

INNOVATION DEVELOPMENT

This study is part of the 2nd Scientific Exploration at Pahang's National Park which engaged researchers from University Teknologi MARA and The Department of Wildlife and National Parks Peninsular Malaysia. Due to the limitations of existing methods in analysing pattern and colour from animals, insects and plants (flora and fauna) found in Pahang National Park from two different perspectives (Art and Science), A Qualitative Analytical Frameworks (Figure 3) was developed through Qualitative Colour Pattern Analysis (QCPA)

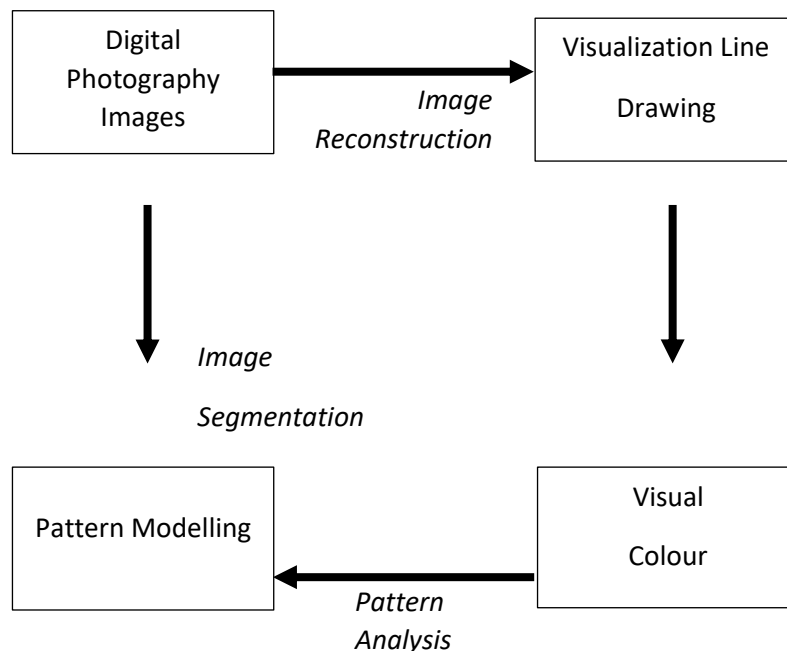


Figure 3: A Qualitative Colour Pattern Analysis Framework

Qualitative Colour Pattern Analysis (QCPA) is a method to assessing how patterns and colours revealed from animals, insects and plants (flora and fauna) appear against their natural background as viewed by ecologically relevant species. It combines calibrated digital photography, visual modelling and colour pattern analysis into an analytical framework.








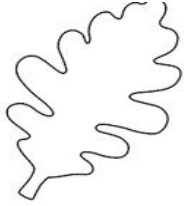




As the research is based on Keniam Trail in Pahang's National Park, the sample of study were focusing only on the plants that were divided into four group: Ferns, Fungi, Leaves and Fauna. The research design has involved in three aspects (Table 1): Design Thinking (DT), Design Processes (DP), and Design Tools (DT). This also leads to the design cognitive model of designers and scientist in the product design process.

Table 1: Research Protocol

Activities	Design Thinking (DT)	Design Processes (DP)	Design Tools (DT)
<i>Arts</i>	Abstract Thinking	Observation Sketches Form and Colour	Line Drawing Graphic Design Prototype
<i>Science</i>	Logic Thinking	Physics Calculation	Algorithm

All those 1200 photograph images firstly were group according to the types and further was analysed based on line drawing (Table 2).

Table 2: The types of plants in nature and group in line drawing

Types	Ferns	Fungi	Leaves	Fauna
In Nature				
In line Drawing				
Colors				

Based on the sample of animals, insects and plants gained from Keniam Trail in Pahang's National Park, a pattern and colour tribulations are achieved by morphological imitation of natural organisms' patterns and colours. Moreover, natural patterns revealed has provided an unlimited source of design and can be effectively applied into form design. This new set of design pattern visibly significant defines the relationship of nature, and can be applied to practical design to enhance and support visual communication. Figure 4 shown an example of colours and pattern used on kitchenware product.



Figure 4: Innovation prototype

COMMERCIAL POTENTIAL

The outcomes of this research have been a merging of aesthetics and science where finding on the science logic behind natural patterns has been a key step for the designers in proposing their new design work. The combination of parametric natural patterns and colours will also open up new methods for designers and scientist to work together. In which, designers are not only required to constantly update their knowledge on design but also need to respect the logical science in environment. Similarly, scientists have required having a parametric aesthetic thinking on the generative system of design. In instance, this study also covered that natural patterns and colours has offered an unlimited source of design and can be effectively applied to form image brand. Those patterns were successfully registered for Intellectual Property Recognition (IPR) under category of Copyright.

CONCLUSION

The findings from the study highly contributing to the Sustainable Development Goals (SDG) in environmental benefits, climate action and increased economic stability via forest products. Importantly, giving special attention to how plant in the forestry can provide a therapy through colours and patterns, this study not only shared the findings from two perspectives but also helps in generating sustainable economic growth and society.

ACKNOWLEDGEMENT

This study is part of the 2nd Scientific Exploration at Pahang's National Park which engaged researchers from University Teknologi MARA and The Department of Wildlife and National Parks Peninsular Malaysia.

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PRESERVATION THROUGH INNOVATION: A VIRTUAL ESL LEARNING PACKAGE FOR ESL CLASSROOM

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ABSTRACT

The Semai people are the largest indigenous group in Malaysia, and they are famous for their unique folktales. Folktales serve as a source for creative inspiration that leads to the emergence of several works in modern literature. However, despite these sterling qualities of folktales, it is endangered with extinction. The project aims to preserve the cultural and heritage of the indigenous Semai through the teaching and learning of Semai folktale in fun, interactive and creative ways. The ESL virtual learning package consists of a virtual puppet show with an E-book entitled The Legend of Cen Cemana accompanied with English language activities for the highflyers, intermediate and beginner level. The innovation was developed as a means to preserve the cultural heritage of the Semai and most importantly to integrate the interesting folktale into ESL teaching and learning during the pandemic phenomena. Legend of Cen Cemana was chosen because the folktale explains about the Semai beliefs and the universal values the elderly Semai used to pass down to the younger generation through oral tradition. The product is commercialized through collaboration projects with schools and ESL teachers. Thus, preservation of Indigenous folktales through the innovation initiatives is the best way to preserve the Semai cultural heritage and the effort should be well received and supported by the government and the Ministry of education.

Keywords: Preservation; innovation; Semai folktales; Cen Cemana; cultural heritage

INTRODUCTION

The Orang Asli in Malaysia have their unique cultures and stories that possess historical importance. In Semai indigenous society, folktales constitute a form of entertainment, relaxation, advice, and education for the children. The stories or folktales are the elements that are often intertwined in daily life in indigenous communities. The term “expressions of folklore” has been defined by the International Bureau of WIPO (World Intellectual Property Organization) as referring to the elements of “traditional artistic heritage” that a certain community or individual has developed and maintained, and they reflect the traditional artistic expectations of such a community [1].

Like other forms of literature, folktales call for the audience to have a certain degree of suspension of disbelief about their fictitious characters and events. Folktales also have the characteristic of literary creativity. Defined at the level of language, literary creativity involves manipulation of sounds, words, phrases, or overall linguistic form of the text [2]. Folktales typically include distinctive linguistic features such as novel words, onomatopoeic sounds, and repeated or paralleled phonological or grammatical patterns that create interesting rhythms.

Furthermore, for many decades, the oral tradition has served as an important teaching tool for the younger generations. Through the stories the elders reveal spiritual and social teaching in culturally significant terms. The Semai oral traditions have their own morals and transitions which symbolize themselves which are the significant elements in the embodiment of their cultural and spiritual lifestyle. The children are educated by their parents, who model cultural practices which they inherited from their ancestors. The core values espoused throughout the oral traditions of folktales provide continuity in nurturing the Semai's beliefs. The Semai indigenous folktales reflect the traditional practices, unique cultures, heritage, the social and lifestyles of the Semai's tribe in the ancient time and place. It also mirrors the people's culture, personal and world view.

Consequently, in the Semai community, folktales which were told orally were a dominant medium used in educating and entertaining the tribes of the concerned culture. Hence, a folktale is a precious heritage that must be safeguarded to avoid complete disappearance consumed by globalisation and profit-making entertainment [3].

In addition, with the emergence of technology, preservation initiatives can be done effortlessly. Oral tales from various cultures have been transformed into written forms (e.g. the series in Folk Tales of the World published by Sterling Publishing). Some have become part of the canon of children's literature (e.g. Carpenter & Prichard, 1984). When folktales were written down and used as a way to introduce the younger generation to literature, suitable vocabulary and medium were often given the priority. The simple forms of language and a storyline with proper beginning, middle and end will be appealing to the young learners.

Despite its simple appearance, folktales address themes and issues that are profound for all humanity. It touches on psychologically significant themes of honesty, kindness, generosity, jealousy, arrogance, greed, and so forth. The themes and issues raised in oral tales can be significant for all ages past and present and all humanity, making them suitable for language learners of all age groups [4]. However, critics have examined folklore as ancient, old fashioned, rural, peasant, uneducated, dying out and fundamentally dismissive. Against this backdrop, some critics limit the genres of folklore to three basic forms of narratives such as myth, folktales, and legends. In addition, in this period where technology is king, a folktale is a precious heritage that has to be safeguarded to avoid complete disappearance consumed by globalisation and profit-making entertainment [5]. To worsen the matter, the younger generation also have dismissed the idea of reading books of ancient folk tales especially of the ones which consist of different social values and cultural beliefs. [6] There are several factors. Hence, it is the responsibility of the researchers to ensure a paradigm shift in promoting folklores through innovation especially in introducing the folktales in ESL classrooms using a virtual medium such as a virtual storytelling, e book and e language activities.

Even though folktales serve as a source for creative inspiration that leads to the emergence of several works in modern literature, these sterling qualities of folktales are endangered with extinction. The invaluable oral traditions are in danger of extinction soon due to the sweeping forces of globalization and commercial entertainment. The need therefore arises for an interface

between the folktale genre and the media where the latter intervenes in the promotion of the genre for its sustenance in society.

Thus, the present project has utilised a folktale from the Semai indigenous entitled The Legend of Cen Cemana in ESL classroom. The story has been translated into simple English language to cater to upper Primary and lower Secondary school students. Realizing the concept of oral stories, which still have features of oral language which make them more suitable for a storyteller to tell them orally and face-to-face with an audience, The ESL language package includes the folktale of The Legend of Cen Cemana in a form of a virtual puppet show, an e book and interactive language activities.

Purpose/Aim

This project was initiated for four major purposes which are;

- To introduce Semai folktales to ESL students.
- To acknowledge Semai folktale as national heritage.
- To educate the younger generation about the indigenous folktale.

To preserve the cultural and heritage of the indigenous Semai through the teaching and learning of English Language in a fun, interactive and creative ways. Another purpose is to educate the younger generation and to value and respect multiculturalism and to practice the good deeds instilled in such stories.

Significance

An English Learning package which includes a virtual puppet show accompanied with a colourful E-story book with language enrichment activities were produced by the researchers with the aim to allow the younger learners to learn English language in fun and interactive ways. In English language classes, tales from any culture translated into English can be useful for beginners to learn simple grammatical features, such as simple past and present tenses, coordinating connectors like “and” and “but”. Being the closest to the oral tradition, the language of folktales will be less complex than the language of academic writing. For example, folktales rarely include phrases like “notwithstanding the fact that” [4]. The fairly simple grammar and language use in folktales makes them practical for the beginners as they will find these texts easier to process.

Methodology

In this Ethnography research, the researcher has gathered a legendary story from the elderly Semai people through a snowball sampling technique. The original story has been transcribed verbatim from Semai language into English language for teaching and learning purposes. The Legend of Cen Cemana is amongst the fascinating stories analysed to discover about the Semai beliefs and cultural heritage as well as the universal values like “keeping promises” and “be careful of strangers”.

The translated version of the folktale has been developed into a virtual storytelling and e-book accompanied with interactive English Language activities for ESL learners. A group of ESL students from primary and secondary schools were chosen to pilot study with the project.

After the project ended, the students were asked to answer a short survey pertaining to their experience and opinion using the English Language Learning package

Findings/Results

The feedback from the students revealed their interest in the Semai folktales and they have obtained positive knowledge and tremendous experience during the learning process using the package. Throughout the process the students have learnt a lot about English language skills such as writing, speaking, reading and listening especially while doing the activities. It was observed that students stand to benefit from lessons derivable from folktales.

The main objectives of this research are to identify students' perceptions of language learning using Semai Folktale and students' perception on the use of the virtual ESL language learning package.

Research Question 1: Language Learning via Semai Folktale

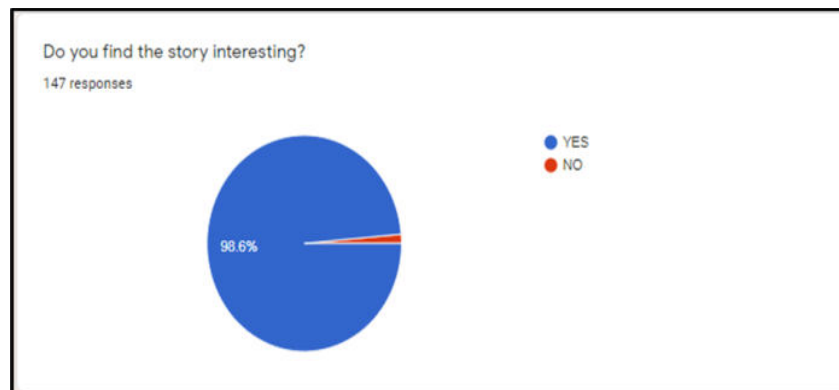


Figure 1: Do you find the story interesting?

The first question requires the students to answer Yes or No on whether they find the short story as interesting. 98.6 % responded Yes compared to No. This shows that the students enjoyed watching the virtual puppet show entitled The Legend of Cen Cema. Then, the students were required to answer a subsequent question which is related to the previous question. Students were asked to give their reasons why they chose Yes or No on whether they find the short story interesting.

Table 1: The reasons of Yes answers

Themes	Students' Feedbacks
The short story is enjoyable due to its storyline.	<ul style="list-style-type: none"> • <i>The story interesting because Atok Ha Laq is brave when he deal with teloche to leave Bahluit body.</i> • <i>Because the short story has an interesting storyline makes me more interested in reading it.</i> • <i>Interesting story and definitely will use it to tell others.</i>
<p>The short story enriches the students with new knowledge</p> <p>The short story teaches the students regarding indigenous culture, tradition and mythical stories</p>	<ul style="list-style-type: none"> • <i>because it helps me to gain more knowledge.</i> • <i>because i can learn so much knowledge from there.</i> • <i>Because it expose me with new informations.</i> • <i>It a tradition story where there are taboo that need to be followed.</i> • <i>Because through the story, I can get to know more about the cultures and races that exists in our country.</i> • <i>Because we can learn about others culture</i>
The short story depicts moral values	<ul style="list-style-type: none"> • <i>because it helps me to always be careful on the things that i am doing.</i> • <i>Because I learn many values from the stories.</i> • <i>I think the story is interesting because the story give me many moral values.</i>
The short story has different themes compared to other short story	<ul style="list-style-type: none"> • <i>the story have attractive character</i> • <i>It is about ghost.</i> • <i>Because it's creepy</i>
The short story improves the students' language learning	<ul style="list-style-type: none"> • <i>it can improve my english skill</i> • <i>because easy to understand</i> • <i>the story is easy to understand it</i>
Invalid answers	<ul style="list-style-type: none"> • <i>Because it is a method for experienced and trustworthy "knowledge keepers" to impart knowledge of the mind, body, and soul in relation to the environment.</i> • <i>it can attract people to cycling and it also give benefits for our health</i>

98.6 % responded Yes, the students replied with various answers in which these positive feedbacks have been classified into several themes. These positive themes are identified as follow.

Table 2: Themes for Research Question 1

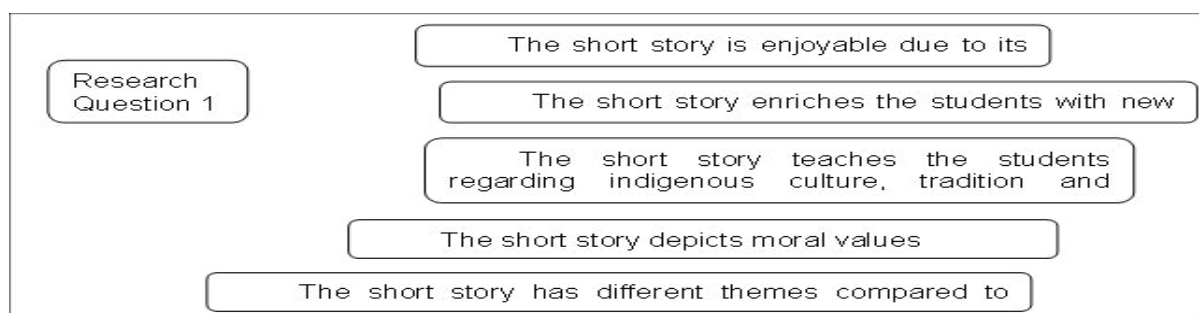
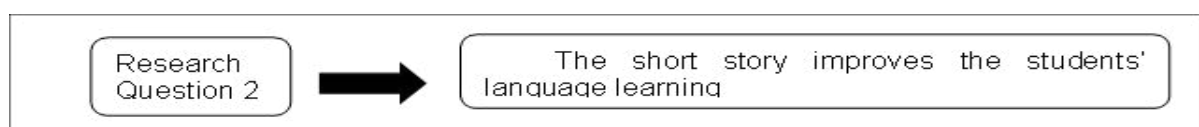


Table 3: Themes for Research Question 2



According to Table 3, the themes stated in the table answered Research Question No 1. Meanwhile, Table 3 indicates only one theme reflected in Research Question 2. Though the themes analysed were derived for Research Question 1 however, the analysis has shown a positive relationship between Semai tribe short stories with language learning. Thus, these themes indicate that the students received positive effects while using the virtual language learning package (the virtual puppet show, the e book of Semai and ESL language activities) in ESL classrooms.

INNOVATION DEVELOPMENT

The aim of producing an ESL Learning Package which includes a virtual The Legend of Cen Cemana puppet show, e book entitled The Legend of Cen Cemana accompanied with English Language activities are developed for ESL learners in Primary and Secondary schools. The innovative package is tailored to appeal to the current generation's consumer interests and lifestyles. The project helps to promote the folktales of the indigenous Semai in a way that can attract the young Semai to learn the priceless cultures and values of their tribe in one hand and learn the English language on the other hand by doing the interactive activities prepared in the application related to the virtual puppet show they have watched. With the immense popularity of social networking and technology, it is high time to develop a high-tech edutainment product for the young learners to quench their thirst for knowledge. This interesting and fascinating product design is aligned with the 21st century teaching and learning a language as it can be used in the classroom as technology-based language enrichment activities.

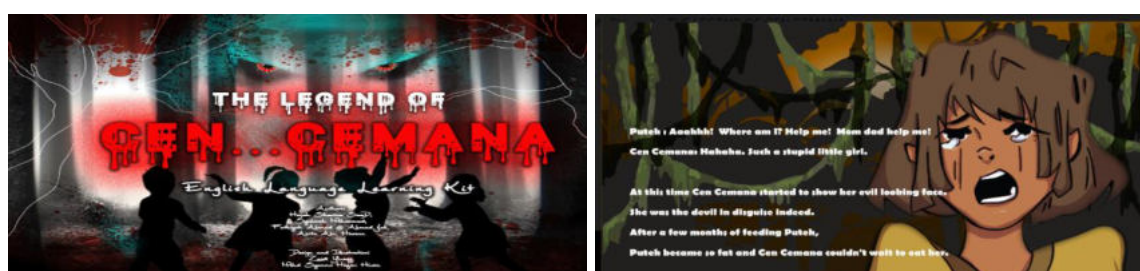
The innovative Language Learning Package includes:

- 1) A virtual puppet show entitled The Legend of Cen Cemana



Figure 2: A virtual puppet show entitled The Legend of Cen Cemana

- 2) The Legend of Cen Cemana e-book



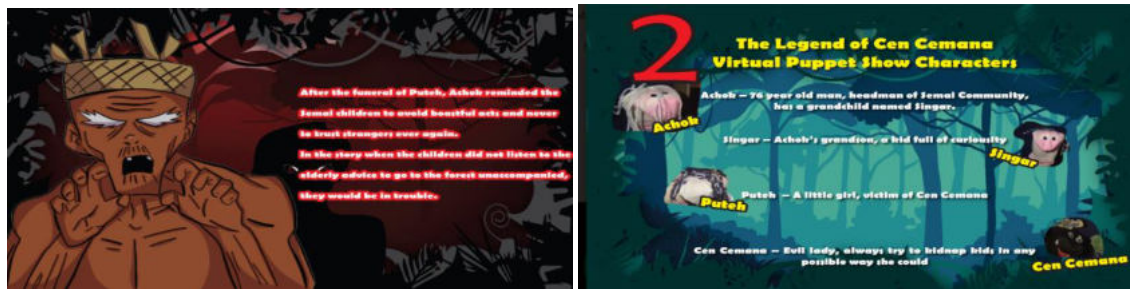


Figure 3: The Legend of Cen Cemana e-book

3) English Language Activities

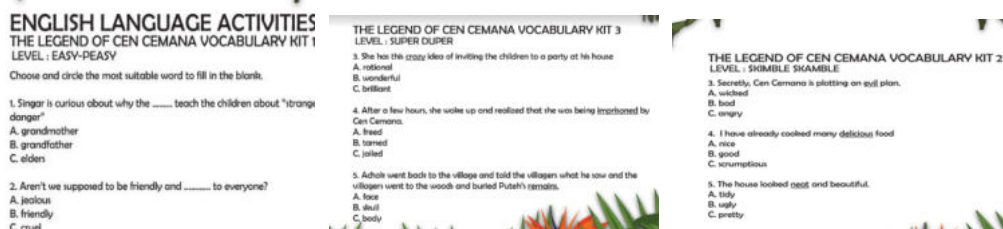


Figure 4: Vocabulary

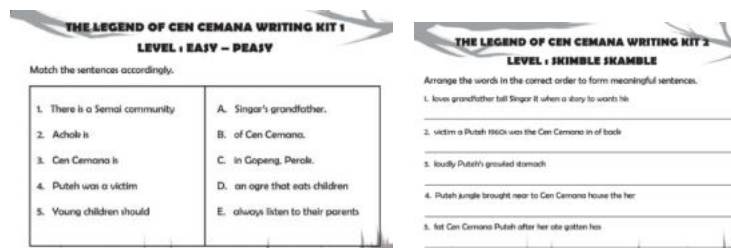


Figure 5: Writing

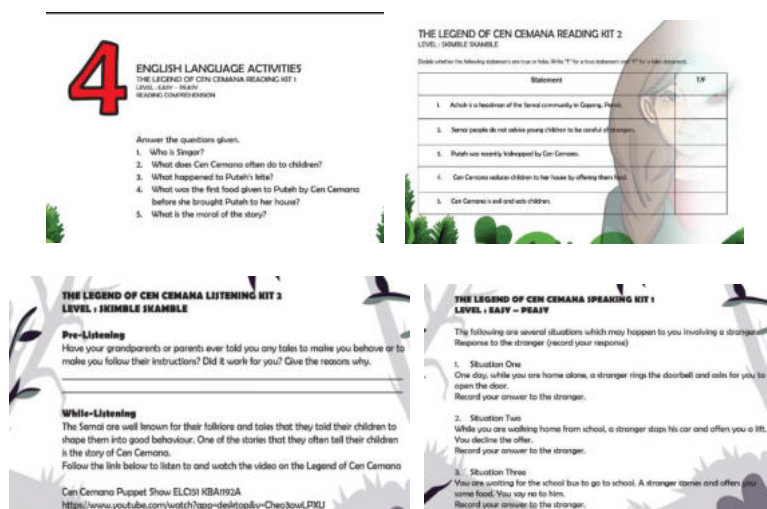


Figure 6: Listening and Speaking

Using language to analyse, evaluate, justify, etc. is a skill closely associated with academic discourse, and it is often one of the important aims of language learning. When done orally in the target language, folktales can serve as a springboard for such task-based talk among learners, which in turn can support their acquisition of the language. Learners can also be given

opportunities to compare, analyse, evaluate, and justify their responses in listening, speaking, reading, writing and vocabulary activities.

COMMERCIALIZATION POTENTIAL

Characteristics

The package is an English Language Enrichment Materials which is a demand in ESL teaching and learning. It benefits in several areas such as:

Education

The ESL learning package can assist ESL learners.

English Language Enrichment Materials

The enrichment activities with interactive application would help the Semai children and those interested in such stories to enjoy the stories and learn English language.

Documentary

The language learning package is a source of documentation of the Semai people way of life, historical issues, and cultural values.

Entertainment

The English language learning package about our own aboriginal tribe can be a source of entertainment. (Virtual puppet show, e book and language activities)



Figure 7: Commercialization potential

Impact Towards Society and Humanity

To eradicate misunderstanding among the society at large on Semai's way of life as they are now exposed to technology and social media and deserve a proper education. Boost social skills and English proficiency

Most stories embody the hopes and aspirations of the majority of the people in the society and are used to transmit and preserve the cultural values of the group

Folklore is also told in order to educate children into cultural values of the society as well as give them motivation and a sense of wellbeing.

To promote Semai's unique cultures, language and values as alternative to western values portrayed in the fairytales.

CONCLUSION/IMPLICATIONS FOR RESEARCH/POLICY

Folktales contain local wisdoms that reflect a number of cultural system information such as philosophies, values, and norms [7] Moreover, the tales have the power to transfer local wisdom, influence people's perception, behavior and attitude [8]. Similarly, the folklores of the Semai people are testimonies to the importance that elders invest in the teaching of Semai traditional beliefs and to nurture a greater sense of Semai's self-identity, hopes and aspirations of most of the people in the society and are used to transmit and preserve the cultural values of the group. Clearly, this paper provides a brief analysis of the traditional values transmitted by Semai folktales and the functions served by local legends and myths in ESL teaching and learning. Finally, this paper offers some practical recommendations for collecting our folktales, myths, and legends in the form of text, audio, and video using the currently available digital technology to create the first comprehensive and dynamic "Semai Folktales Online Database". Obviously, the project was one of the initiatives to preserve the folktale and the indigenous Semai rich culture and heritage. It is also an initiative to produce many references for the younger generations. Educators, and people in creative industries have to collaborate to put some effort into preserving folktales by holding storytelling events, publishing children folktale books and/or interactive e-books, and even producing movies. The unique cultures and the highly aesthetic values of the Semai are not to be hidden but to be revealed and promoted as additional reading materials for public use and in classrooms. Thus, this study has a lot of contributions to national heritage and the body of knowledge.

ACKNOWLEDGEMENT

Special thanks to Jabatan Kemajuan Orang Asli Perak, Bah Sermo and Pak Appa from Pos Dipang Orang Asli Semai settlement who have dedicatedly assisted in this research endeavour. The research is dedicated to the young generation to quench their thirst for knowledge.

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Safety Testing of Level 3 Autonomous Vehicle with Human-in-the-Loop Interface

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ABSTRACT

The testing of autonomous vehicle in Malaysia is a field-based testing which brings high cost and safety risks. To provide a solution, this project focuses on interfacing human-in-the-loop system with the vehicle dynamic and environment model, developing the advanced driving assistance system (ADAS) as plug-in model in vehicle driving simulator as well as investigating the human-in-the-loop performance using vehicle driving simulator based on various driving scenarios. The software used in this project are IPG CarMaker and MATLAB. Two Malaysia-based vehicle models and five environment models based on five different locations in Malaysia were developed. Three Advanced driver-assistance systems (ADAS) controller was used as plug-ins into the simulation testing. Then, twelve different test cases focusing on ADAS such as Automated Emergency Braking (AEB), Adaptive Cruise Control and Lane Keeping Assisted System were developed, and test case automation was also part of the research for this project. In order to accommodate the automated driving scenarios, a driving platform was then built and integrated into IPG CarMaker, the driving platform consists of a test rig with total weight of 35kg, with dimension such 100cm length, width of 53cm and height of 50cm. The driving platform is integrated with Logitech gear shifter, pedals and steering kit. The special features of this for this project is the system integration of the hardware components from Logitech with IPG CarMaker driving simulation software by establishing Application Programming Interface (API) using Phyton as the interface medium. Through this interface, the human responses can be recorded and applied in the driving simulator during critical driving conditions. Other special features for this project are the virtual test case development based on the actual driving scenario happens in Klang Valley area, which is highly congested with traffic conditions.

Keywords: Human-in-the-loop; virtual safety testing; autonomous vehicle; urban environment; Malaysian road; traffic environment

INTRODUCTION

Autonomous vehicles have become one of the key solutions to overcome adverse traffic conditions in most of the countries [1, 2]. This upcoming technology is aimed to decrease traffic congestion and road accidents in developing countries [2], such as Malaysia. Recently, Malaysian 7th Prime Minister has stated in the National Automotive Policy 2020 that one of the major focuses in this policy will be the digital industrial transformation from 2020 to 2030 in automotive industries [3]. This policy will enable the automotive industries to focus more on development and deployment of Level 3 and Level 4 autonomous vehicles in Malaysia. However, a proper safety testing platform with integrated human-in-the-loop (HiL) is required to achieve this policy. The purpose of this platform is to evaluate the performance of the Level 3 autonomous vehicle that adapts to Malaysian roads and traffic environments as well as to minimize road accidents [4].

The Human-in-the-Loop (HiL) is used basically to investigate the human-machine-interface for safety testing of autonomous vehicle using driving simulator [5, 6]. The HiL is used as the study the human response while driving in simulated environment which represents actual road traffic conditions and as an approach to take control the Level 3 autonomous vehicle during critical driving conditions. Hence, a safety testing platform framework for autonomous vehicle using HiL for simulated Malaysian environment is developed in this project. The performance of the autonomous vehicle will be evaluated based on safety assessment criteria to minimize the road accidents. Besides, the platform can be used to supervise autonomous vehicles that developed from other countries to adapt with Malaysian roads and traffic scenarios.

In this project, the main goal of this study is focused on the system configuration of human-in-the-loop simulation testing to evaluate the performance of autonomous vehicle using a 3D virtual vehicle driving platform. This system configuration is focused on generation and collection of human's driving data up to safety testing of the controllers developed in critical scenarios in the virtual platform. The proposed solution could be one of the new breakthroughs for automotive industries in Malaysia to encourage more Level 3 autonomous vehicle to be deployed in Malaysia. The safety testing platform integrated human-in-the-loop configuration could provide supports for the local agency such as Malaysian Road Safety and Research (MIROS) to conduct the safety testing evaluation virtually before on-road deployment of autonomous vehicle in Malaysia. This will create huge impact to socio-economic about human driving behaviors and investigate their driving pattern which leads to road accidents and used it as the benchmark to enhance performance of autonomous vehicle for Malaysian environment.

INNOVATION DEVELOPMENT

The high-level overview of the virtual platform is illustrated in Figure 1. IPG CarMaker is the main component in the architecture as it provides the 3D virtual environment, vehicle dynamic modelling and sensors simulation. Simulink is used to design sub-models and algorithm such as ADAS controller and driver models, which can then integrate them in the CarMaker [7]. In this project, Simulink model is used to create an interface of Logitech G29 Driving Force Steering Wheel and Pedals kit to CarMaker. Meanwhile, Python programming is used in this study to read data and send control command to the ego vehicle. Furthermore, video stream of the virtual camera on an ego vehicle from CarMaker also been captured using Python and this is important for vision-based autonomous driving vehicle.

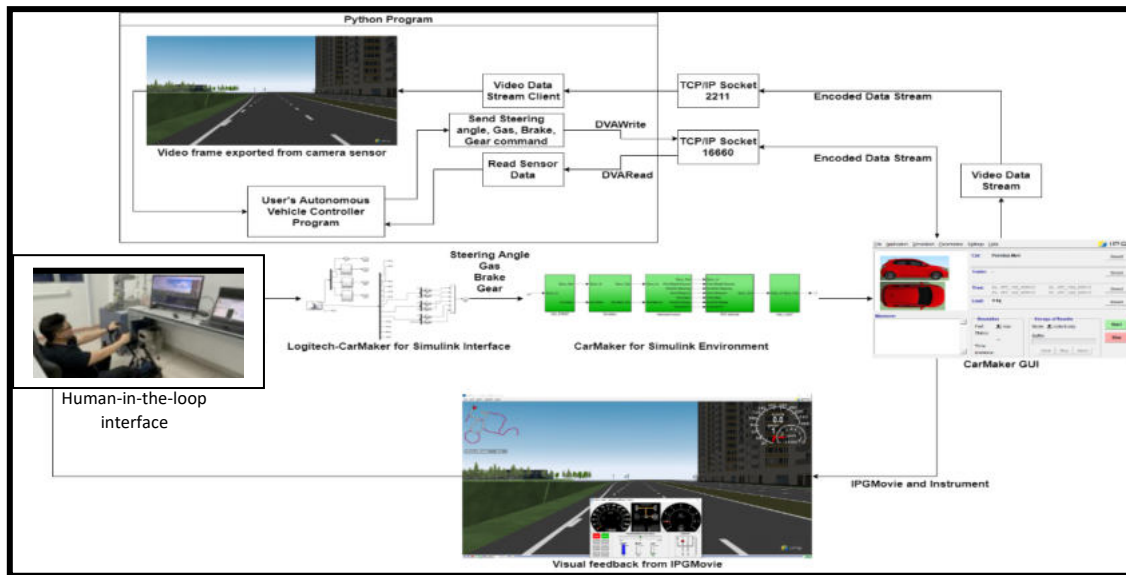


Figure 1: Virtual platform architecture using Simulink and Python [8]

Hardware-In-The-Loop Interface in IPG CarMaker

In this project, instead of developing the autonomous vehicle controller, an integration of external driver model into the IPG CarMaker software only is mainly focused. This is to ensure that the autonomous vehicle able to receive driving inputs from the human driver during emergency takeover conditions. In order to achieve this goal, a human interface hardware device is required to allow human's control over the software. The hardware device used is the Logitech G29 Driving Force Steering Wheels and Pedals to enable human control of vehicle steering angle, gear, gas pedal position and brake pedal position as shown in Figure 2. The Steering wheel allows 900 degrees lock-to-lock rotation and force feedback to provide realistic driving experience. This is important to ensure that the human's action data collected when driving in the simulator are close to actual actions taken by same driver while driving in real life environment.



Figure 2: Logitech G29 Driving Force Steering Wheel, Pedals and Gear Shifter

To interface the Logitech G29 kit to IPG CarMaker, a Simulink model that maps the control signals from the Logitech G29 kit need to be developed. The control signals are channeled into steering angle, gear, gas pedal and brake pedal signals in the IPG CarMaker. In general, IPG CarMaker used built-in driver model, known as IPG Driver to drive the virtual vehicle. In order to bypass the IPG Driver and use external driver's control input, the output of

the default IPG's Simulink driver model is replaced with the corresponding outputs of the external driver model, as shown in Figure 3.

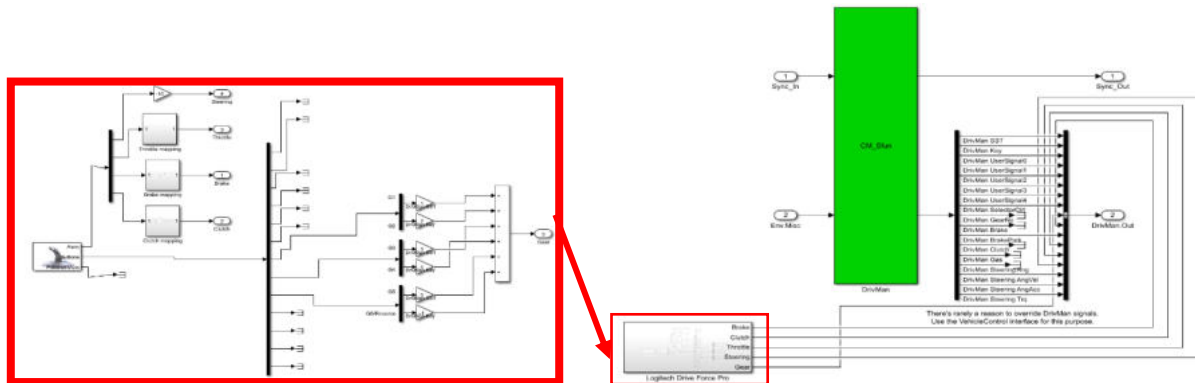


Figure 3: Logitech G29 interface with CarMaker for Simulink [8]

Human-In-The-Loop Simulation Architecture using Python

Simulink is not as convenient as Python when comes to developing machine learning based self-driving model prototypes. This is mainly because Python more powerful and easy to use libraries such as TensorFlow and PyTorch, which have vast community resources and supports. However, there is no direct method to integrate Python with IPG CarMaker such as shown in IPG CarMaker for Simulink. However, IPG CarMaker allows using TCP/IP sockets for communication. Thus, by establishing a TCP/IP bridge between the IPG CarMaker and the Python program, the program can access and manipulate the quantities in IPG CarMaker via Direct Variable Access (DVA) during simulation. Once the TCP/IP bridge is established, the program can write the value of a quantity by simply transmitting a DVAGet message encoded with the name of the quantity, duration and the desired parameters' values to IPG CarMaker. Whereas to read a quantity can be done easily by simply sending a DVAGet message encoded with the name of the quantities. Then, IPG CarMaker will return the instantaneous value of quantity specified as shown in Figure 4.

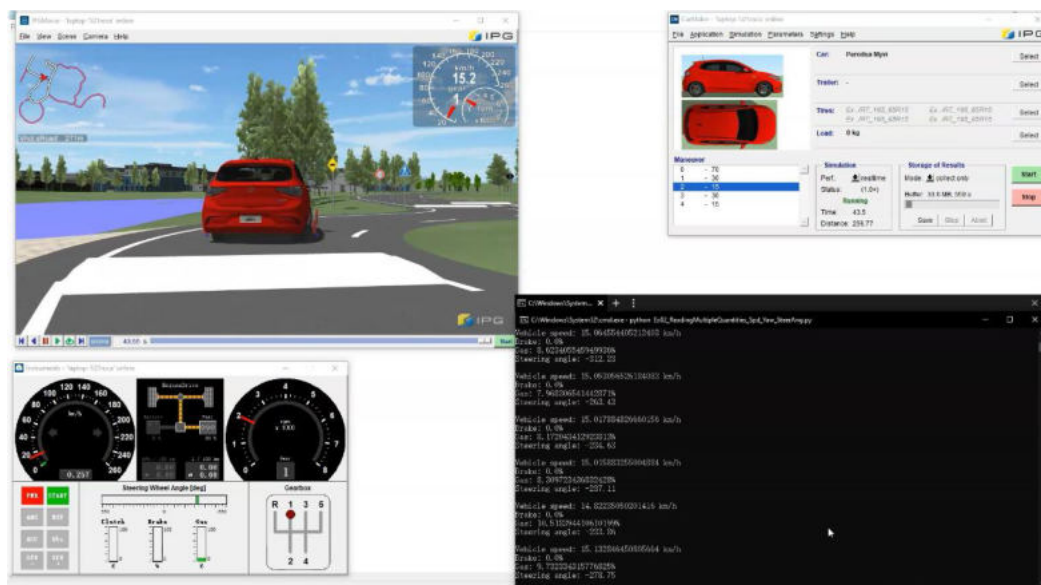


Figure 4: Reading vehicle speed, brake pedal, gas pedal and steering angle quantities from IPG CarMaker using Python [8]

Besides accessing and manipulating the quantities of IPG CarMaker, Video Data Stream (VDS) generated by virtual camera mounted on the ego vehicle can be exported over TCP/IP and read by Python program, which is very important for vision-based autonomous vehicle controllers that take in images as data input. Unlike accessing the quantities of the IPG CarMaker, a configuration file for IPGMovie is required before using the VDS to define the TCP/IP socket for streaming and camera's configuration such as resolution, framerate, relative distance and orientation of the camera [7]. Python is used to decode and extract the image data from the VDS received. Once the image data is extracted, the image data is reshaped into RGB three color channels image based on the width and height information decoded from the header information string. Finally, the image can be used according to user's requirement such as feeding into a vision-based controller's input and displaying on the screen using OpenCV library.

NOVELTY AND BENEFITS

The uniqueness of this developed product is the ability to integrate with human response during driving conditions in 3D scenarios based on the Malaysian road network. Other than that, this product also able to generate the traffic flow model based on Malaysian traffic conditions which is used for the virtual simulation testing. The developed environment models are selected based on Malaysian road and traffic network mainly for testing Level 3 autonomous vehicle. In order to evaluate various test cases in a shorter period time, test case automation has been established for simulation testing based on various driving and traffic conditions based on actual scenarios in Malaysia. This will enhance testing capacity of the Level 3 autonomous vehicle in very effective way without increasing cost and testing period. The developed driving simulator has the potential in marketability and commercialization in automotive industries. The developed system can be used as the safety testing tool for new technology development focusing on Level 3 and Level 4 autonomous vehicle. Besides, this product has the potential to apply as a tool to investigate human driving behaviors which represents actual human drivers in Malaysia. The driving data can be used for development of driver prediction model which supports for the safety testing of autonomous vehicle for Malaysian road conditions.

COMMERCIAL POTENTIAL

The target market for this project can focus three aspect which is research area, testing and training purpose related to safety testing for Level 3 autonomous vehicle. In terms of research area, the developed system will be useful to evaluate the performance of Level 3 autonomous vehicle developed by local researchers and manufactures in Malaysia. This will support their effort to develop and deploy autonomous vehicle safely in Malaysian road and traffic environment. On the other side, this product also will be helpful as testing facility for government agencies such as MIROS to evaluate the response of autonomous vehicle by local or overseas developers before providing approval for on-road testing in Malaysia. Meanwhile, the proposed platform can be used as the training facility for the drivers who are required to handle the Level 3 Autonomous Vehicles (AV). This is mainly to train the driver to handle critical scenarios which could not be handled by the (AV) and the driver should make emergency decision to control the vehicle to avoid any road casualties. Various types of critical test cases based on actual scenarios from Malaysian road environment will be used to evaluate the credibility of the driver before approving them as official AV's drivers.

CONCLUSION

It can be concluded that an end-to-end virtual simulation platform that can be used for human's driving data collection and testing Level 3 autonomous vehicle's safety system. The system is developed by integrating the IPG CarMaker with Simulink and Logitech G29 Driving Force Steering Wheel and Pedals kit. Using this driving interface, the virtual vehicle can be driven by human on a virtual road network created based on actual road environment. The data collected also can be successfully stored in file for further usage. In addition, we have also shown that Python can be used to deploy machine learning algorithm with IPG CarMaker. Therefore, this virtual simulation platform developed will ease the development of autonomous vehicle and improve safety testing reliability.

ACKNOWLEDGEMENT

This work is part of the research project entitled "Vehicle-in-the-loop Safety Testing Platform for Autonomous Vehicle using Malaysian Road and Traffic Environment". This research is fully supported by Yayasan Tun Ismail Mohamed Ali Berdaftar (YTI) under Permodalan Nasional Berhad and the grant is led by Assistant Professor Dr. Vimal Rau Aparow. The team would like to thank University of Nottingham Malaysia for continuous support to conduct research in this area.

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DUAL-ANTIBAX (Organo-Metal-Clay) Antibacterial Cream

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ABSTRACT

The issue increases when germs or bacteria infiltrate the skin, resulting in an infected skin problem. The cost structure of treatment is similar to that of an iceberg, with material expenses accounting for 20% of the total and nursing and hospitalisation costs accounting for the remaining (bottom of the iceberg). As a result, it's vital to keep the skin problem from getting worse, particularly in Malaysia, where the tropical temperature favours bacterial growth. The most common treatment for skin disorders is antibiotic or hormone cream, which may be bought from clinics and pharmacies. Bacterial resistance, on the other hand, is caused by antibiotics. As a result, you can use the Dual-Antibax cream instead of these creams. There are two (dual) antibacterial agents in the Dual-Antibax cream: silver ions and a surfactant in a kaolinite carrier system. The kaolinite is employed as a carrier system for these two antibacterial agents, allowing them to be used in smaller doses while maintaining excellent efficacy. Dual-Antibax cream is a carrier system that comprises Dual-Antibax powder, which contains two antibacterial agents. The cream can be used to treat or prevent bacterial growth in certain skin disorders. Utility invention (UI2013700023) has been granted to the Dual-Antibax manufacturing process, which is now in the market-ready prototype stage. The claim in the intellectual property right (IPR) that there are two processes for Dual-Antibax manufacturing: (1) silver-kaolinite manufacture, and subsequently (2) surfactant attachment, establishes the uniqueness. The immediate effect for skin problem treatment with high efficacy and low cost, safe for humans, and based on a strong scientific approach is the product's value proposition. The cream's concept is akin to that of a cosmetic rather than a traditional therapeutic product in order to establish a bigger market size. The product will soon be available in a variety of market areas, including infant, health and beauty, and pet care goods.

Keywords: Antibacterial cream; kaolinite; silver; surfactant

INTRODUCTION

Once infected by bacteria, skin problems such as rashes, eczema, and others can become more severe and infectious. Because some pathogenic bacteria are resistant to antibiotics and antibacterial agents, treating infected skin is a serious concern in clinical practise today [1]. As a result, silver (Ag)-based products like silver nanoparticles and silver sulfadiazine could be

utilised to cure infection or prevent bacterial growth on the skin [2]. Overdosing on silver, on the other hand, can be hazardous to humans [3]. Silver nanoparticles, on the other hand, will cause mitochondrial collapse and DNA damage due to their smaller particle sizes and capacity to create reactive oxygen species (ROS) [4]. The essential aim of any antibacterial related material is the use of antimicrobial agents without compromising skin condition. As a result, it's critical to utilise an antibacterial agent that can prevent or destroy hazardous microbes while still being safe for human skin.

Silver, in the form of silver ions, has been shown to exhibit antibacterial properties, as well as favourable conductivity, stability, and activity, making it suitable for loading in a carrier system such as minerals clay kaolinite [5] or zeolite [6]. As a result, one of the alternative antibacterial agents is to use a silver-based solution, which has a broad-spectrum antibacterial action and the ability to kill bacteria on the skin. Various natural resources, such as herbs, honey, and, most crucially, clay, have been used to cure injuries or wounds since ancient times [7].

Due to its antibacterial activity against a broad spectrum of bacteria and synergistic impact with other chemicals [1, 8], silver-based products have become a very good antibacterial agent in recent decades. Silver has been shown to bind to the bacterial cell wall, cytoplasm, and inactive bacterial DNA, killing the bacterium as a result [9]. Clay's antibacterial activity could be improved by modifying it with silver. It can be protected from degradation and deliver a greater dosage at the site in a precise manner by immobilising on an appropriate carrier system. As a result, even if just a small amount of the antibacterial agent is used, its action is increased. The cationic surfactant quaternary ammonium compound is another antibacterial agent with antibacterial action (QAC). Hexadecyltrimethyl ammonium bromide (HDTMA), for example, has high affinity for electrolytes and can also limit bacterial biofilm formation and development [10].

As a result, this invention is concerned with the use of organo(HDTMA)-modified kaolinite (clay) as an antibacterial cream. The organo-silver-kaolinite, which is a modified kaolinite with two antibacterial agents, was made in a stepwise procedure: first, the silver-kaolinite was made by loading silver ions with half (50%) of the cation exchange capacity (CEC) of the kaolinite, and then the silver-kaolinite was attached with HDTMA at an initial concentration of 2.0 mM, which is slightly higher than its critical micelle concentration (CMC) value. The HDTMA molecules will attach to the silver-kaolinite surfaces, resulting in organic rich surfaces, which is why the modified clay is known as organo-metal-clay. The silver ions are situated inside the kaolinite [5] and then covered by HDTMA molecules at the exterior sites of the kaolinite surfaces [11], which makes this material unique. This could maximise the antibacterial potential of both antibacterial chemicals.

INNOVATION DEVELOPMENT

If we have a skin problem like rashes or eczema, we will visit a clinic or a pharmacy to obtain a pharmaceutical solution, and we expect rapid results. However, due of the problem of bacterial resistance to antibiotics, most of the products contain antibiotics, steroids, or hormones, which can either cure or worsen the condition. Aside from that, avoiding bacteria development on the skin is critical in preventing an infected skin disease from worsening. Furthermore, the true cost of treating infected skin problems is like an iceberg, with nursing and hospitalisation costs accounting for 90% of the total. As a result, Dual-Antibax cream, which contains two antibacterial agents in a carrier system, can prevent our skin from becoming infected or becoming more severe. Dual-Antibax cream is a topical cream that contains the

active component Dual-Antibax powder. The Dual-Antibax powder is a hybrid organic-inorganic substance that combines surfactant, an organic molecule, with silver ions, an inorganic ion, in a natural kaolinite carrier system. The Dual-Antibax cream contains potassium cornate, *Melaleuca alternifolia* (tea tree) leaf oil, *Oryza sativa* (Rice) bran oil, modified kaolin, salicylic acid, honey, and phenoxyethanol.



Figure 1: Picture of the Dual-Antibax cream.

The Dual-Antibax cream's uniqueness is based on the intellectual property given by the Malaysian Intellectual Property Corporation (MyIPO) under Utility Innovation [12]. The Dual-Antibax is made up of two important processes that make it a one-of-a-kind product:

Attaching to the clay by cation exchange a metal selected from silver, copper, zinc and their mixtures in an amount corresponding to 40-60 %, more preferably to less than 50 %, of the cation exchange capacity of the clay, thereby producing a metal-clay

Attaching to the metal-clay by cation exchange at least one quaternary ammonium compound by addition of excess amount of the quaternary ammonium compound, thereby producing an organo-metal-clay, which is the antibacterial agent.

Because there are two antibacterial agents in a carrier system in the Dual-Antibax as active ingredients, the degree of inventiveness is very high. The Dual-Antibax contains a small amount of silver ions, but it is quite effective at preventing bacteria development. This is because silver ions and surfactant, as an antibacterial agent, have synergistic effects. The use of two antibacterial agents which are silver ions and surfactant (HDTMA) are the antibacterial agents in a carrier system is the innovative concept.

The foundation of technological innovation is a solid fundamental principle. Dual-Antibax was discovered as a result of our study and experimentation at the Nanomaterials Laboratory, Department of Biosciences, Faculty of Science, UTM. To prepare this material, we must first determine the kaolinite's Cation Exchange Capacity (CEC), after which the silver ions are loaded to fill half of the place in the kaolinite. The surfactant molecules are then bonded to the silver-kaolinite surface. Based on this process, the amount of silver ions can be lowered by the attachment of the surfactant and nevertheless, it has excellent antibacterial activity. Figure 2 shows theoretical mechanism of formation of organo-metal-clay (Dual-Antibax) which is the attachment of surfactant on silver loaded kaolinite.

Two papers related to the invention development are listed here:

- 1) Muhammad Hariz Asraf, Atieya Abdul Hadi, Faisal Hussin, Nik Ahmad Nizam Nik Malek (2020). Antibacterial Metal-Loaded Kaolinites and Zeolites. In Nik Ahmad

Nizam Nik Malek (Ed) (2020). Antibacterial Agents (pp. 81-100). Johor Bahru: Penerbit UTM Press.

- 2) Muhammad Hariz Asraf and Nik Ahmad Nizam Nik Malek. Effect of Different HDTMA Loading on Silver Modified Kaolinite on its Antibacterial Activity. AIP Conference Proceedings 2231 (2020) 0420003

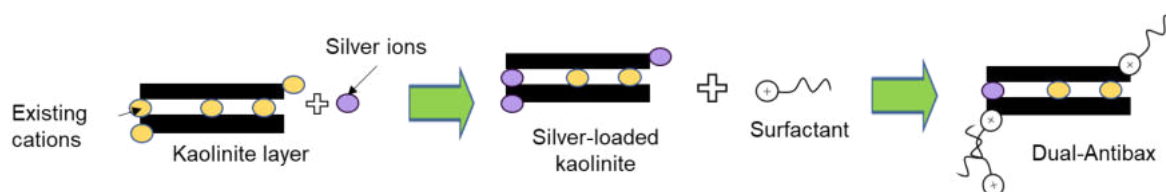


Figure 2: Theoretical mechanism of formation of organo-metal-clay

COMMERCIAL POTENTIAL

The use of Dual-Antibax cream on skin problems to prevent bacterial growth is highly relevant to Malaysia's geographical conditions. Malaysia is a tropical country with high humidity and temperatures, allowing microorganisms to thrive. Bad microbes can wreak havoc on our skin. As a result, by applying Dual-Antibax cream to the skin problem area, we can prevent our skin problem from worsening.

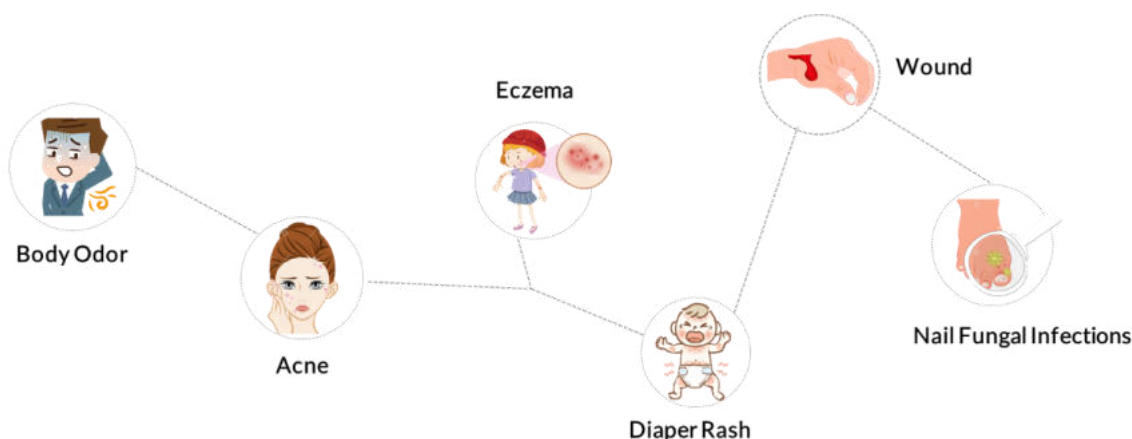


Figure 3: Technology application of the Dual-Antibax cream

Dual-Antibax cream is a biocompatible antibacterial agent that combines products for human skin's health and appearance. The skin care products market in Malaysia was valued \$804.5 million in 2019 and is predicted to reach \$1,288.7 million by 2027. (Allied Market Research). The market is growing in a healthy direction. From 2019 to 2024, the global market for antimicrobial compounds is expected to be worth \$7 billion or more: Cosmetics and personal care items are increasingly containing antimicrobial agents (www.prnewswire.com). Everyone is looking for an effective antimicrobial agent because of COVID-19 and MCO, and the online marketplace is rapidly developing, allowing the Dual-Antibax cream to be offered on this platform. This product can be used by anyone with skin issues, including babies, toddlers, teenagers, and adults with skin issues and allergies, as well as diabetes patients and others.

When we compare Dual-Antibax cream to other antibacterial products on the market (Figure 4), we can see that the Dual-Antibax cream outperforms them. Most competitors in the

market utilise chemical antibiotics as active ingredients, while we use a low amount of surfactant and silver ions in a kaolinite substance in the Dual-Antibax cream. Antibiotics may cause bacterial resistance, rendering them ineffective and encouraging bacteria to become stronger.



Figure 4: Competition analysis

The Dual-Antibax product is simple to make, as it does not require high temperatures, energy, solvents, or sophisticated tools. Additionally, cosmetic-grade kaolinite is abundantly available in the area. In addition, the Dual-Antibax cream has a reduced production cost due to the lesser amount of silver and surfactant used. Due to synergistic effects, Dual-Antibax has been found to have strong antibacterial activity against a wide spectrum of bacteria (both Gram positive and Gram negative bacteria). It is simple to apply to the skin and has quick effects in terms of the customer. Dual-application Antibax's as a new antibacterial agent will help us learn more about hybrid organic-inorganic materials.

Dual-Antibax can save treatment expenses by inhibiting bacterial development and preventing skin diseases from worsening. The low-income group will benefit from this product because the cost of treating diseased skin diseases is a financial hardship for them. The Dual-Antibax cream can also be used in the event of a local crisis, such as a flood. Skin disorders caused by unhygienic circumstances and the environment can be prevented with the Dual-Antibax cream. Larger manufacturing locations and activity will be necessary due to the increasing demand for the Dual-Antibax product, creating job opportunities for our local talent. The usage of Dual-Antibax cream will open up a new market area for the treatment of skin issues using hybrid organic-inorganic components.

The development of Dual-Antibax cream has progressed to TRL6 since receiving prototype research fund from this project (Technology Readiness Level stage 6: Technology demonstrated in relevant environment). Before entering the commercialization stage, the Dual-Antibax cream must get multiple product certifications from relevant authorities (TRL7-TRL9). Furthermore, the production procedure for the active ingredient (Dual-Antibax powder) must

be perfected before it can be mass-marketed. ClayNiQ Enterprise will licensed the IPR and a joint venture (JV) will be formed to produce the Dual-Antibax powder. The product is scheduled to be sold this year, as it has already been approved by Malaysia's Ministry of Health (MoH). This product's commercialization approach is depicted in Figure 5. ClayNiQ Enterprise will enter into a licencing deal with UTM and manufacture Dual-Antibax powder. The cream will be produced and labelled by Biopro Consortium Sdn Bhd, an OEM business with a GMP (Good Manufacturing Practices) facility. Youbaby Millions Sdn Bhd and ClayRa Beauty and Health Enterprise would thereafter promote and distribute the cream. With this method, ClayNiQ Enterprise will have a better chance of finding other companies that are ideal for marketing and distribution for various market segments. Perhaps there will be products for pets such as cats and dogs in the future.

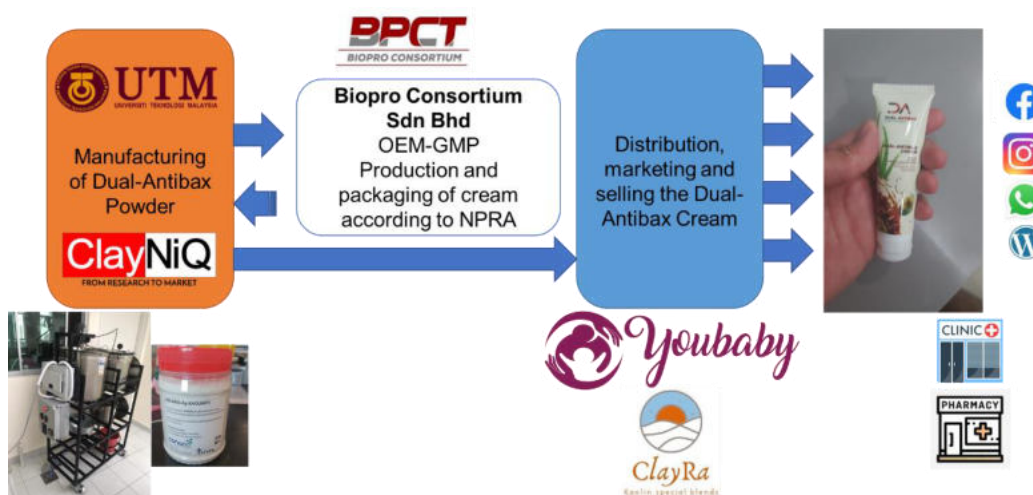


Figure 5: Commercialization strategy

CONCLUSION

Dual-Antibax cream is a novel antibacterial treatment for treating skin disorders. This product's innovation is based on Utility Innovation's claims, and it was produced using a rigorous scientific approach. The prototype development stage is complete, and the product is ready to be commercialised. Other novel items that can be developed from organo-metal-clay in the future include scrubs, facial masks, handwashes, shower creams, and other cosmetics.

ACKNOWLEDGEMENT

The inventor would like to that Ministry of Higher Education Malaysia and Universiti Teknologi Malaysia for several research grants including Prototype Research Grant Scheme (PRGS) Vot. No. 4L619, Prototype Development Fund (PDF2) Vot. No. 4J538, and Prototype Development Research Grant scheme-ICC (PRGS-ICC) Vot No. 4J442.

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SEZANNE: Green-Silver Nanoparticles-Zeolite Nanocomposite as Antibacterial Talcum Powder

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ABSTRACT

Malaysia, a tropical country with high humidity and temperatures, is a favourable environment for the growth of microorganisms. When harmful germs or bacteria infect the skin, the odour and quality of the skin can quickly deteriorate. These disorders can lead to unpleasant secondary complications, such as major skin problems that may require hospitalisation. The cost of hospitalisation is prohibitively high, putting a hardship on low-income families. As a result, controlling bacterial development on our bodies is important to treating the problem. It is possible to accomplish so by applying Sezanne to certain parts of our bodies, with silver nanoparticles (AgNP) deposited on zeolites performing the antibacterial function. Immobilizing AgNP on zeolite may also minimise the amount of AgNP used, resulting in less silver being discharged into the environment. The environmentally safe approach of making AgNP from plant extract could eventually replace the dangerous chemical process. Body odour and skin problems have an impact on our lifestyle and productivity, which can be alleviated by removing bad germs or bacteria from our skin. This can be accomplished with Sezanne, a green antibacterial chemical created after extensive research. A patent application (PI2020006064) has been filed for the process of creating a zeolite loaded with biosynthesized AgNP using plant extract, proving the composite's uniqueness. The plant extract is employed as a bioreducing agent in the synthesis of AgNP on zeolite surfaces. Based on in vitro human cell studies, this compound has considerable antibacterial action against common bacteria and is safe for humans. TRL4 (Technology Readiness Level 4) has been achieved, and some expenditure will be required. Because everyone is looking for an effective and ecologically friendly antimicrobial agent to help us maintain a healthy and clean lifestyle, which has also been impacted by the COVID-19 pandemic, the market is large.

Keywords: Silver nanoparticles; zeolite; biosynthesis; antibacterial

INTRODUCTION

Silver nanoparticles (AgNP) are widely used in the home and pharmaceutical industries as an antibacterial talcum powder, deodorant, and medical bandage active component. The antibacterial mechanism of AgNP was discovered to be linked to the release of silver ions (Ag^+) from the nanoparticles, which then killed the bacteria via Ag^+ action [1]. Despite AgNP's excellent antibacterial activity and efficacy, its widespread use leads to a growth in antibacterial resistance. In comparison to the wild type strain, a mutation in the porin protein of the bacteria *Escherichia coli* resulted in increased resistance to AgNP [2]. Bacterial resistance to an antibacterial agent may cause a secondary problem that must be addressed sooner rather than later. As a result, one strategy is to reduce AgNP usage while keeping its effectiveness. This can be accomplished by immobilising AgNP on inorganic materials like zeolite, a form of aluminosilicate with a high surface area, stability, and low toxicity [3]. Zeolite is a porous material with a variety of molecular size channels that allows it to perform specialised roles in catalysis, separation, and ion exchange [4], and these qualities are crucial for AgNP immobilisation. The combination of zeolite immobilised or functionalized with other components yields innovative materials with biological and medicinal uses. Unless it is treated with antibacterial chemicals, raw and unmodified zeolite cannot suppress bacterial growth.

The immobilisation of bio-green AgNP on synthesised zeolite utilising an in-situ reduction technique is the subject of this invention. In situ refers to the conversion of AgNPs from Ag^+ that took place inside the synthesised zeolite. It's a unique technique based on in situ Ag/zeolite synthesis with NaBH_4 as a chemical reducing agent [5]. Chemical reducing agents such as NaBH_4 and trisodium citrate ($\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$) have previously been associated with environmental hazards if improperly dumped. As a result, biological sources such as plants, microorganisms, and yeast can be used as a reducing agent in the synthesis process to make AgNP in a more environmentally friendly way [6]. As a result, the current study focuses on the application of *Orthosiphon aristatus*, a native herb, as a green reducing agent. The plant grows abundantly in Southeast Asia's tropical climates, including Thailand, Malaysia, and Indonesia, and it's used to treat renal disease, bladder inflammation, arthritis, and diabetes [7]. The antioxidant activity of the plant is attributed to phytochemical components in the plant extract, and this activity may also be responsible for the reduction of Ag^+ to Ag^0 (AgNP) [8].

The growing trend of using microorganisms and plants as resources in the green production of nanoparticles has opened up a world of possibilities for researchers. Plant extracts such as *Dodonaea viscosa* [9], *Polygonum minus* [10], and *Mikania micrantha* [11] have been used in numerous research to synthesise nanoparticles. Green syntheses are more biocompatible, scalable, and adaptable to a wide range of applications [12]. As a result, the goal of this invention is to immobilise AgNP on the zeolite by decreasing Ag^+ and generating AgNP inside the synthesised zeolite using an in-situ technique employing plant leaf extract. The substance is then combined with talc to create antimicrobial talcum.

INNOVATION DEVELOPMENT

Sezanne is a talcum powder with antibacterial properties that can be used to kill bacteria or prevent bacteria from growing on the skin. It can be used to treat skin conditions like eczema, rashes, acne, and other skin conditions. Sezanne is made up of AgNP that has been immobilised on zeolite. Plant extracts, such as extract misai kucing plant, are used to make AgNP, while zeolite is a mineral found in volcanic areas. Sezanne's originality and uniqueness are supported by the claims in the patent for the production technique of bio-AgNP-zeolite composite [13]. A method of making this composite, according to the claim, entails mixing zeolite with silver

nitrate to make silver-zeolite, then adding plant extract to the silver-zeolite to produce AgNP, which is then loaded into the zeolite [13].

This product has a very high level of originality. As previously stated, there are a few critical phases involved in the manufacture of AgNP-zeolite composites. This is done to ensure that the zeolite can trap the maximum number of silver ions in the zeolite structure before using the plant extract as a green and sustainable reducing agent to produce AgNP. The AgNP that has been synthesised using a green and sustainable manner can then be placed on the zeolite framework and its release can be controlled in this way. The development of the product is based on solid scientific concepts that we discovered in the lab. The experiment's findings were reported in the Q1 journal Particuology [14]. Figure 1 depicts key findings from the development of a bio-AgNP-zeolite nanocomposite. AgNP has been loaded on the zeolite, as seen by the X-ray diffractogram and infrared spectroscopy. The particle size of AgNP is in the range of 20 nm, and it is positioned within the zeolite framework, according to the TEM image. Furthermore, the cream contains antibacterial properties against two common germs found on human skin (Figure 2). In vitro cytotoxicity against normal human fibroblast cells (Figure 2) revealed that the bio-AgNP-zeolite composite was not harmful to human cells. This result demonstrates that the substance is suitable for topical human use [14].

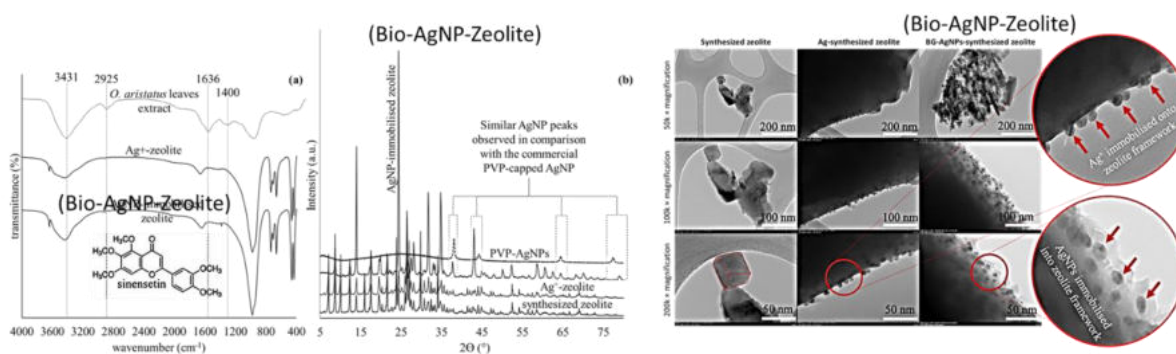


Figure 1: (a) Infrared spectra, (b) X-ray diffractogram, and (c) Transmission electron microscope (TEM) images of Bio-AgNP-zeolite as comparison with other materials.

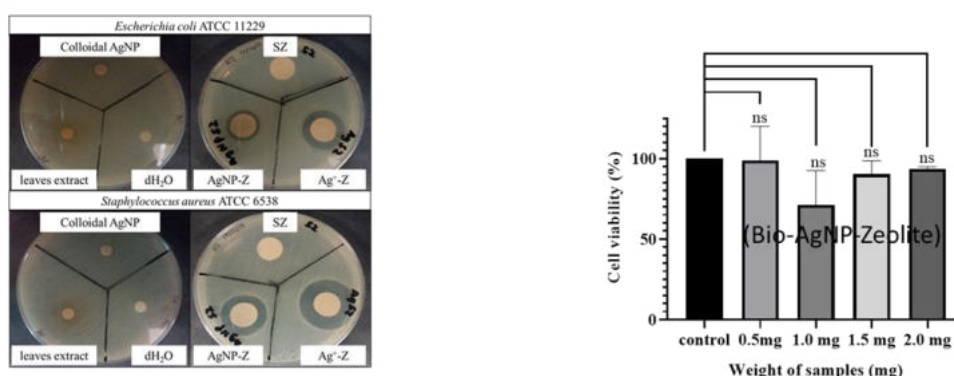


Figure 2: Antibacterial (Left) and cytotoxic (right) activities of the composite.

It's a small, lightweight item that can endure temperatures of up to 40 degrees Celsius. The powder form is noted for its stability in most situations, where its qualities do not easily alter. The powder form, unlike other oil or cream-based treatments, does not smear and is not oily. It's easy to clean with water or a damp cloth. The antibacterial agent in the product, AgNP, is the most effective, destroying a wide range of pathogenic microorganisms. According to

scientific evidence, the product is safe. Because no hazardous chemicals are utilised in the manufacture of AgNP, it does not contain any additional additions or compounds. Plant extract is used as a substitute for chemicals. The powder is fine and pleasant to the touch.



Figure 3: Image of SEZANNE, a green-AgNP-zeolite nanocomposite as antibacterial talcum powder.

Green technology is used in the product development. AgNP produced from plant extract and chemicals have similar antibacterial efficacies, however plant extract is safer. As a result of the usage of harmful and carcinogenic substances in some products, consumer awareness has developed over time. The use of selected plants and herbs to synthesise AgNP and zeolite to include the produced AgNP has opened up new pathways for green technology applications in medical and cosmetics. The usage of a bio-AgNP-zeolite composite in combination with talcum powder is a green technology method for integrating cosmetics and medicine.

Additional energy, high temperatures, chemicals or reagents, or specialised machinery or instruments are not required in the synthesis of bio-AgNP-zeolite composite talcum powder. Plants and zeolite are easily available as raw materials, and the cost of production is minimal because silver nitrate is the only chemical used. Natural elements like zeolite and plant extracts have been proven to be safe for humans and the environment. The product has antibacterial active as well as cytocompatible (Compatible to the human cells), hence, it is utilised to enhance the cosmetic value of this product by soothing the skin.

This product empowers the customer to choose from a wider choice of products that best suit their needs. Talcum powder is a basic substance that can be safely applied to the skin. The commercialization of this product will result in increased large-scale manufacturing of this novel material, necessitating nanotechnology expertise. This product can prevent pathogenic germs from growing on the skin, preventing the bacterium from spreading throughout the organisation. This product is also appropriate for persons of all ages. Infants, toddlers, teenagers, adults, and the elderly can all benefit from it. As a result, when a person buys this device, his or her complete family can utilise it.

TRL 5 is the stage of product development where the product has been proven and validated in the lab. The next phase is to seek precommercialization finance from government organisations and develop joint partnerships with related companies. The precommercialization




funded project will focus on optimising large-scale production and will create a market-ready prototype with Ministry of Health (MoH) approval. The fundamental goal of commercialization is to optimise Bio-AgNP-zeolite nanocomposite synthesis in order to lower costs. Sezanne will be produced in big quantities by an OEM with a GMP (Good Manufacturing Practices) facility, and it will be supplied to customers by other businesses.

Because everyone is seeking for an effective antimicrobial product as a result of COVID-19, the global market for AgNP is huge. However, broad usage of AgNP will lead to secondary and, eventually, tertiary concerns such as antibiotic resistance in bacteria and environmental pollution. Bacterial resistance to AgNP is likely to develop in the future if this material is widely employed as an antibacterial agent over the world and in our everyday life. Furthermore, the enormous demand for AgNP produced through physical and chemical synthesis methods necessitates the use of dangerous chemicals and a large amount of energy. As a result, adhering to the Sustainable Development Goals (SDG) is required in order to carry out a more sustainable production or alternative.

If AgNPs are immobilised on a suitable carrier system, such as zeolite, they can be used more effectively. Because of its high surface area and porosity, as well as its stability and inertness, zeolite was chosen. It is also harmless for humans because it is a mineral. Plant extract is utilised as a bioreducing agent in the biological synthesis process to manufacture immobilised AgNP on zeolite. This environmentally friendly method can be used instead of physical or chemical methods, and the plant extract is far safer than employing toxic chemicals. Sezanne is a talc that contains immobilised AgNP on zeolite, as well as talc mineral and plant extract.

Bio-AgNP-Zeolite, a beneficial combination of AgNP, plant bioactive chemicals, and zeolite, is found in Sezanne. The product is effective against a variety of harmful bacteria and is unlikely to cause bacterial resistance. The product has been shown to boost the viability and proliferation of human skin cells in vitro cell culture experiments and is safe for human skin. Manufacturing costs are inexpensive since the process does not require a lot of energy, a sophisticated reactor, a lot of heat, a lot of solvent, and so on. Because AgNP are immobilised on zeolite, their concentration is low, yet they are still functional.

Table 1: Competitor analysis

Product image	Product name	Active ingredients	Product feature	Issue
	Sezanne	Silver nanoparticles, herbs bioactive compounds, zeolite	Low amount of silver nanoparticles and bioactive compounds kill the bacteria, and zeolite remove stains.	No issue
	Agnesia	Zinc oxide	It absorbs sweat and prevents bacterial growth.	Allergic reaction, lower antibacterial activity of zinc oxide compared to silver.
	Aiken	Licorice Extract, Fermented Green Tea & Lemon Myrtle Oil	Natural protection with Herbal Protective Therapy ingredients	Herbal products has lower stability, and hence, shorter shelf-life

Sezanne competes with any medicated talc that performs a comparable function, such as antibacterial action. The analysis of competitors is shown in Table 1. Agnesia talcum powder is the primary competitor. Copper oxide, an inorganic antibacterial agent with lower activity than silver, is used in this product. Another competitor is Johnson&Johnson's talcum powder.

This commercial product, however, is fraught with controversy because it contains asbestos, a known carcinogen. Unlike Sezanne, which contains AgNP immobilised zeolite, there is no antibacterial talcum powder generated from AgNP on the market.

CONCLUSION

Sezanne is a talcum powder with antibacterial properties that can be used to kill bacteria or prevent bacterial growth on the skin. It can be used on the skin to treat skin diseases or to reduce body odour. Sezanne's originality is based on a claim in the patent that explains the bio-AgNP-zeolite nanocomposite's unique technique. It has a large market because everyone is looking for an antimicrobial product that is both effective and safe for humans. In the not-too-distant future, product development will reach the pre-commercialization stage, and it will be ready to join the market.

ACKNOWLEDGEMENT

The inventor would like to that Ministry of Higher Education Malaysia and Universiti Teknologi Malaysia for several research grants specifically UTM-Transdisciplinary Research Grant (UTM-TDR) Vot No. 06G72 and 06G71.

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SILVERN: Kesum-Silver Nanoparticles as Antibacterial Wound Healing Agent

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ABSTRACT

When a wound becomes infected with germs, the treatment costs skyrocket, especially in terms of nursing and hospitalisation, which can be prohibitively expensive for low-income populations. As a result, silver nanoparticles can be utilised at the wound site to either kill or suppress bacterial growth. Silver nanoparticles are a frequently used antibacterial agent that is safe for humans at low concentrations. Physical and chemical synthesis approaches, on the other hand, had limitations, including hazardous waste creation and excessive energy consumption. As a result, biosynthesis of silver nanoparticles with kesum leaf extract could be a sustainable and safe process. Kesum leaf is also abundant, easy to grow in Malaysia, and rich in antioxidant activity. SILVERN applied to the wound site can assist to inhibit the spread of dangerous bacteria while also lowering treatment expenses, which benefits the community. According to in vitro skin cell and in vivo animal testing assays, SILVERN exhibits significant antibacterial activity against diverse bacteria, is safe for humans, and acts as an antibacterial wound healing agent. Copyrights for the biosynthesis process and its use as an antibacterial wound healing agent have been filed (LY2020004347 & LY2021E05078). Silver nanoparticles, antimicrobials, and wound healing have a big market, hence SILVERN's commercialization potential is enormous. A few local companies have been identified as potential industrial partners for our commercialization approach. SILVERN has the advantage of being able to generate silver nanoparticles in a sustainable manner without generating toxic waste, contributing to the circular economy manufacturing inventiveness.

Keywords: Silver nanoparticles; kesum; antibacterial; wound healing

INTRODUCTION

Bacterial infection of the wound bed is one of the most prevalent consequences following a skin injury. Because bacterial colonisation hampers natural regenerative and reparative processes, wound infections are the leading cause of delayed wound healing. Similarly, recurrent infections obstruct the wound's repair of structural and functional integrity, resulting in chronic wounds. Antibacterial medications, such as antibiotics, are used in modern medicine to either destroy or limit bacterial growth. Antimicrobial medicines are frequently used to prevent infection and excessive inflammatory response in wounds [1]. However, a significant

rise of antibiotic resistance in bacteria has resulted from insufficient research and development of novel medicines, as well as indiscriminate antibiotic use [2]. As a result of this condition, bacterial infection continues to be a leading cause of morbidity and mortality [2]. According to the Centers for Disease Control and Prevention (CDC) report on antimicrobial resistance (AMR), bacteria and fungi cause an estimated 2,868,700 illnesses per year [3]. Methicillin-resistant *Staphylococcus aureus* (MRSA) accounts for 40% of wound isolates and infects 14% to 17% of patients with burn wounds, according to the study [4].

Silver is an effective antimicrobial agent against bacteria, fungus, and yeast, as well as antibacterial resistant forms. The advancement of nanotechnology, which allows for the manufacture of silver nanoparticles, has ushered in a new possible therapeutic. Biogenic silver nanoparticles are a type of biocidal nanoparticle that is known to be harmful to bacteria through a variety of mechanisms and can help with wound healing by regulating the inflammation phase. The rate of wound closure was increased by modifying growth factors and cytokines via antibacterial and anti-inflammatory action in a study using silver nanoparticles produced by cellulose nanocrystals [5]. Another study concluded that biosynthesized silver nanoparticles have broad-spectrum antibacterial action and improve wound healing via anti-inflammatory activity [6]. Silver nanoparticle-mediated scaffolds have also been reported to be used in newborn wound care dressing materials that have a high wound healing capability [7]. These findings indicate silver nanoparticles' potential use in medicine, particularly as antibacterial and wound-healing agents.

Various forms of ointment, gel, or dressings, such as hydrogels, gauze, hydrocolloids, films, and polymer dressings, are being used in wound treatment. However, materials composed of synthetic chemicals and materials have non-biocompatibility difficulties, are difficult to remove after application, causing skin trauma, have poor water absorption, and have a high production cost [8]. Natural resources, such as plant extracts, have attracted a lot of study attention among the several modalities for manufacturing silver nanoparticles since they are safe and environmentally friendly [9]. The plant extract's biomolecules have a significant impact on the distribution and size of metal nanoparticles, which has a significant impact on the physical, chemical, and biological properties of the nanoparticles [10].

Silver nanoparticles have been used in a variety of biomedical applications in recent years. Plant-derived drugs have risen in popularity in recent years as a result of their potential efficacy and absence of side effects [9]. Furthermore, they are said to be more beneficial to the human body than modern synthetic drugs [11]. In reality, there is a pressing need to better understand and investigate the effects of plant-derived medications. Kesum is a common plant from the Polygonaceae family that is frequently used in Asian cookery, particularly in Malaysia. Although the phytochemical components of this plant have been identified, the chemicals' lowering potential for the production of silver nanoparticles has yet to be investigated. As a result, this invention is concerned with the biogenic manufacture of silver nanoparticles utilising kesum leaves extract as a reducing agent, and it might be utilised to treat antibacterial wound healing.

INNOVATION DEVELOPMENT

Silver nanoparticles were created via a green biosynthesis approach using kesum leaf extract in the SILVERN cream. In the creation of silver nanoparticles, kesum leaf extract acts as a green bio-reducing agent. The procedure is environmentally friendly since kesum leaf extract, a plant extract, replaces the usage of a harmful chemical reducing agent. SILVERN cream has been demonstrated to destroy a variety of pathogenic bacteria as well as heal wounds.

Experimental results from in vitro antibacterial assays, human skin cell culture, and in vivo animal testing [12] support this efficiency. As a result, SILVERN cream can be utilised as a topical antibacterial wound healing agent. Figure 1 depicts a SILVERN product and how the cream should be applied to the skin.



Figure 1: Picture of SILVERN and how it can be applied on our skin

The claims in the IPR support the product's originality, novelty, and uniqueness. This product is protected by two copyrights. First, the copyright (LY2020004347) is for an enhanced AgNP biosynthesis process using kesum (*Persicaria odorata*) leaf extract. Another copyright application has been filed for the antibacterial wound healing activity of biosynthesized silver nanoparticles utilising kesum extract (LY2021E05078). Due to the sustainable and green synthesis technique, SILVERN is significantly cheaper and safer for humans than other silver nanoparticles. SILVERN also performs two roles at the same time: antimicrobial and wound healing.

Because it was built based on multiple research projects, it has a high level of originality. The results of the experiment have been published in our publication [12]. SILVERN as an antibacterial wound healing agent is founded on a strong scientific principle in which the synthesis method of silver nanoparticles has been modified in the laboratory to obtain the best synthesis conditions, including a shorter synthesis time but a higher yield. The physicochemical properties of the biosynthesized silver nanoparticles are subsequently validated using numerous high-end instruments. Because the silver particles are so tiny, characterisation is critical to avoid particle aggregation or agglomeration (Figure 2). Figure 2 shows how the manufacturing of silver nanoparticles has been optimised in the lab (a). The yield of the optimised silver nanoparticles was then determined using a spectrophotometer, as shown in Figure 2. (b). Figure 2(c) depicts the morphology of silver nanoparticles, which are spherical in shape and range in size from 5 to 20 nm. Figure 2(e) indicates that silver nanoparticles have a significant antibacterial activity against two harmful microorganisms. The biosynthesized silver nanoparticles' in vitro cytotoxicity and in vivo wound healing activities were tested to ensure the product's usefulness. In terms of human cell toxicity, SILVERN has a low toxicity, as seen in Figure 3. (f). In vitro and in vivo wound healing activities demonstrated that SILVERN can heal the wound faster, as shown in Figures 3(g) and 3(h). As a result of these findings, it may be concluded that the SILVERN product can be employed as an effective antibacterial wound healing agent.

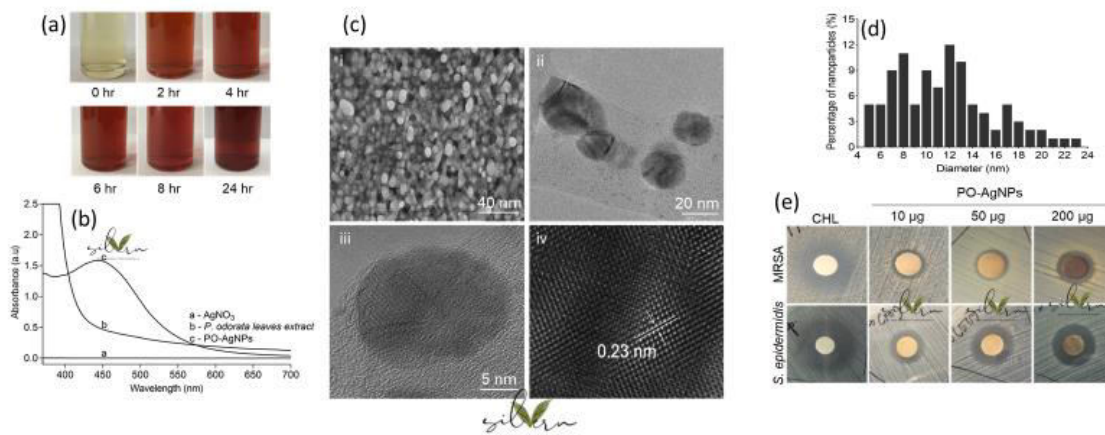


Figure 2: Characterization results of the biosynthesized silver nanoparticles. (a) colloidal silver nanoparticles formation based on different periods, (b) UV-Vis spectra, (c) scanning electron microscope (SEM) and transmission electron microscope (TEM) micrographs of the silver nanoparticles, (d) particle size, and (e) antibacterial activity of silver nanoparticles [12].

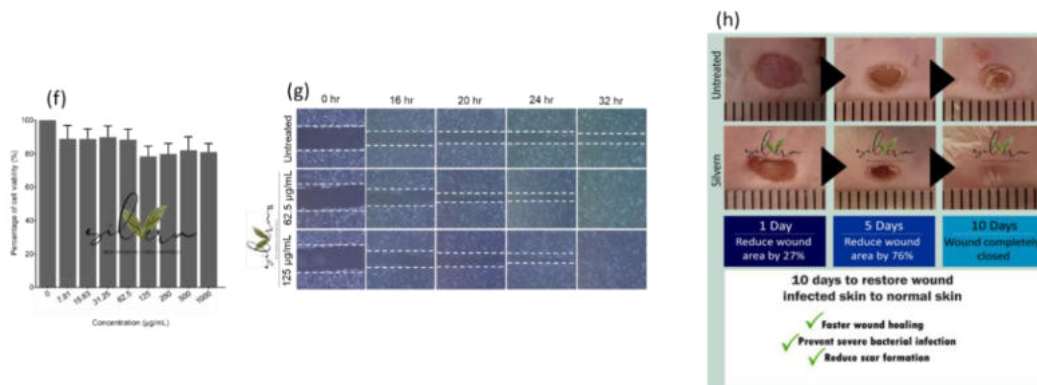


Figure 3: In vitro and in vivo analyses of silver nanoparticles: (f) cell viability, (g) scratch assay, and (h) in vivo wound healing assay on rat.

Because Malaysia is a tropical country with high humidity and temperatures, germs can grow easily on a variety of surfaces, including human skin. According to the Malaysian Ministry of Health (MOH), 15 percent of Malaysia's 3 million diabetic residents would suffer lower limb ulcers and wounds [13]. This number is expected to rise gradually, with an alarming 7 million adults in Malaysia impacted by diabetes, both diagnosed and undiagnosed, by 2025 [14]. The utilisation of kesum extract to biosynthesize silver nanoparticles will unlock new knowledge and technologies about other native plant herbs that may be used to synthesise AgNP and employed as an antibacterial wound healing agent.

In the forecast period, 2021-2028, the global wound care market is expected to increase at a CAGR of 6.1 percent, from \$15.84 billion in 2021 to \$24.01 billion in 2028. (www.fortunebusinessinsights.com). From 2020 to 2027, the global silver nanoparticles market is expected to increase at a CAGR of 15.7 percent, from \$1.8 billion in 2019 to \$4.1 billion in 2027. (www.alliedmarketresearch.com). The global antimicrobial additives market was estimated to be worth \$4.7 billion in 2020, rising to \$9.3 billion by 2030, with a CAGR of 7.1 percent from 2021 to 2030. (www.alliedmarketresearch.com). Silver nanoparticles, wound and antimicrobial agents have a favourable trend and a large market, indicating that SILVERN as

an antibacterial wound healing agent will be in high demand in the near future. Because of the COVID-19 pandemic, everyone is looking for an antimicrobial agent that can inhibit microbial growth and promote a healthy lifestyle.

Because wound care and antimicrobial products are intertwined, the market for both is enormous. As a result, combining the antibacterial and wound-healing properties of biosynthesized silver nanoparticles with plant extract is appropriate for this market. Furthermore, the biosynthetic approach to silver nanoparticles can cover a portion of the global silver nanoparticles market while also being more environmentally friendly and sustainable. Due of the COVID-19 pandemic, biosynthesized silver nanoparticles are also a solution to fulfil the rising demand for antimicrobial agents. To attain Technology Readiness Levels (TRL) 6 to TRL 9, the next step in the commercialization process is to seek precommercialization funding.





The SILVERN product for topical antibacterial application has reached TRL (Technology Readiness Level) stage 5 because the prototype was verified in the lab utilising in vivo investigations. As a result, in order to attain TRL 6 to 9, qualifying for a precommercialization fund is a high priority (development and deployment). The precommercialization fund will cover large-scale manufacturing in order to cut costs and gain Ministry of Health approval (MoH). The SILVERN product for wound healing, on the other hand, is presently at TRL3, and more preclinical and clinical testing is needed. To reach TRL4 to TRL9, precommercialization funding is also required to ensure that the product can be approved by the Ministry of Health.

SILVERN has a minimal manufacturing cost due to easy preparation processes that do not require chemicals, significant energy, or waste. Plant extract is used in the biosynthesis process, which is abundant in Malaysia and neighbouring countries such as Indonesia and Thailand. Experimental in vitro and in vivo research have revealed that the substance has immediate effects with excellent antibacterial and wound healing activity. Based on in vitro cytotoxicity and in vivo animal tests, the SILVERN is likewise safe for human skin, with no signs of skin irritation. The inclusion of silver nanoparticles, an inorganic antibacterial agent that prevents bacteria and other microbes from growing in the product, keeps the product stable for longer.

SILVERN inhibits bacterial growth in the wound region, preventing the wound from worsening. The preventative technique can help to keep bacteria from spreading throughout the community. Aside from that, the prevention technique can help the low-income community avoid greater care costs for infected wounds. By using kesum extract as a bioreducing agent for silver nanoparticles, water pollution caused by chemical reduction agents can be avoided. The use of biosynthesized silver nanoparticles is a green and long-term solution that can benefit our community.

Competitor of SILVERN is the antimicrobial or wound healing products at the clinics or pharmacies such as Betadine cream, guardian antiseptic cream and Bepanthen cream. Table 1 compares SILVERN with its competitors in the market. Betadine cream contains water soluble iodine, which can stain our cloth, as opposed to SILVERN cream, which is safe to use on skin. Because of its chemical composition, chloroxylenol and chlorhexidine in the most antiseptic cream have side effects such as skin irritation, itching, and other unpleasant skin consequences. SILVERN contains silver nanoparticles along with bioactive substances from plants that are safe for humans, as opposed to normal commercial silver nanoparticles. The SILVERN can be employed as an antibacterial agent in the future, as well as antifungus, antiviral, antibiofilm, and other applications.

Table 1: Comparison with competitor

Product image	Product name	Active ingredient	Product feature	Issue
	SILVERN Cream	Biosynthesized silver nanoparticles	Proven to kill bacteria, safe to human and can treat wound, and it can rejuvenate the skin	No skin irritation, no color stain, safe to the cells
	Betadine Cream	Povidone-iodine water soluble ointment	Proven to kill bacteria and other microbes	Not proven to heal the wound. Yellowish stain that hard to be removed.
	Guardian Antiseptic Cream	Chloroxylenol 0.3%w/w, Triclosan 0.3%w/w	Guardian antiseptic cream is a dual protection against infection. It is suitable for cuts, abrasions, minor burns & wounds	Chloroxylenol has side effects such as skin irritant, and highly toxic to fish and cats.
	Bepanthen First Aid Kit Cream	Chlorhexidine hydrochloride	Specially formulated to help protect wounds and fight infection whilst soothing damaged skin	Chlorhexidine topical side effects include severe burning, itching, or redness; blistering or peeling

CONCLUSION

SILVERN is an alternative treatment for treating bacteria-infected wounds or preventing bacterial growth in the wound region. The invention's originality derives from the use of kesum leaf extract in the manufacture of silver nanoparticles. The invention is also founded on a strong scientific methodology that has been validated using

characterisation techniques, in vitro antibacterial and cell assays, and in vivo animal testing. The product has a large market, and it is believed that it will be able to replace several commercial wound healing and antibacterial products.

ACKNOWLEDGEMENT

The inventor would like to that Ministry of Higher Education Malaysia and Universiti Teknologi Malaysia for several research grants specifically UTM-Transdisciplinary Research Grant (UTM-TDR) Vot No. 06G72 and 06G86. Thanks to Platinum Coatings (M) Sdn Bhd for Research Grant Contract Vot No. 4C535.

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C.A.K.A.P (Communication Kickstart Pro.) for MUET

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ABSTRACT

Due to the limitation of Open and Distance Learning (ODL), students encountered difficulties to practice English language, especially speaking skills as they would require ample amount of speaking practices outside of the classroom. Moreover, students find that the speaking component in MUET is the most difficult component and the number of practices in class is not sufficient for them to prepare themselves for MUET. C.A.K.A.P. (Communication Kickstart Pro.) is an innovation created to help foundation students in UiTM to practice the English language with other students virtually as well as receive curated help from experienced lecturers for tips and tricks to improve on their speaking skills. This innovation's main objective is to create a platform for the students in foundation studies in UiTM to interact with one another in a MUET setting. As students in foundation studies are not widely exposed to the setting of MUET, this platform will act as a platform to help students practice individually as well as in groups. C.A.K.A.P. is looking forward to expanding as a go-to platform and helping students across Malaysia in improving their speaking skills in preparation for the MUET speaking test.

Keywords: MUET; speaking skills; e-learning

INTRODUCTION

The Ministry of Education has initiated the Malaysian University English Test (MUET) as a compulsory requirement for public universities and colleges admission to ensure the students meet the minimum level set for their language proficiency in English. Correspondingly, Universiti Teknologi Mara (UiTM) would also use MUET as a measure for their students' English competence to be placed in certain academic programmes depending on their results for MUET. This is aligned with the objective of MUET by the Malaysian Examination Council [4] to measure the English language proficiency of candidates who intend to pursue first degree studies in order to help institutions make better decisions about the readiness of prospective students for academic coursework, and about their ability to use and understand English in different contexts in the environment of higher education. Hence, it is shown that MUET is a substantial indicator of their English language proficiency which enables them to enrol on their desired course [3]. However, despite learning English for 11 years from

primary school to secondary school, the younger generations still have issues in mastering the English language skills, specifically in speaking skills. Schools have been focusing on essay writing to prepare them for the examination which resulted in many students being able to write in English but their ability to communicate fluently outside of classroom settings is impeded due to the main focus on the writing format and point elaborations [8].

Moreover, with the pandemic that has been going on for three years, most of the institutions are conducting their classes in ODL mode where virtual classes are conducted which includes UiTM. Due to the limitation of ODL, students also encountered difficulties to practice the English language, especially speaking skills as they would require an ample amount of speaking practice outside of the classroom. In addition, students find that the speaking component in MUET is the most difficult component and the number of practices in class is not sufficient for them to prepare themselves for MUET as they would have to concentrate on the other aspects of the language skills as well [5]. Hence, they would have to find other alternatives to enhance their speaking skills. Thus, we have created one of the easiest and most user-friendly alternatives for the students to practice and develop their speaking skills, especially for MUET which is the C.A.K.A.P. (Communication Kickstart Pro.). C.A.K.A.P is a prototype website with the main objective to act as a speaking platform for Centre of Foundation Dengkil Campus students in enhancing their MUET speaking skills. It would be beneficial for the students as it is a platform that could help them to practice their speaking skills as the platform provides extensive practices not only with their fellow peers but with students from other programs and able to have an online consultation with our consultants. Moreover, news updates on MUET, speaking tips and other information related to speaking will also be available on the platform.

INNOVATION DEVELOPMENT

C.A.K.A.P. is an innovation that is aiming to encourage and motivate students in practising the English language during the ODL mode. Hence, this website is created to become a platform where Foundation students can practice with other students from different faculties, keep themselves updated with the MUET examination schedule, and provide speaking tips and samples for their own references.

For the students to be a part of the C.A.K.A.P community and have access to the services that we provide, they would have to register/sign up and log in to the website. Figure 1 shows how the students can register for the website.

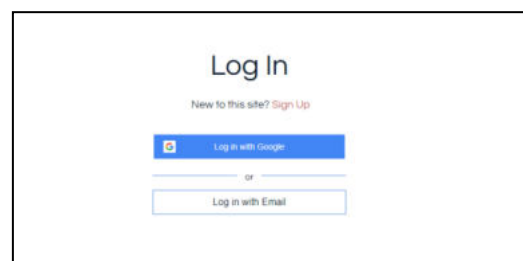


Figure 1: Registration via website

The interface of the website is user friendly and built for the students to have easy access to the MUET information, MUET speaking guidelines and book online the services and other information and activities on the website. Figure 2 shows the details of the website's interface.

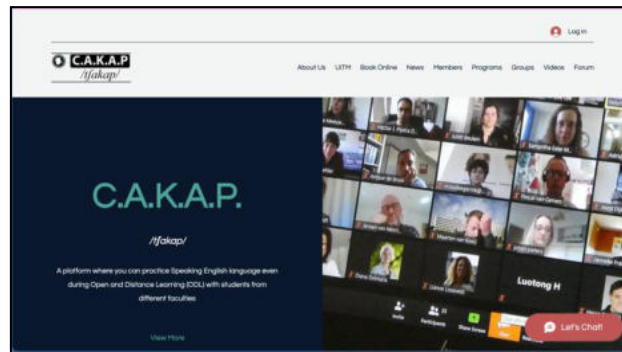


Figure 2: The website's interface

Focusing on the three main headings – MUET, SPEAKING and BOOK ONLINE. For the MUET header, the students can find MUET examination details as follows:

- 1) Information about MUET; MUET schedule 2022, MUET fees and the registration process.
- 2) Explanation on MUET Examination Type; MUET on Demand (MOD) and MUET Exam
- 3) Explanation on the 4 components of MUET, the scores and percentages

The SPEAKING header consists of the information on the speaking component for MUET. The details are as follows:

- 1) MUET Seating
- 2) Part 1 (Individual Presentation) & Guidelines for Part 1
- 3) Part 2 (Group Discussion) & Guidelines for Part 2
- 4) Tips (Speaking Tips in MUET)
- 5) Question Sample

The BOOK ONLINE header consists of the services provided for the students and they would be able to book it online according to the time that they prefer based on the schedule that the consultants have come out with. The details are as follows and in Figure 3:

- 1) Speaking Online Learning Course
- 2) Speaking Private Consultation
- 3) Online Speaking Group Practice



Figure 3: The BOOK ONLINE

The main objective for the development of the website prototype is to provide the students with extensive speaking practices for their MUET speaking component for free. However, the website would also provide speaking online courses and private consultation to the students at a reasonable price.

COMMERCIAL POTENTIAL

The Fourth Industrial Revolution (4IR) has impacted how we live, work, and communicate as the education realm has witnessed a very significant change from traditional learning to technology-based learning [2]. However, it is also in line with the trend of student learning that shapes education today when the pandemic outbreak hits worldwide and technology-based learning is optimised during the ODL session. Hence, 21st-century learning requires teachers to dominate 4IR to make the teaching and learning process more appealing and convenient to new millennials. Developing an effective tool for language learning specifically for speaking practices is imperative to match with the current methodology of teaching and learning, especially for MUET speaking component. This is because students need ample practise to familiarise themselves with the technique of the MUET speaking component. We have come across many applications and tools to improve speaking skills but all are not specifically looking into the MUET speaking component. Taking this fact into account, public universities and colleges should invest in this C.A.K.A.P web development so they can comfortably meet the needs of their tech-savvy users – the students. C.A.K.A.P. (Communication Kickstart Pro.) as a prototype website plans on encouraging UiTM Foundation students to practise the English language with other students in a manner that allows the students to practice with MUET style questions and manner. It also aims to become a platform where UiTM Foundation students can interact with one another in a MUET Speaking setting. Alongside the curated comments and ways to improve the students' speaking skills, the users of this website will also be receiving MUET speaking tips that would be helpful for the students. This prototype website understands the students' needs and is developed as a solution that can produce optimum results in catering to students. Technology keeps evolving and creating innovative ways to be implemented in the learning process [1]. Hence, as the innovation grows, C.A.K.A.P. aims to grow bigger and be helpful for UiTM students not only from Foundation Studies in UiTM Dengkil but available for other faculties and campuses across Malaysia with more experts on board to share more knowledge to help the students improve in MUET speaking component and speaking skills in general.

CONCLUSION

In conclusion, the development of C.A.K.A.P will fulfil the objective to prepare the students for their MUET speaking test by providing extensive exercises for them to do outside of the classroom settings. They can opt for other services such as personal consultation if they would like the consultant to evaluate them and help them to improve their speaking skills. As this platform is still a prototype the innovators would definitely want to come out with the final product with more intensive and comprehensive activities for the C.A.K.A.P community. C.A.K.A.P. is looking forward to expanding as a go-to platform and helping students across Malaysia in improving their speaking skills in preparation for MUET speaking test

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SOOTHE: Silica Incorporated Hydroxyapatite as Bioactive Material

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ABSTRACT

Hydroxyapatite, a popular and well-known bioactive substance with a composition similar to human bone and also used as a skin care product, has several disadvantages. Hydroxyapatite is fragile and has a low tolerance to fatigue. Because of its limited reactivity with damaged bone, it cannot be directly implanted in a fracture bone. Incorporating it into silica aerogel networks is the greatest technique to improve its quality. Aside from that, silica-based substance is a well-known bioactive material for skin rejuvenation and repair. As a result of the synergistic effects of hydroxyapatite in silica aerogel networks, cell growth can be boosted. It's difficult to incorporate hydroxyapatite into silica networks, and the ratio of these materials needs to be tuned before it can be used for human purposes. Our researcher, on the other hand, has perfected the preparation technique and element ratio of hydroxyapatite and silica aerogel for use as a bioactive material. The invention relates to a method of generating hydroxyapatite-incorporated silica aerogels (SOOTHE), in which the material is prepared utilising an aqueous colloidal sol-gel approach with rice husk ash as a low-cost silicon source. The addition of hydroxyapatite (Bone mineral) to a silica aerogel was discovered to improve the silica's bioactivity. SOOTHE can be utilised for a variety of health and medical applications, including wound healing, tissue regeneration, skin rejuvenation, and bone implants, among others. Our invention's findings are based on substantial scientific evidence that SOOTHE enhanced human cells (skin and bone cells) in vitro while remaining non-cytotoxic and improving biomineralization (bioactivity). SOOTHE can be used as an alternative to existing rejuvenating silica-based skin-soothing products such as Dermatix.

Keywords: Silica aerogels; hydroxyapatite; skin rejuvenation; bioactive material

INTRODUCTION

Hydroxyapatite has received a lot of attention as an alternative biomaterial for skin and bone tissues. Hydroxyapatite has been used in the creation of numerous face rejuvenation and cosmetic products due to its filler lifespan, biocompatibility, and non-migratory qualities [1]. This biodegradable substance promotes fibroblastic infiltration into soft tissues like the dermis, causing cells to generate their own collagen [2]. However, existing hydroxyapatite has a number of flaws, including poor mechanical characteristics and brittleness with low fatigue resistance [3-5]. The poor bioactivity of hydroxyapatite stoichiometry is due to its strong chemical stability [6]. It has a slow reaction time and integrates with cells [7]. This could result in a lengthier rehabilitation period for the patient [4]. As a result, altering and embedding hydroxyapatite onto support materials like silica-based materials could improve mechanical strength, tissue restoration rate, and quality.

Compared to other organic systems such as micelles, liposomes, and polymeric nanoparticles, silica modified hydroxyapatite synthesised using the sol-gel process displayed good biomaterials system for implant technology, according to Balamurugan et al. [8] and Ravarian et al. [9]. Based on the composition of integrated silica, the sol-gel approach was able to manufacture multiphase hydroxyapatite with improved biological response and crystalline degree [10,11]. However, it is unclear if the silica included in the hydroxyapatite structure is partially or totally swapped with the phosphorus. The chemical composition of silica modified hydroxyapatite is unknown. As a result, developing a new generation of silica modified hydroxyapatite composites requires a simple and direct sol-gel ambient condition synthesis process.

The sol-gel method is a well-established method for the synthesis of silica modified hydroxyapatite that has been shown to outperform other methods [12-14]. The capacity of the sol-gel technology to produce pure and homogeneous products at low temperatures has led to its widespread use [15,16]. The most fascinating aspect of the sol-gel technique is the ability to control the composition and microstructure of the materials at the molecular level, as well as the ability to shape them at room temperature, such as by casting bulk gels in precision moulds, spinning fibres, or dip coating thin film [17]. As a result, the sol-gel technique could be a viable alternative to traditional ceramic production methods, which involve shaping granules into shapes and then densifying them at temperatures close to their liquid state [18].

The invention relates to the use of a sol-gel and ambient pressure drying approach to create silica modified hydroxyapatite by adding hydroxyapatite into silica aerogels networks. As a result, this invention permits the development of new potential alternative biomaterials for soft and hard tissue engineering applications. Because of a variety of factors, including its unique structure, inertness, and stability, silica aerogels were chosen as a support system for hydroxyapatite in this innovation [19]. In a previous study [20], we discovered that using the sol-gel ambient pressure drying process to produce silica aerogels from rice husk ash enhanced the cell survival of human dermal fibroblast cells in vitro. Silica aerogels are intended to improve hydroxyapatite's bioactivity and biofunctionality. Silica aerogels have several desired and distinctive features in biomedical applications [20] due to their amorphous microstructure, which comprises of nano-sized pores generated from connected particles and extremely low heat conductivity [21].

INNOVATION DEVELOPMENT

The invention is a silica aerogel incorporating hydroxyapatite that is a novel and improved bioactive material (SOOTHE). The concept of integrating hydroxyapatite particles in manufactured silica aerogel networks by an aqueous colloidal sol-gel procedure employing rice husk ash as a cheap silicon source is the uniqueness of this invention. SOOTHE has the ability to stimulate the growth of normal human cells in vitro, including skin (fibroblast) [22] and bone (osteoblast) [23] cells, without causing cytotoxicity. SOOTHE is a biomaterial that may be used to rejuvenate and mend human skin, as well as a wound care product and an alternative biomaterial for bone implants. SOOTHE is a powder-based skin rejuvenation product that potentially replace silica-based gels and creams. The basic principle of SOOTHE is depicted in Figure 1. The SOOTHE comprises HAESA, a wound healing agent [22] as well as a resorbable bone implant [23].



Figure 1: The concept of fundamental findings for SOOTHE development

The process of producing hydroxyapatite incorporated silica aerogels via an aqueous colloidal sol-gel technique has been submitted for copyright (LY2016003397). The ability of this invention to boost the bioactivity of silica and hydroxyapatite, as well as the growth of normal human cells in vitro, is also a unique feature. Current commercial materials are either hydroxyapatite or silica-only, but our idea is a hybrid of the two materials. Unlike existing commercial products, which are in the form of cream or gel, our product is in the form of powder. The powder form of the substance is more effective than other forms because it may be used right away without the need for any additional preparation. Currently available commercial products are either hydroxyapatite or silica-only, however our concept combines the two elements in one product. In contrast to existing commercial products, which are in the form of cream or gel, our product is in the form of powder. The powder version of the substance is more effective than other forms because it may be utilised without any additional chemicals.

At the nanoparticle level, the product is a mixture of two bioactive materials: hydroxyapatite and silica. Because the manufacturing technology is new, other useful bioactive elements or active compounds could be incorporated into the silica aerogel network. The

bioactivity of the product is increased as a result of this combination, and it overcomes the disadvantages of these two materials, such as decreased cell proliferation and difficult resorption. The substance is in powder form and can be applied directly to human skin, which could lead to a new market segmentation of similar goods as compared to gel and cream-based solutions.

The idea was discovered using sound scientific concepts, and it began as a theory that the silica aerogel could be combined with diverse components to improve its activity. We conducted a comprehensive investigation, beginning with the fabrication and characterisation of the materials and concluding with the use of multiple high-end instruments to prove the structure, elemental composition, and morphology of the synthesised materials. The produced substance is next tested in vitro for viability and proliferation against normal human dermal fibroblast and normal human osteoblast cells. The scientific data has been presented at various conferences and has been published in a few reputable journals [22-23]. The material is a cutting-edge application of a sol-gel process for inclusion of any materials inside the silica aerogel networks. Figures 2 and 3 show some important results that we obtained from our experiments.

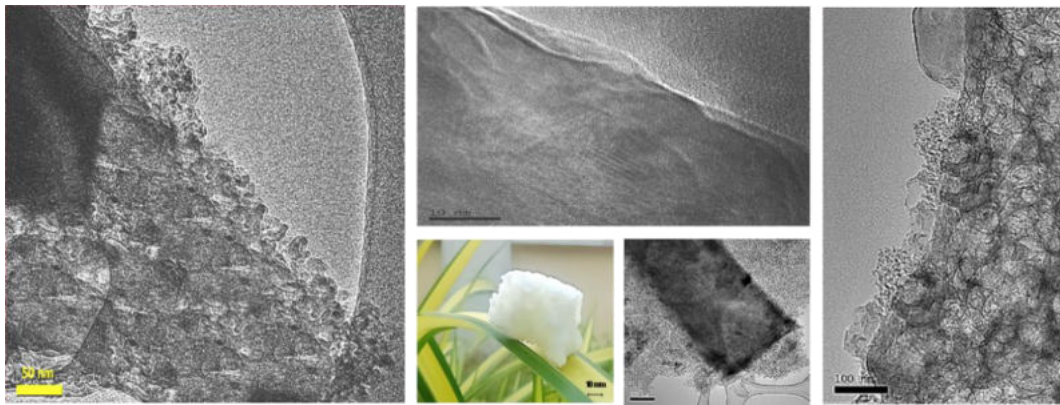


Figure 2: Morphology of SOOTHE showing nano-spherical particles with amorphous structure widely distributed on highly ordered crystalline micro-rod of the hydroxyapatite

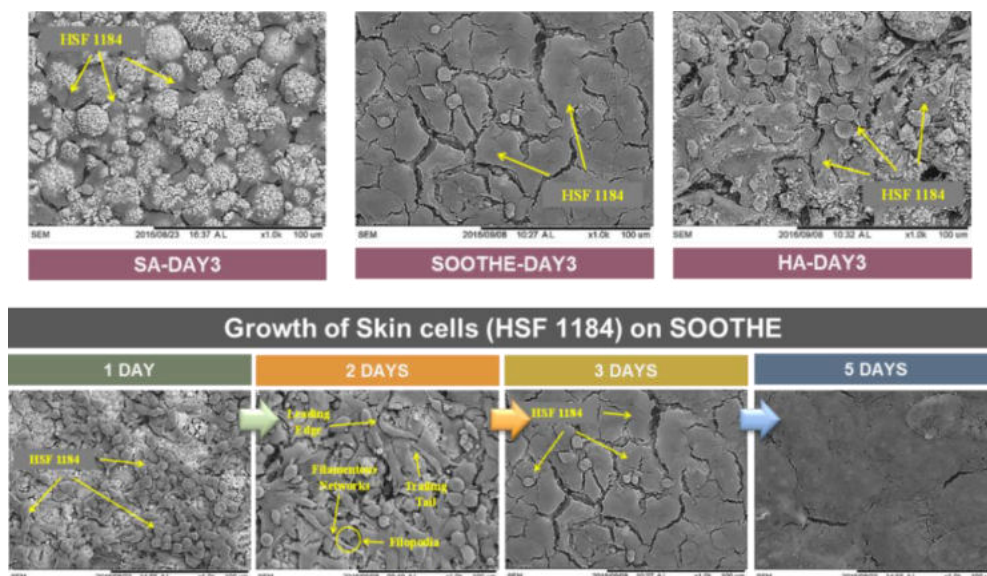


Figure 3: Cell proliferation analysis of SOOTHE against skin cells in vitro

The benefits of SOOTHE includes its ability to solves various drawbacks of hydroxyapatite such as poor mechanical properties and brittles with poor fatigue resistance and limited bioactivity. It enhances bioactivity of hydroxyapatite and silica-based products such as enhanced cells growth, cells proliferation and biomineralization. Other benefits include, the preparation that involves a sol-gel technique in which the preparation method forming pure and homogenous products at a very low temperature. SOOTHE has various application mainly for rejuvenating and repairing human skin, as wound care product and biomaterial for bone implant. The application of SOOTHE to the patient could reduce high cost of skin repair and bone implant since it can regenerate the cells and eventually proliferate tissues.

The majority of comparable products are imported from other countries and sold and available in pharmacies. The preparation of the material using the sol-gel process is not commonly employed in Malaysia. As a result, the creation of SOOTHE will improve knowledge of the sol-gel process on a broad scale. The powder form of a product for rejuvenating and mending skin is also new to the Malaysian market, as users previously relied on traditional plant-based products for this purpose. SOOTHE is made using the sol-gel process, which may be done at room temperature and at normal pressure. Because SOOTHE has a combination of hydroxyapatite and silica aerogel, it has the potential to improve cell development when compared to a single substance. SOOTHE may be made at a minimal cost because the basic ingredient, rice husk ash, is acquired from agro-waste. Because it can be directly applied to human skin, using SOOTHE in powder form is more convenient for the user than using other products that are based on cream or gel. SOOTHE can be sold in a new skin rejuvenation and repair market segmentation.

SOOTHE has the potential to be employed as a bioactive material for soft and hard tissue, such as human skin or bone implants, based on our proof of concept. SOOTHE can thus be manufactured locally using the sol-gel process at ambient pressure, and the product can be sold by putting it in a cosmetic container for skin rejuvenation and restoration. SOOTHE can also be used as an active ingredient in cosmetics, facial washes, and as a bone implant filler. Before it can be utilised for human purposes, the product must be registered in the NPRA (National Pharmaceutical Regulatory Agency) system (<https://www.npra.gov.my/>). After it has been registered under NPRA, the commercialization approach will be done by securing precommercialization fund such as from MTDC, Platcom Venture or Joint Venture with suitable investor.

The global market for skin rejuvenation has been steadily growing since 2012, according to Persistence Market Research (www.persistencemarketresearch.com/market-research/skin-rejuvenation-market). According to this analytical research analysis, the trend is predicted to continue in the future years, with the worldwide skin rejuvenation market expected to rise at a high CAGR of roughly US\$ 2.2 billion by the end of the forecasted year. Microdermabrasion, chemical peels, dermabrasio, IPL photo rejuvenation, ablative lasers, and other techniques are popular in this industry. According to www.marketsandmarkets.com, the biomaterials market is expected to grow at a CAGR of 14.5 percent between 2019 and 2024, reaching USD 207 billion from USD 105 billion in 2019. The biomaterials market is being driven by factors such as increased finances and grants from government organisations around the world for the development of innovative biomaterials, expanding demand for medical implants, and the rising incidence of cardiovascular illnesses.

According to a market survey, the market for skin rejuvenation is focusing more on surgery and laser techniques, which can have long-term negative effects on human skin. As a result, SOOTHE provides a unique method for users to apply this product directly to their skin.

Furthermore, SOOTHE in powder form is placed inside a cosmetic container to make it more appealing to the user and easier to apply and transport this product anywhere and at any time. The business plan will include a new market segmentation, skin rejuvenation in the form of powder, as well as active ingredients that can be used in other cosmetic products.

SOOTHE's main competitors are existing skin rejuvenation and repair products based on silica and hydroxyapatite. QSilica colloidal liquid is an example of a silica-based product that can be used to promote the normal growth and function of connective tissue, hair, skin, nails, and joint cartilage. Another silica-based product is Dermatrix Acne Scar, which is a gel that combines silicon, Vitamin E, and antioxidant ingredients to soothe and moisturise skin. Omyaskin is an example of a hydroxyapatite-based product that improves the effectiveness of sebum absorption and skin feel while also easing the manufacturing process. SOOTHE is superior to these existing products because silica is combined with a well-known bioactive material, hydroxyapatite, which can enhance cell growth when compared to silica alone.

CONCLUSION

SOOTHE is a product that can be used to revitalise the skin. The product development is based on very strong scientific principles, and the results of experiments have been reported in peer-reviewed journal articles. SOOTHE is a skin rejuvenation product that is available in pharmacies and clinics. Because everyone is interested in healthy and beauty products these days, the market for this product is enormous.

ACKNOWLEDGEMENT

Inventors would like to thank the Ministry of Education, Malaysia and Universiti Teknologi Malaysia (UTM) for financially supporting this research work under the Fundamental Research Grant Scheme (FRGS, Vot No: 4F514).

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ATOM: CLICK & MATHSUP

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ABSTRACT

ATOM is an acronym for A Team of Mathematicians which has created the innovation "Module: Click and Mathsup". This innovation is a combination of continuous training, self-learning and leveraging technology. Mathematics learning requires constant drills and specialized guidance from the instructor. Yet the new learning norm has changed teaching strategies to digital and virtual. This has sparked the idea for researchers to create a "Module: Click and Mathsup". The objective of this innovation is to improve students' mastery in answering UPS and PSPM questions, which are the main tests and examinations in matriculation. Next is to create self-learning resources for students. This innovation was planned early from the construction of the module to the video of the solution one by one which is linked in the interactive module. Students would value self-directed learning more and this has increased students' motivation towards learning even in digital learning. ATOM: Click and Mathsup has been widely used at the Kelantan Matriculation College and received good responses and has become a main digital reference source among students and lecturers. In conclusion, the innovations of ATOM: Click and Mathsup have had a tremendous impact on Mathematics teaching and learning strategies and changed the quality of students' self-learning. ATOM is planning to be commercialized, but the Movement Control Order (MCO) limits the process. However, the researchers continue to update and refine the Module: Click and Mathsup to be continued in the future and shared to all Matriculation Colleges in Malaysia.

Keywords: ATOM; Click and Mathsup; self-learning; digital; interactive

INTRODUCTION

Since March 2020, the Education system in Malaysia has undergone various changes and improvements to ensure that teaching and learning sessions continue. Various policies and recommendations have been implemented so that it is in line with the introduction of learning in the new norms.

On 23 January 2021, Datuk Seri Mahdzir Bin Khalid, through an interview with Utusan Malaysia expressed his concern regarding the challenges of online education. He has shared several suggestions for the improvement of online teaching and learning, one of which is non-real time online learning such as Google Classroom and Telegram. This aims to reduce the concerns of educators, students and parents regarding the issue of poor internet access.

Looking at the reality of teaching and learning in matriculation that has the same problems as in school, our innovation group took the initiative to introduce an innovation that not only promotes 21st Century Education (PAK 21) that is student-centered but has also integrated it with current issues of learning new norms. ATOM: Click & Mathsup is the effort

of a group of researchers who are lecturers from the Mathematics Unit of Kelantan Matriculation College.

Problem Statements

The following are some of the problems identified before the innovation was implemented:

- (i) Face to face learning cannot be conducted due to COVID-19 pandemic.
- (ii) Students need to go through self-study process.
- (iii) Limited learning platform.

Objectives

The objectives of this innovation are:

- (i) To improve students' competence in answering exam questions.
- (ii) To create self-learning resources for students.
- (iii) Making use of the advancement in technology to benefit students in every way possible.

Mainly, to boost their excellence.

INNOVATION DEVELOPMENT

After identifying the problems and listing the objectives, the researchers have designed the ATOM: Click & Mathsup innovation that targets Kelantan Matriculation College students. The innovations are as follows:

- (i) UPS and PSPM training questions of 18 sets (Mathsup Set).

The interactive question set is distributed in hard and soft copies to students. Students can answer a given set of questions to improve and reinforce the level of mastery in the Mathematics subject they have studied.

The interactive question set in the form of a soft copy facilitates students' access to practice at any desired time.

The interactive question set in the form of soft copy can make it easier for students to share with other students quickly by passing through online mediums such as WhatsApp, Telegram and others.

An interactive question set in the form of a soft copy can help students to have a discussion of difficult questions through an online medium.

- (ii) An upgraded interactive answer set by embedding solution methods through videos recorded by researchers on YouTube.

Students can repeat to watch the video solution provided on YouTube as needed.

Students can access the interactive answer to review the solution method any desired time.

The interactive answer sets make it easy for students to share with other students quickly by passing through online mediums such as WhatsApp, Telegram and others.

Solution suggestions videos provided on YouTube, can help students in self-learning.

The use of ATOM: Click & Mathsup is very practical and easy for students to access. Students simply need to click on the link provided by the lecturer and continue to be able to access the practice questions as well as the suggested solution answers. The diagram below shows the steps of using ATOM: Click & Mathsup.

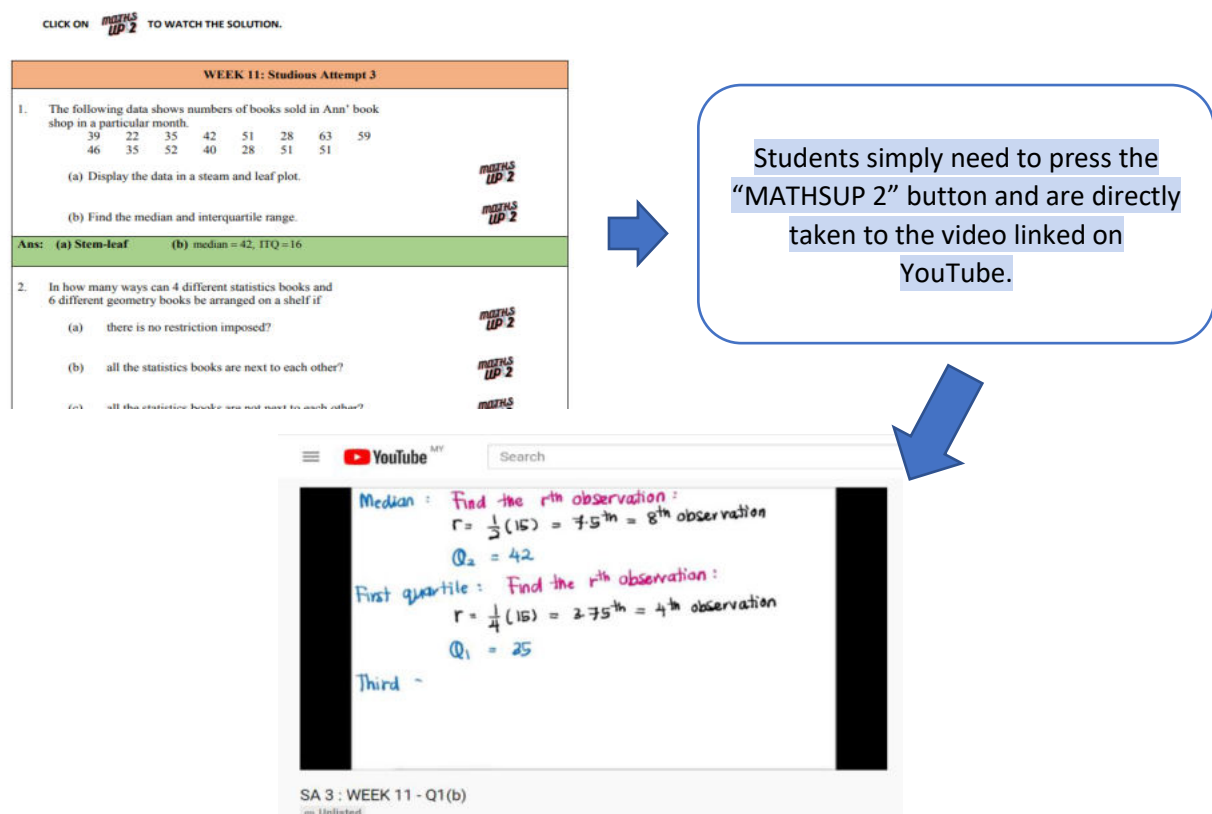


Figure 1: Steps of using ATOM – Click & Mathsup.

COMMERCIAL POTENTIAL

In order to use the ATOM: Click & Mathsup material that has been conducted, students only need to do a few very simple steps. After obtaining the link of the interactive training document provided by the lecturer, students can directly access the training as well as the suggested solution video of the answer. In addition, the ATOM: Click & Mathsup interactive exercises and videos facilitate student to do self-revision as these interactive exercises provide a direct link to each question for a solution suggestion video. Students only need to have a device such as a mobile phone or laptop as well as an internet connection to use the ATOM: Click & Mathsup innovation to help students revise.

EFFICIENCY/EFFECTIVENESS

Save Time

Through this innovation, the interactive mind map provided helps students review the subject of Mathematics thoroughly for each topic. These complete, engaging, and user -friendly notes save students time to reinforce their understanding after class and refer to any problems when answering questions because everything is available at their fingertips with just one click.

Cost Savings

ATOM: Click & Mathsup is completely digital with no setup and usage costs. The set of practice questions and interactive answers provided on the YouTube site can be accessed repeatedly as the average mobile network has an unlimited plan for YouTube.

Increase Productivity

This innovation increases student productivity when implementing self-learning. When faced with the challenge of totally online learning, easily accessible materials like ATOM: Click & Mathsup lift their spirits and give them the confidence to keep trying and not give up easily especially when answering questions. Students will be more independent, continue to review and have a high interest to keep trying as well as have the initiative to discuss with the lecturer if they have any problems or confusion.

Providing Real Benefits

The real benefits of this innovation can be seen from the increase in PSPM results of Kelantan Matriculation College students for the subject of Mathematics.

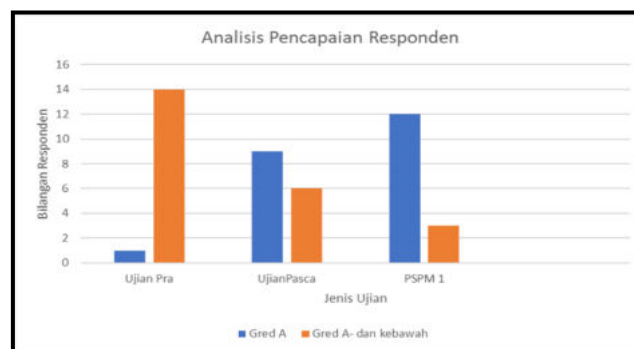


Figure 2: Respondent achievement analysis

Provide Customer Satisfaction/Stakeholders

Through the questionnaire conducted, the average student is very satisfied and happy with the benefits derived from the innovation of ATOM: Click & Mathsup.

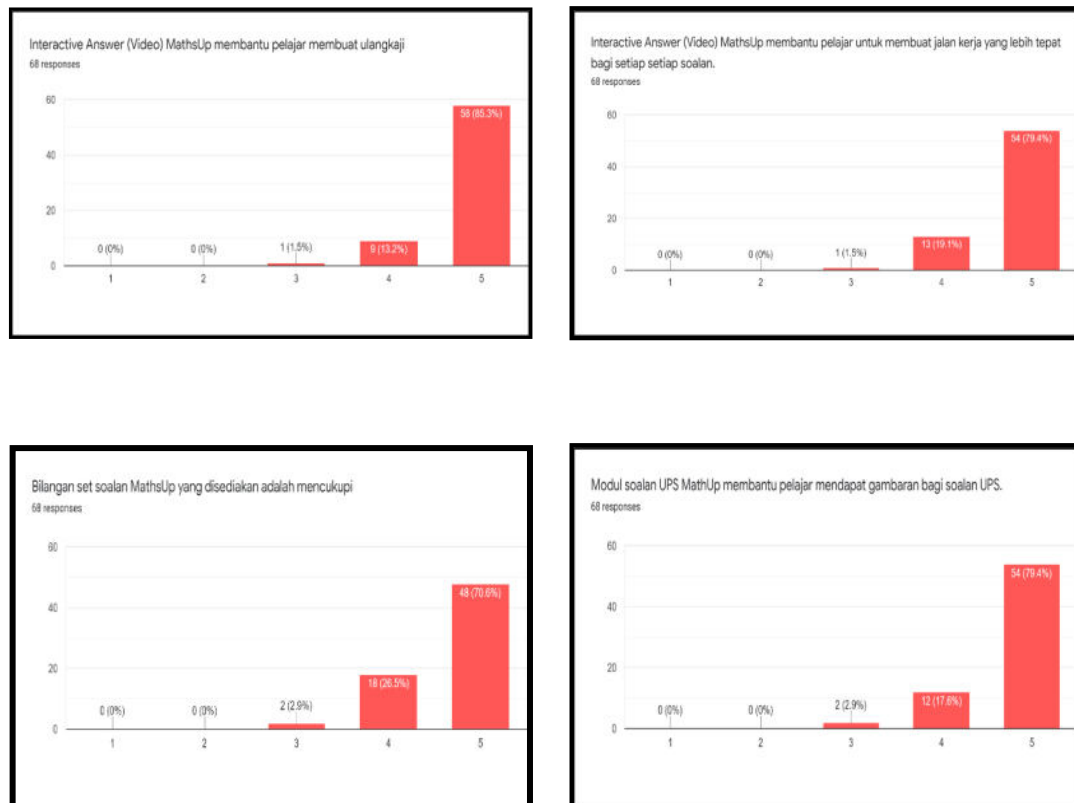


Figure 3: Questionnaire

SIGNIFICANT/RELEVANT

ATOM: Click & MathsUp. has a far -reaching impact on the educational community as a whole. This is because Mathematics is a subject that is universal and transcends any discipline. Coinciding with a pandemic era that limits our face-to-face movements and activities, technology driven innovations that resemble face to face interaction are sorely needed. ATOM: Click & MathsUp adopting such a concept is the right innovation to be cultured with the current situation. Thus, the use of ATOM: Click & MathsUp will have some impact on the educational community at the National and Institutional levels in particular.

Starting with the lowest impact, at the matriculation level, ATOM: Click & MathsUp innovation becomes an important element in being a guide and tool for students to do revision effectively. With the speed of just a few seconds, students can make references to questions that cannot be answered. Students will be given interactive guidance with complete descriptions and videos. ATOM: Click & MathsUp focuses on coaching selectively without the need for students to watch long and boring videos. As a result of the advantages of ATOM's innovation in terms of accessibility, students' motivation to learn Mathematics can be improved more effectively. At the same time, it leads to improved student performance in exams and quizzes.

Meanwhile, at the national level, ATOM's innovation has been utilized by Matriculation college students in Malaysia. The Youtube Channel which broadcasts question-solving broadcasts by the ATOM group has received thousands of visits from matriculation students across Malaysia. In addition, ATOM innovations are also benefited by school students, as the issue of ATOM content is comprehensive and equally relevant for the benefit of students taking Additional Mathematics subjects at the secondary school level. With the widespread use of these ATOM innovations, the greater the impact that can be felt by ATOM: Click & MathsUp

users. At the international level, ATOM: Click & Mathsup is looking for opportunities to expand its influence even more widely.

Based on the huge potential on this innovation, the members of the ATOM group agreed to create intellectual property protection against the ATOM innovation: Click & Mathsup. This innovation was registered with MyIPO on 2 August 2019. This innovation project has also been disseminated nationally and internationally with various parties including:

- (i) International University Carnival On E-Learning (IUCEL) 2021.
- (ii) Kelantan International Learning & Innovation Exhibition 2021 (KILIEX 2021).
- (iii) Pre- University Malaysia Innovation Competition 2021.
- (iv) International Digital Innovation and Invention Challenge 2021.

Appendix: <https://sites.google.com/view/atommathkmkt/home>

CONCLUSION

The COVID-19 pandemic hit the whole world and caused the closure of most sectors including the education sector to combat the spread of the virus. Therefore, most of the learning and teaching sessions were conducted online. Along with the advancement of technology and internet access, various initiatives are taken by educators to make the learning and teaching sessions a success.

Easy access to Mathsup module is also one of the factors that can help students to improve their understanding and skills in solving a given problem. In addition, the set of interactive answers through video using the YouTube platform can also be used as reference material for students to review in preparation for the Peperiksaan Semester Program Matrikulasi (PSPM).

In conclusion, the whole process of effective learning and teaching needs to go through the thorough involvement of students and lecturers. Therefore, the role of the lecturer to provide appropriate teaching materials can help students to improve understanding in the subjects studied. Practice question sets and interactive answer sets are a complete set that can be used as learning aids for students to make the learning process effective as well as to help students in implementing learning independently.

ACKNOWLEDGEMENT

I would like to express our gratitude and appreciation to all those who gave us the possibility to complete this paper. Special thanks are due our Ketua Unit, Pn Nurul Nadiah binti Che Rahim and our Ketua Jabatan Matematik, Pn Fazlina binti Yaakob who always encourage us all time in writing and carry out this project. I would also like to acknowledge with much appreciation to all members of Unit Matematik, Kolej Matrikulasi Kelantan, who always give support to our group.

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Visual Planning Tool for Postgraduate Students Towards Graduate on Time (GOT)

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ABSTRACT

Generally, most postgraduate students failed to conceptualise their research topic visually. Majority of the postgraduate students have difficulties to visualise the whole research process which they need to engage to complete their studies. Nevertheless, the postgraduate students might have their research proposal as reference, however there was nothing available that brought the information into a coherent, easy to manage whole where they can visualise in one image. As a result, visual tools such as the swimlane flowchart could be use by the postgraduate students as strategic research and writing tool for them towards achieving GOT. This is a visual tool with iconographic. This will enhance the students' understanding of their research overall. Postgraduate students can use this kind of mind map as a planning tool for their research project. Using the visual tool like this the postgraduate students become more aware of the components in their study e.g., Research approach (quanti/quali/mix-method), methods involve etc. The students could also plan on the number of papers that could be generated from their project and also the titles for each paper even before they start their research. Will be easier for supervisors to monitor their students' progress based on this kind of mind map. This type of visual tool can be used as research planning tool for the postgraduate supervision towards GOT (Graduate on Time). By using visual tools postgraduate students also can visualise each of the study involves in their project in terms of method to be used, sample size, tools to conduct the study and even the number of papers with title that could be generated from each study from their research project. This is important, because the students would not be able to lose track of their research project. Visual tools like this could also be used for supervisory meetings and a monitoring tool by the supervisors. This visual tool or the flowchart was copyrighted (LY2019000696).

Keywords: Postgraduate; graduate on time (GOT); Swimlane flowchart; visual tools

INTRODUCTION

Majority of the postgraduate students have difficulties to visualise their whole research process which they need to engage in order to complete their studies. Nevertheless, the postgraduate students might have their research proposal as reference, however there was nothing available that brought the information into a coherent, easy to manage as a whole where they can visualise in one image. That's how I developed something to be visualised by the postgraduate students to refer to.

Generally, many postgraduate students failed to conceptualise their research topic visually. Majority of the postgraduate students have difficulties to visualise their whole research process which they need to engage in order to complete their studies. Nevertheless, the postgraduate students might have their research proposal as reference, however there was nothing available that brought the information into a coherent, easy to manage as a whole where

they can visualise in one image. The lack of structure and the level of independence required has led to students reporting feelings of disorientation and isolation [1],[2] and [3].

As a result, visual tools such as this flowchart (Figure 1) could be used by the postgraduate students as strategic research and writing tool for them towards Graduate on Time (GOT). Among the objectives of this innovation is i) to develop a visual tool for postgraduates on their research journey and ii) to support the process towards GOT.

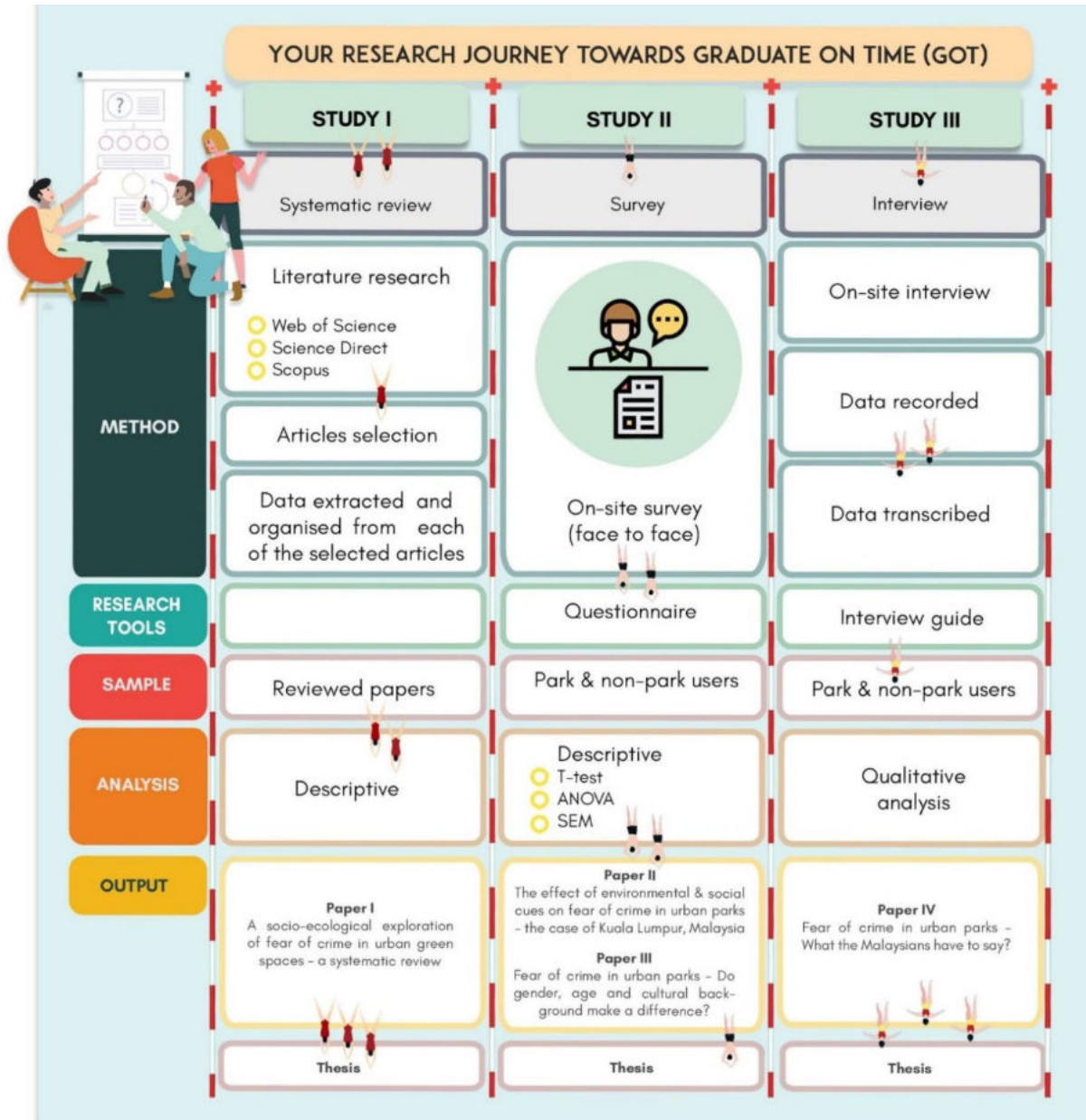


Figure 1: Swimlane flowchart (LY2019000696) as a visual planning tool for postgraduate students towards graduate on time (GOT).

Visual planning tool can be used by almost all postgraduate students. It is a visual research planning tool which could be adapted for any field of studies. It gives a clearer picture of the journey of their postgraduate project. It would be better if the postgraduate students could come out with their own visual planning tool at the beginning of their study to make sure each student are on track of their research. This is important because attrition can be as high as 50% for

students on postgraduate research programmes [2] and aside from the capacity to adapt to different expectations, an altered skill set and the ability to manage external life influences (e.g. family, work demands – acknowledging that many postgraduate research (PGR) students will be working parttime to provide financial sustenance for their studies) are oft cited factors influencing dropout at this level [1], [4]. Therefore, time management could be considered fundamental to success at postgraduate level.

Visual tools like this could also be utilized for supervisory meetings and as monitoring tools by the supervisors. Understanding the research process, and prior involvement in scholarly activities eg. presenting, producing publications/research papers are also significant factors in relation to academic readiness for PGR programmes [2]. With this the author hope, by using the visual planning research tool, the postgraduate students would be able to complete their studies on time.

INNOVATION DEVELOPMENT

This type of visual planning tool can be used by almost all postgraduate students. It is a visual research planning tool which could be adapted for any field of studies. It gives a clearer picture of the journey of their postgraduate project. It would be better if the postgraduate students could come out with their own visual planning tool at the beginning of their study to make sure each student are on track of their research. This is important because attrition can be as high as 50% for students on postgraduate research programmes [2] and aside from the capacity to adapt to different expectations, an altered skill set and the ability to manage external life influences (e.g. family, work demands – acknowledging that many postgraduate research (PGR) students will be working part-time to provide financial sustenance for their studies) are oft cited factors influencing dropout at this level [1], [4]. Therefore, time management could be considered fundamental to success at postgraduate level.

Initially this study was carried out based on the similar issues among most postgraduate students noticed at our local universities in general. In general, many at the initial stage not sure what to do, how to move on etc. because most of these students do not have a mental image of their research. From this problem, I believe it is pertinent to create something visual for the students to refer for the planning of their research. This flowchart was based on the research elements e.g., method, sample size, sample, objectives, publication etc. Based on these elements I developed the flowchart.

Survey

A survey was conducted with the postgraduate students from my faculty of this flowchart. 90% of the students said this type of flowchart is beneficial for their planning of their postgraduate research project (extremely agreed). 92% of the students said by using this type of flowchart they are clearer about their research. 92% of the students also said that by using such a flowchart makes them worry unnecessarily.

Students' Feedback

Majority of the postgraduate students gave positive remarks (Fig. 2) about the flowchart.



Figure 2: Users' feedback on the Swimlane Flowchart

COMMERCIAL POTENTIAL

At present this flowchart (Figure 1) has been copyrighted (LY2019000696). It has the potential to turn this flowchart into an app system. It would be useful for the postgraduate students to use this app as a planning tool for their postgraduate studies plus for the supervisory meetings.

CONCLUSION

Visual planning tool can be used by almost all postgraduate students for any field of studies. It gives a clearer picture of the journey of their postgraduate project. It would be better if the postgraduate students could come out with their own visual planning tool at the beginning of their study to make sure each student are on track of their research. Therefore, time management could be considered fundamental to success at postgraduate level. Visual tools like this could also be utilized for supervisory meetings and as monitoring tools by the supervisors. Understanding the research process, and prior involvement in scholarly activities eg. presenting, producing publications/research papers are also significant factors in relation to academic readiness for postgraduate research.

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NanofoodAtoZ: Website for Consumers' Awareness on Nanofood

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ABSTRACT

Food and food packaging containing engineered nanomaterials (ENMs) have entered the domestic market. Despite the rapid growth of nanofood, consumers' awareness of nanofood is still lacking due to the credence nature of nanofood, inability to identify the tiny particles using taste or naked eyes, and the labelling of nanofood is not yet a legal mandate. Consumers are unable to distinguish between nanofood with conventional food. They are being exposed to the potential safety and health risks posed by the oral exposure of ENMs. NanofoodAtoZ is a website created to raise awareness among consumers about nanofood, educate them on the integration of nanotechnology into the food and agriculture industries, and disclose the potential nanofood products that are currently available on the market. It is to help consumers make an informed choice and take the necessary precautions against the risks. NanofoodAtoZ is the only website in Malaysia that provides consumers with essential information on nanofood and nanofood inventory. Nanofood's manufacturers or suppliers can have their products listed in the inventory by paying a registration fee. The inventory helps manufacturers to promote the benefits of nanotechnology incorporated into their products. This website also advocates responsible nanotechnology development and is aligned with the United Nations' Sustainable Development Goals (SDGs) on strengthening global food security.

Keywords: Consumers' awareness; nanofood; safety and health risks; inventory

INTRODUCTION

Nanotechnology involves the manipulation of organic and inorganic materials at the nano scale, i.e., 1 to 100 nanometers, or one billionth of a meter. The tiny particles that are too small for the human eyes to see have exceptional implications and applications for humankind [1]. Nanotechnology has been regarded as one of the keys enabling technology for the fourth industrial revolution (4IR) that cut across various industries [2]. The vast functionality of the tiny particles is associated with unique psychochemical properties and novel behaviours such large surface area, high volume ratio, and increase reactivity [3]. In the food and agriculture industry, nanotechnology is regarded as new frontier technology that can overcome the food security and food safety issues, and eliminate global hunger [4]. Engineered nanomaterials (ENMs) and nanodevices has been widely applied in the area of food analysis, production, processing, packaging, and storage to produce fresh, authentic, convenient and flavourful food products [3]. Rapid applications of nanotechnology in the food and agriculture industries have seen the influx of nanofood and food packaging with ENMs in the domestic market, be it locally manufactured or imported.

Despite the rapid growth of nanofood in the market, consumers awareness of nanofood is still lacking [5,6]. It is due to the credence nature of nanofood, inability to identify the tiny particles using taste or naked eyes [7], and the labelling of nanofood is not part of food labelling requirement. Hence, it is impossible for consumers to distinguish between nanofood and conventional food. They are being exposed to the oral exposure of ENMs. Unfortunately, they are unaware of the potential safety and health risks associated with such exposure. Nanotechnology is popularly known as emerging technologies that is surrounded by scientific uncertainty on its safety status [8]. Various scientific studies demonstrate the potential adverse effects from oral exposure of ENMs to gastrointestinal tract [9]. Furthermore, the disclosure of nanofood in Malaysia is still lacking as there is no specific food inventory dedicated for nanofood.

Therefore, consumers in Malaysia are in need of a platform that provides them with essential information on nanotechnology, nanofood, and nanofood inventory. Therefore, NanofoodAtoZ is a website created to raise awareness among consumers about nanofood, educate them on the integration of nanotechnology into the food and agriculture industries, and disclose the potential nanofood products that are currently available on the market. The information provided enables the website's users to make an informed decision on whether or not to choose nanofood and exercise necessary precaution when dealing with nanofood. The creation of this website is also consistent with National Nanotechnology Strategy and Policy 2021-2030 that inter alia promotes a responsible nanotechnology development. The advancement of nanotechnology in various industries must take into consideration the potential safety and health risks. Consumers have a right to be informed on the proliferation of nanotechnology in consumers products. NanofoodAtoZ also helps to achieve the United Nations Sustainable Development Goals (SDGs), i.e., goal 2 on achieving zero hunger and strengthening global food security. Nanotechnology had been declared as an enabling technology to achieve SDGs in 2030.

INNOVATION DEVELOPMENT

NanofoodAtoZ is the only website in Malaysia that provides consumers with essential information on nanotechnology, nanofood, and nanofood inventory. Currently, there are four agencies dedicated for nanotechnology research and development (R&D) and commercialisation, namely the National Nanotechnology Initiative, NanoMalaysia Berhad, and NanoMalaysia Center [10]. Unfortunately, these agencies do not offer consumers in Malaysia with information on nanofood, consumers' rights associated with nanofood, and legal issues arising from the integration of nanotechnology in the food and agriculture industry. Their responsibility is to nurture and coordinate nanotechnology development across industries. Meanwhile, NanoVerify Sdn Bhd is the only nanotechnology product certification agency in Malaysia.

NanoVerify's website is the only website in Malaysia with inventory for nanotechnology products. However, the inventory is only limited to nanotechnology products that have received certification as nanotechnology products from NanoVerify [11]. Hence, the nanofood listed on their website is limited to food certified by NanoVerify. JAKIM Halal Directory also listed several food products with nano labels [12]. It is uncertain whether the food with a nano label is produced using nanotechnology given JAKIM is Halal certification agency. There is a possibility the word nano is used for commercial and promotional purposes. The novelty of NanofoodAtoZ can also be seen from the features of the website. The website consists of several pages, as listed in Table 1:

Table 1: Novelty of NanofoodAtoZ

Page	Description
Homepage	Provides information on the concept of nanotechnology, its history, and its development. In addition, this page also provides information on engineered nanomaterials in food products and food packaging.
Blogpost	Provides reading materials on nanofood. Short articles on nanofood are provided for example, fundamental characteristics of nanotechnology, nanotechnology and United Nations Sustainable Development Goals, and also Nanofood: What's it all about?
Publication	<p>Several academic publications of journal articles on nanofood are provided in this page. Here is the list of academic publications provided:</p> <ol style="list-style-type: none"> 1) Hasmin, N. A., Mahmood, A., Azizun, N., Abd Kadir, N. H., & Matmin, J. (2021). Consumers' Awareness and Knowledge af Nanofood in Malaysia. <i>Social and Management Research Journal</i>, 18(2), 23-46. 2) Hasmin, N. A., Zainol, Z. A., Ismail, R., & Mahmood, A. (2020). Regulatory Challenges of Nanofood Labelling. <i>J. Pol. & L.</i>, 13, 241. 3) Hasmin, N. A., Zainol, Z. A., Azizun, N., & Abd Kadir, N. H. (2020). Mandatory Labelling of Nanofoods and the WTO Agreements. <i>Journal of International Studies</i>, 16, 59-72. 4) Hasmin, N. A., Zainol, Z. A., Ismail, R., & Matmin, J. (2021). Disclosure of Nanomaterials under Nanotechnology Product Inventory, Voluntary Certification, and Voluntary Labelling. <i>Pertanika J. Soc. Sci. & Hum.</i> 29 (1): 157 – 174. 5) Zulkupri, M., Mahmood, A., Zainol, Z., & Hasmin, N. (2022). Consumer Related Theories and the Right to Informed Choice for Consumer in Nano Food Consumption. <i>UUM Journal of Legal Studies</i>, 13(1), 199-220. doi:10.32890/uumjls2022.13.1.9
Consumers' Rights	<p>Information on consumers' rights related to nanofood is provided. The following information is provided on the website:</p> <ol style="list-style-type: none"> a) consumers' basic rights as nanofood consumers b) the law regulating nanofood c) list of products that contained engineered nanomaterials
Forum	The most salient feature of the website is forum page as this page serves as a platform to gather all people around the world that share similar topic of interest (in particularly on nanofood) to interact with each other. Anybody can use this forum page as the medium to exchange information on nanofood or to have a discussion on any topic relating nanofood.

Source: Authors' interpretation

Based on these unique features, this website can be considered as the first virtual information centre on nanofood available in Malaysia. This website also serves as a one-stop centre for the public to have quick and easy access to information on nanofood and the insightful journey to discover the world of nanofood. Without NanofoodAtoZ, the information on nanofood is scattered, which means consumers have to look at several websites. This difficulty

may be a reason that discourages consumers from learning about nanofood. Therefore, with the introduction of NanofoodAtoZ, it provides an easier way for consumers to look for information on nanofood. This website can be easily accessed by anyone at www.nanofoodaz.com and it is designed for the public, particularly consumers who are interested in discovering nanofood. This website is the first of its kind that provides a platform for gathering necessary information on nanofood, specifically focusing on consumer protection on one single website.

COMMERCIAL POTENTIAL

NanofoodAtoZ is a social innovation that supports social progress and helps society prosper by deploying an effective solution to the challenging issues related to nanotechnology in the food and agriculture industries. The information on the website contributes to creating awareness among society about the potential benefits and risks of ENMs in the food and agriculture industry. Creating awareness using accurate information is crucial in enabling consumers to make informed decisions and exercise necessary precautions. Informed decision and precaution are two essential aspects when dealing with emerging technology that is surrounded by scientific uncertainty [13].

It is also important to highlight the idea behind NanofoodAtoZ. It started after a paper entitled “Disclosure of Nanomaterials under Nanotechnology Product Inventory, Voluntary Certification, and Voluntary Labelling” was published. The finding indicates a lack of disclosure instruments for nanofood in Malaysia, unlike in the European Union and the United States. Therefore, this is also an initiative to create a medium to disclose the availability of nanofood in Malaysia.

Even though NanofoodAtoZ is a social innovation, it also has commercial value. Currently, the website’s profits are generated by collecting revenue from advertisements displayed on the website. Revenue is generated every time the advertisements are viewed or clicked by the website’s visitors. Another way to generate income from the website is by imposing registration fees on the nanofood manufacturers and suppliers who are interested in listing their nanofood in the inventory. This would be the innovators’ next project, which is to approach relevant industry players to participate in this website. The advantages of listing their nanofood in the inventory include the ability to inform consumers about the availability of their products on the market, the benefits of nanotechnology or ENMs in their food products, and potential safety and health risks (if any). With the increased volumes of nanofood in the market, NanofoodAtoZ is undeniably an appropriate venue for manufacturers and suppliers to disclose their nanofood to consumers.

CONCLUSION

Hence, NanofoodAtoZ is essential to modern consumers due to the influx of nanofood in the market and nanotechnology is one of the key technologies that will change the traditional food science. It is recommended that more social science study on the effects of nanofood should be undertaken such as consumers’ protection and consumers’ perception on nanofood.

ACKNOWLEDGEMENT

The authors would like to thank the Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor Kampus Dengkil for the financial support given for this research paper.

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THE BATIK PERFECT 10 TRAVEL KIT

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ABSTRACT

The Batik Perfect-10 Travel Kit was developed as a significant product that impacts public health and safety by emphasising the sense of self-assurance and ease of feeling during post-pandemic travel. There are three major components of The Batik Perfect-10 Travel Kit: First, it includes three COVID-19 self-test kits (fingertip pulse oximeter, COVID-19 antigen rapid test and thermometer strips). Second, it provides three protective kits (disposable face mask, hand sanitizer, and disposable gloves) and the last component is the hygiene kit for travel (anti-bacterial wipes, toothbrush and toothpaste, shampoo, and body wash). The objectives of this product were meant to give travellers greater peace of mind because the majority of people are not yet willing to travel, they will want to be prepared by taking personal and proactive actions to limit infection rates in the new normal caused by pandemic COVID-19. Additionally, it is crafted from an exclusive Terengganu traditional batik fabric, making it suited for a variety of circumstances and environments. This product has multiple pockets for storage convenience, as well as a sling bag function for carrying convenience and hanging ability. Convenience sampling was used to distribute a total of 209 self-administered market survey questionnaires. According to the results, 82 percent or 173 of the respondents are eager to buy, and 49 percent believe the product is very innovative. Through collaboration with Pertubuhan Pemulihan Dalam Komuniti (PPDK) Wakaf Tapai, and UNI Pharmacy, this project is aligned with the Sustainable Development Goals (SDGs), as it supports the commercial viability of this product as an impulse product during travel, likely to result in the sustainable growth of local batik heritage, social, and economic relationships with the community.

Keywords: Travel Kit; batik; post pandemic travel; sustainable

INTRODUCTION

The globe has been stunned by the alarming spread of coronavirus illness (COVID-19). Travel restrictions and border closures have resulted in significant losses for all sectors, particularly the tourist and hospitality industries, all over the world. Given the global presence of COVID-19, thorough post-COVID-19 travel plans for all tourists are required. When the travel resumes, there are components that can be controlled and those that cannot. The visitor can regulate the usage of masks, frequency of hand washing, type of encounters with others, number of persons in encounters, and type of activities (Wilson and Chen, 2020; Khan and Hashim, 2020; Zanin and Papo, 2020). Travel kits now include hand sanitizers, face masks, cleansing wipes, thermometers, and perhaps pulse oximeters for people who need them (Wilson and Chen, 2020).

With the pandemic and more competitive work chances than ever, the obstacles and barriers experienced by people with disabilities are worsening (Suhaimi, 2020). The social entrepreneurship initiative features a network of cooperation with chosen groups, recognising that individuals with disabilities are the most affected group during the COVID-19 pandemic. Batik Perfect 10 Travel Kit is being made by disabled people because they believe that social entrepreneurship is the greatest way to take through this difficult period with enormous potential for future success (Rozali et al, 2018).

This effort at innovation is critical for the recovery of post-pandemic tourism. Also benefiting from this are disabled people's social entrepreneurial enterprises, as well as the communities that manufacture local batik as part of the bag design process. This innovative initiative will help improve public health and safety during post-pandemic travel. To sum up, this project's concept may support and be consistent with a variety of government policies and plans such as NEP 2030, Malaysian Plan of Action for People with Disabilities 2016-2022, 11th Malaysian Plan (RMK11), and Sustainable Development Goals (SDGs).

INNOVATION DEVELOPMENT

The 5 stages product innovation development process was implemented in this innovation project. This method was chosen because it involves the process of: 1. developing concepts, 2. doing research, 3. creating potential product analysis, 4. developing the product, and 5. launching the product.



Figure 1: The Batik Perfect 10 Travel Kit Innovation Development Process

Stage 1 (Concept)

After innovating three (3) Travel Kits previously, the Batik Perfect 10 Travel Kit is the most recent and fourth prototype product developed. Respondents' comments, suggestions, and recommendations from the previous market survey project were collected for consideration in new product development. According to the results, most respondents believe that the next travel kit should include the following criteria:

- 1) Each item is labelled in its own compartment.
- 2) Water-resistant material is used to protect bag from damage.
- 3) Incorporating some Malaysian culture into the design.
- 4) Introducing a sling bag style for ease of travel

Stage 2 (Research)

Convenience sampling method is used to distribute questionnaires to the targeted respondents. The survey included three sections A) respondents' demographics information, B) product's impressions, C) the respondent's intention to buy. The data were collected through online distribution, namely WhatsApp, Instagram, Telegram, and Instagram by using Google Form. 209 respondents completed the questionnaires and valuable responses were used for data analysis. Descriptive statistics were used to identify respondent's demographic information, to summarise the product's impression by the potential user and respondent's intention to buy the product.

Stage 3 (Analysis)

Six (6) items were listed and analysed in the demographic profile. Age, gender, marital status, monthly income, occupation, and travel frequency are all part of the demographic profile. Table 1 shows a summary of the data from each respondent's demographic profile that was analysed.

Table 1: Distribution of Respondent Profiles

	Category	Frequency	Percentage (%)
Gender	Male	42	20.1
	Female	167	79.9
Age	20-29 years	61	29.0
	30-39 years	87	41.0
	40-49 years	52	24.0
	Above 50 years	9	4.0
Marital Status	Single	78	37.3
	Married	130	62.2
	Divorced	0	0
	Widowed	1	0.5
Monthly Income	Below RM4360	97	46.4
	RM4360-9619	100	47.8
	RM9620 and above	12	5.7
Occupation	Private	85	40.7
	Government	56	26.8
	Others	68	32.5
Frequency of Travel	Once in a year	71	34.0
	Twice a year	55	29.2
	More than twice a year	77	36.8

As illustrated in Table 1, the respondents comprised 79.9% (n=167) females and 20.1 percent (n=42) male respondents. Most of the respondents were between the ages of 30 and 39 years old (41%) with married people accounting for 62% (n=130). Furthermore, most respondents (n=100) earn between RM4360 and RM9619 per month and work in the private sector (n=85). Approximately 36.8% (n=77) of respondents travel more than twice a year.

Customer Perceptions towards The Batik Perfect 10 Travel Kit

Figure 2 shows the potential customers' perception towards the product. This survey revealed that most of the respondents expressing very positive feelings as their first reaction to The Batik Perfect 10 Travel Kit (51.2%, n=107), and 49% of respondents agree that The Batik Perfect 10 Travel Kit is very innovative product; whereas most of them of 56% (n=117) responded from need to don't need The Batik Perfect 10 Travel Kit.

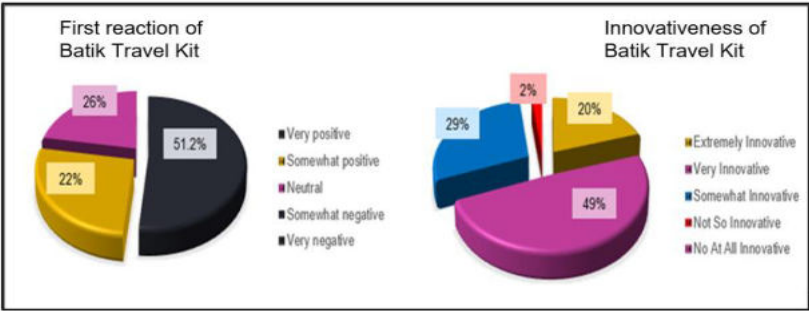


Figure 2: Customer perception on first reaction and innovativeness

Customer Purchase Intention towards The Batik Perfect 10 Travel Kit

Figure 3 depicted more than 82 percent (n=173) of respondents would be somewhat likely to extremely likely to purchase The Batik Perfect 10 Travel if it became available on the market immediately.

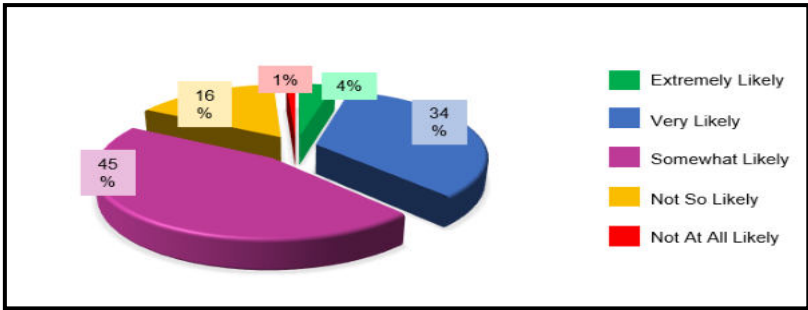


Figure 3: Customer purchase intention

Furthermore, the relative importance of the most important criteria when purchasing travel kit for customers is that they will primarily look for quality as a very important criterion n = 111, followed by functionality n = 108. They are unconcerned about price or design if quality and functionality are met first. The Batik Perfect 10 Travel Kit has the highest level of agreement on the reason for purchasing a travel kit. The exclusive price is a better value for money than other similar products (n=90), followed by its suitability as a good gift (n=86), it fills a need that is currently unmet (n=83), and it is of higher quality than the travel kit they previously owned (n=82).

Stage 4 (Develop)

The development of the product is based on the result from the survey conducted to the potential respondents. Besides, the following procedures are in place to ensure the seamless development of The Batik Perfect 10 Travel Kit:

Product Innovation Definition and Ideation Session with Group Members

The concept stage is frequently the most critical stage of product brainstorming because it is where many product ideas originate. Occasionally, at this first step, a SWOT analysis (strengths, weaknesses, opportunities, and threats) is used to prioritise ideas for the Batik Perfect 10 Travel Kit. Figures 4-6 shows the discussion with the group members and collaborators for this Batik Perfect 10 Travel Kit.



Figure 4: Brainstorming with group members



Figure 5: Meeting with PPDK



Figure 6: Meeting with UNI Pharmacy

Exclusive Material and Product Selection

The most important thing to remember at this point is to choose materials that meet all the materials selection requirements while still being the least costly. Materials such as the fabric to be used, the label to be attached to the bag, tags for the bag, and the products to be included in the travel kit are all important considerations while creating The Batik Travel Kit.



Figure 7: Material used for Batik Travel Kit

Prototype Batik Travel Kit Production

The focus of this phase is not only on product design, but also on the refinement of the product's prototype. Prototypes are frequently tested by team's members, who iteratively incorporate client feedback into the design. The step-by-step production are as follow:



Figure 8: Cutting the PVC



Figure 9: Cutting the Batik



Figure 10: Ironing the batik on PVC



Figure 11: Sewing the beg



Figure 12: Sewing the tagging



Figure 13: Sewing the straps



Figure 14: Sewing the Perfect 10 label

Step by step bag production by the OKU trainee from PPDK Wakaf TAPAI.

Final Product of Batik Travel Kit Production

During this stage of the product development process, the team completes all necessary steps to bring the finished product to market.



Figure 14: Final product of Batik Travel Kit

Stage 5 (Launch)

The team will be able to launch Batik Travel Kit product to the market once all the necessary procedures have been completed. At this point, promotion should be carried out through official social media accounts such as Facebook and Instagram.

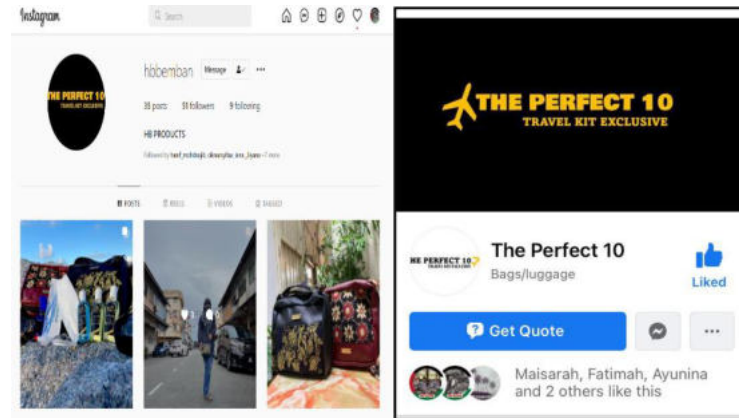


Figure 15: Social media – Instagram & Facebook

COMMERCIAL POTENTIAL

People have grown more careful than usual about their personal safety and health as a result of the present pandemic and soon-to-be endemic scenario; hence the product has commercialization potential as an impulsive item. Travelers will benefit from having a survival kit to keep safe and clean, especially during times when people are afraid of travelling and need to minimise the spread of infectious diseases.

The products have three (3) major unique innovations. In the first place, this is the only travel kit on the market that includes the COVID-19 Self-Test Kit, the Protective Kit, and the Hygiene Kit all in one little bag. As a bonus, this kit is made of water-resistant material, so its contents will stay dry inside. This makes it ideal for a wide range of situations and environments. Finally, it is made with local batik multi-compartments and pockets for storage, as well as a sling bag function that makes it easy to carry and hang. Because the kit's versatility comes from unique batik, it is a must-have accessory for any traveller on a post-pandemic trip.

CONCLUSION

The Batik Perfect 10 Travel Kit has received a lot of favourable response from customers. A market survey shows that the travel pack can be a lifeline for those who are apprehensive of visiting and want to decrease the danger of illness. As consumers become more concerned about their personal safety and health, the device may be sold as an impulse buy. We also want to upgrade the travel kit's materials to make it more versatile and sturdier to endure any condition, as well as having several variants or themes for ladies and gentlemen to meet their specific demands. We also plan to grow our partnerships with other organisations to serve society through The Batik Perfect 10 Travel Kit.

ACKNOWLEDGEMENT

We would like to thank UiTM Cawangan Terengganu for their assistance with this project. PPDK (Pertubuhan Pemulihan Dalam Komuniti) Wakaf Tapai, and UNI Pharmacy Dungun deserve special thanks for their participation and collaboration in this project.

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Discussion Kit

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ABSTRACT

Speaking skills contribute 25% of the overall mark in the new SPM English Language format starting in 2021. However, one of the common problems faced by form four and form five students in SMK Binjai was that they scored poorly in part 3 of the speaking test which requires them to discuss a topic with their partner. They felt that the question was too difficult. Many of them were not confident, lacked ideas, and did not use the language needed in a discussion. Therefore, a Discussion Kit was introduced to assist students to improve speaking skills and to help them ace the SPM speaking test. This product consists of question cards ranging from different topics, QR codes (connecting to songs, mind maps, websites, and videos), discussion starters, a detailed manual, and a listener's checklist. These elements cater to students' individual learning styles and multiple intelligences and are based on second language learning theories such as Krashen Comprehensible Input Theory, Zone of Proximal Development, and corrective feedback. The result of the pre-test showed that the average mark of students was 31%. After using it for two weeks, the average result of the post-test showed that the mark had increased to 80%. From the interview with the participants, this innovation gives them a lot of ideas to deliver content, helps them structure the discussion, and eventually make them confident in speaking English. Based on the feedback from teachers at other schools, they also found that it is an effective teaching aid to help students improve their speaking skills. This innovation is a must-have for every teacher due to its complete set without any prep and easy-to-follow manual. It can also be used as a game during relief or at home. This innovation has commercial potential; as it is multifunction, edutainment, low-cost, and mobile. Therefore, it is the researchers' inspiration that this innovation could serve as a teaching aid for teaching speaking.

Keywords: Speaking skills; discussion; motivation; second language learners

INTRODUCTION

Speaking skills contribute 25% of the overall mark in the new SPM English Language format starting in 2021. Part 3 of the speaking test requires students to discuss something with their respective partners. The pair will be given one mind map with 6 points to discuss the topic together throughout.

One of the common problems faced by form four and form five students in SMK Binjai was that they score poorly in part 3 of the speaking test. They felt that the question was too difficult. Many of them were not confident, lacked ideas, and did not use the language needed in a discussion. Therefore, a Discussion Kit was introduced to improve speaking skills and to help them ace SPM speaking test.

INNOVATION DEVELOPMENT

This product consists of a zipped file, question cards, question cards with extra support, discussion starters, listener checklist, manual.



Figure 1: A set of discussion starter

A File

A transparent zipped file is used to store all the equipment. The logo of the Discussion Kit is on one side of the file and another side is detailed manual to guide the users to use the product.



Figure 2: The zipped file for storage

Question Cards

The questions on the question cards are based on the SPM speaking test format. The questions are based on the different themes covered in the syllabus which are people and culture, consumerism, health, environment and science and technology. On each of the question card, there is a QR code that leads to a mind map, video, song, or website to provide content for students. The QR codes cater to students' individual learning styles and multiple intelligences which are important as they will not only allow different types of learners to learn but will enrich every individual's understanding of the topic (Patsy & Spada, 2013).

There are two types of question cards. The first set only has questions and QR codes, meanwhile the second set has extra help which has pictures to scaffold the students and directly give some ideas to answer the questions. It helps to generate students' ideas and introduce precise vocabulary when they talk about the topic. It caters to students' different proficient levels that is effective to lift the performance of all students, including those who are falling behind and those ahead of year level expectations (Cox, 2008).

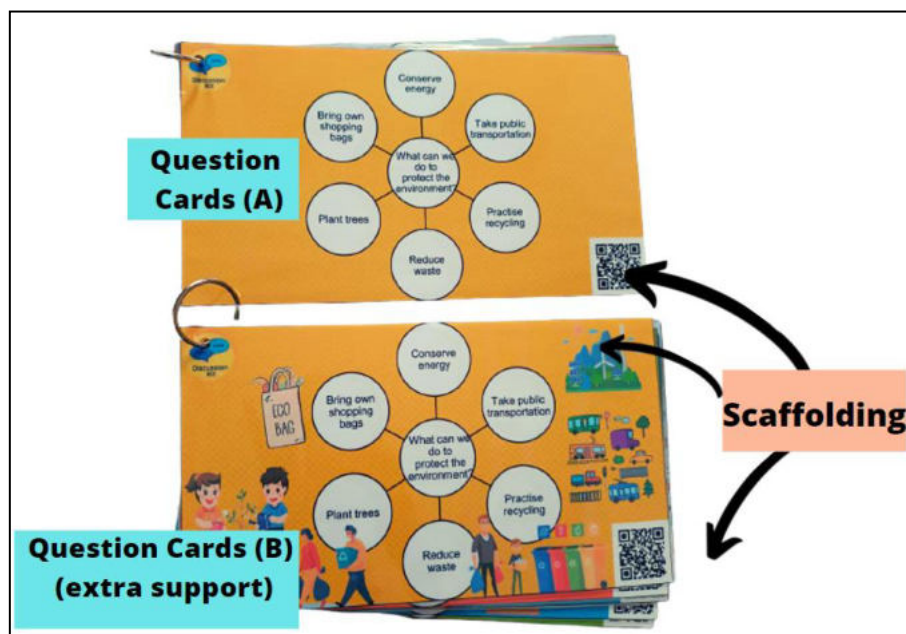


Figure 3: Question cards

Discussion Starters

Discussion Starters contain useful expressions for starting, adding to, disagreeing with, interrupting, and concluding a discussion. It guides the students to lead and discuss a topic with their partner. It is designed small enough to fit in the palm of students' hands, thus it is great if they want to use it secretly. It allows individuals to plan ahead of time, which can help them feel less anxious and improve their fluency indirectly.

Pictures and QR codes on the Question Cards, as well as Discussion Starters scaffold students to complete the task. Scaffolding has long been considered an effective teaching approach to assist students in extending their competence in the Zone of Proximal Development (Raphael, Pressley & Mohan, 2008). It enhances students' skills because it provides assistance, fosters students' learning, and focuses on interactions with peers and teachers. In the end, it makes students feel motivated as they achieve learning goals.



Figure 4: Discussion Starters

Listener Checklist

The Listener Checklist provides feedback to the speakers. Corrective feedback is an essential part of second language learning and teaching that influences students' learning and achievement. Feedback helps both the teachers and the students to meet learning the goals and instructional means in teaching and learning (Lyster, Saito & Sato, 2013).



Figure 5: Listener Checklist

COMMERCIAL POTENTIAL

The effectiveness of the Product

Discussion Kit is a comprehensive set that can build stronger and proficient second language learners. This product was developed by considering second language learning theories, learning theories and SPM syllabus. The researcher tested students' speaking skills. The results indicated a lot of improvement in marks which shows that the use of Discussion Kit helps students to improve their speaking skills.

a) Result of pre-test and post-test

Table 1: Result of pre-test and post-test

Student	Pre-test score	Post-test score
SS1	32	81
SS2	15	65
SS3	32	85
SS4	17	78
SS5	30	73
SS6	30	80
SS7	40	81
SS8	32	82
SS9	30	86
SS10	30	80
SS11	36	86
SS12	30	71
SS13	30	83
SS14	28	86
SS15	40	86
SS16	42	80
SS17	36	83
SS18	29	75
SS19	25	78
SS20	36	81
Mean (M)	31	80

Using the Statistical Package of Social Sciences (SPSS), these are the results of this analysis; pre-test, $M=31.75\%$ and post-test, $M=81.95\%$. The results show that the learners' scores are higher during post-test.

b. Observation

Apart from that, the findings of this study also revealed that the use of Discussion Kit increased learners' motivation to learn the language. This could be seen through their enthusiasm and interest during the process of learning. Molenda (2013) stated that the use of any teaching tool or platform that catches the interest and enthusiasm of learners can enhance their learning positively. The use of colorful cards has attracted learners' interest in learning. Besides, the QR codes and pictures help students generate ideas to answer the speaking questions. The QR codes, which are also purposely linked to different websites, videos, and

mind maps to cater to students' individual learning styles and multiple intelligences. When students' basic needs are met, they could concentrate on speaking. This shows that the use of interesting and suitable teaching and learning tools contributes to an improvement in learners' learning.

Semi-structured Interview

The researcher also interviewed the participants after pre-test and post-test. The responses are as below:

Table 2: Semi-structured Interview - students

After pre-test	After post-test
“It’s difficult. I don’t have any ideas to talk about. That’s why I feel nervous” SS6	Before this, I was always nervous to do part 3 of the speaking test. I was not confident and did not know how to do it. After my teacher introduced this product in the class, things changed. This game has boosted my confidence level and also made me feel more comfortable talking in English with others. The most interesting thing about this game is the QR codes help me to explore more about the content. It helps me to widen my knowledge and I can also learn new vocabulary. I love it!
“I don’t like to speak in English. It’s hard” SS8	With this product, I can practise English everywhere either with my friends or siblings. I also love the listener checklist. When I practise, I will ask my friend to assess me. We usually take turns in the roles. I love to get feedback. It improves my speaking.
“I don’t know what and how to discuss with my partner” SS12	Thank you teacher for introducing this Discussion Kit to me. Now I know how to participate in a discussion effectively. The Discussion Starters help me to use the discussion expressions needed correctly. It makes the discussion smooth and understandable.
“I feel uncomfortable. I don’t know what to talk about. The question is difficult” SS15	I like everything about this Discussion Kit. It makes my learning interesting and fun. I like the colourful pages of the Question Cards. I also like the pictures. The pictures help to give spontaneous ideas meanwhile I use QR codes when I want to explore more. Once I become confident, I change to the Question Cards for advanced. I feel satisfied when I complete the task.

This Discussion Kit was also distributed to teachers in different schools to get the feedback. Here is the feedback:

Table 3: Semi-structured Interview – teachers

Teacher A: This product is so perfect and exactly what I need for my students. It comes at the right time as we are lacking resources. My students love it! I'll be saving this resource to use again next year. Thank you!
Teacher B: As a new teacher, this product is a lifesaver! No prep is needed. It is clearly outlined and the guideline is easy to follow. It's very comprehensive, everything I need is there. Awesome!
Teacher C: It's a great resource. I love it! My students were engaged and enjoyed the activity. I'll buy it for my kids at home too.

Based on the responses received, it is obvious that learners are more positive about the use of Discussion Kit Meanwhile, for the teachers, Discussion Kit helps teachers greatly.

The Cost and Proposed Price

Table 4: Proposed selling price of a Set of Discussion Kit

No	Item	Cost	TOTAL
1	Zippered file	RM 2.00	RM2.00
2	Printing and laminating	RM 12.00	RM 12.00
3	Paper ring	RM 0.20 x 5	RM1.00
TOTAL			RM15.00
PROFIT			RM10.00
PROPOSED SELLING PRICE			RM25.00

CONCLUSION

It is hoped that the Ministry of Education can consider providing this Discussion Kit as a teaching aid to practise speaking English in all Malaysian schools. It can train individuals to speak English fluently. It can also change the way of teaching from teacher-centred to student-centred. This innovation can be used and adapted across the curriculum and other subjects by changing the questions on the question cards.

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Micro-Credential Functions for Learning Elementary Mathematics Using Online Platform

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ABSTRACT

The pandemic that occurs in the twenty first century has created a big impact in education system. A lot of drastic changes have been done due to the needs of the current situation especially in higher education. Online distance learning has been widely used to make sure that students can still upgrade their knowledge and skills. Thus, Micro-Credential has been developed to encounter this problem and further, upgrade one's knowledge and skills. This Micro-Credential module focuses for learning elementary level in mathematics. The topic of functions has been chosen due to difficulty of the topic in algebra syllabus. There are seven modules developed which consist of teaching materials using Ufuture online platform such as youtube video, notes, quizzess, test, course infromation and other additonal material for teaching and learning. At the end of this Micro-Credential, students will be assessed on their knowledge and understanding about the topics through final assessment. A certificate will be given to those students attend and pass in this Micro-Credentials. The Micro-Credential modules can be learned in a flexible time and the duration for this course is also shorter. A set of questionnaires have been distributed to students to investigate the feedback on the Micro-Credential's learner's satisfaction. The result shows that majority of students satisfied using the Micro-Credential modules. Therefore, this Micro-Credential's module is suitable to be used as part of lifelong learning using online platform and help students to upgrade their knowledge and skills especially for learning elementary mathematics.

Keywords: Micro-Credential; module; online distance learning; functions

INTRODUCTION

The pandemic occurs in Malaysia since 2020 has created a big impact in education system. Classical pedagogy learning in education system through face to face also has been transformed drastically due to the current situation especially in higher education. Through the concept of lifelong learning to many people, Micro-Credentials (MC) have been introduced globally. By the end of year 2021, the Institute of Continuing Education and Professional Studies (iCEPS), Universiti Teknologi MARA (UiTM) has launched the variety of MCs courses to promote digital learning and offer the course of Micro-Credentials [1]. The Micro-Credential is one of online learning platform where adult learners who have no opportunity to enter formal higher education institution could obtain certificate through attending the course of Micro-Credentials [2]. The emerging of Micro-Credentials also provided the opportunity for many people who wish to have a mix of Micro-Credentials. Thus, Micro-Credentials enable adults or

students to organize their learning into more qualification and skills. According to [3], Micro-Credentials in Mathematics for engineers was offered in secondary school for students to develop the skills required to be applied in engineering field as well as promoting STEM related education. In this Micro-Credential, the topic of functions has been chosen due to difficulty of the topic in algebra syllabus. This Micro-Credential Functions has been developed to encounter the problem of basic elementary mathematic skills in algebra syllabus. It is also suite for beginner learners to understand and increase their knowledge and skills about algebra topic. The content of Micro-Credential Functions consists of seven subtopics module which is elaborated in innovation development (Subsection 2). The Micro-Credential Functions is created by using Ufuture online learning platform and could be accomplished by students around six weeks only. Through the innovation learning by using Micro-Credential Function, it could benefit to many people especially for learning elementary mathematics as well as it supports the Sustainable Development Goal (SDG 4) in giving quality education for nation and gain people knowledge and skills in various fields.

INNOVATION DEVELOPMENT

The contents of the Micro-Credentials were developed follow the MQA guideline [4] and based on references from reference books, reputable websites and subject expert's YouTube video [5,6,7]. For each subtopic in Micro-Credentials, Microsoft PowerPoint slides were first developed. Then, animations were applied in the slides. Then, the slides were used to record the explanation and the video was produced for each subtopic. The videos were then uploaded to YouTube channel. In addition, the PowerPoint slides were also converted to PDF files so that students can have a copy of the notes that were easy to be referred anytime offline. Furthermore, exercises were also developed in the form of multiple choices and short answer with simple calculation needed. Some activities were also prepared such as Quizizz for students to further understand the topic. Additional materials such as references from useful notes from website and subject expert's YouTube videos were also provided to students for additional references. After students learning every subtopic, assessment is given to students to test their understanding. The assessment is in the form of multiple choice and the score will be given immediately after the assessment. This is to give immediate feedback to students to evaluate whether they have performed well or otherwise there is a need for the student to revise the lesson. Figure 1 shows the items in online platform for one of the Micro-Credential modules.

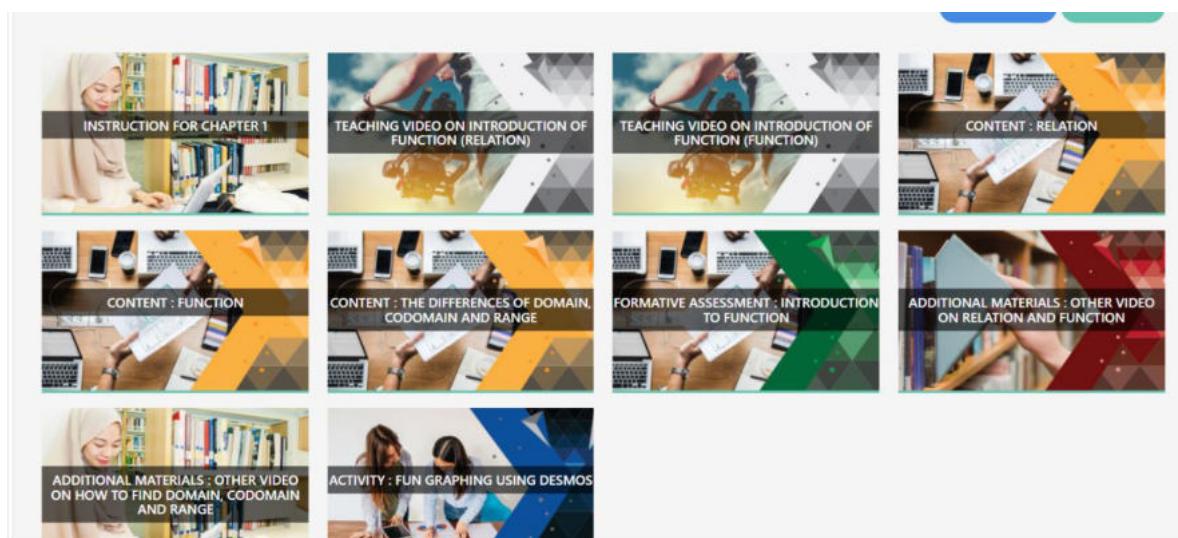


Figure 1: Items in the online learning platform

COMMERCIAL POTENTIAL

This Micro-Credentials module is uploaded in the online learning platform where the lessons are in the form of recorded videos. Students can learn the module in a flexible time. Furthermore, the duration for this course is also shorter than normal formal higher education course. Hence, this module has given a big advantage not only to students but also to workers to upgrade their skills in elementary mathematics.

The online questionnaires were distributed to investigate the learner's satisfaction on Micro-Credential Functions module. Figure 2 shows the bar chart of the learner's satisfaction on Micro-Credential Function. The finding of learner's satisfaction on Micro-Credential Functions module showed the highest percentage is the learning material was taught well (68.8%). It followed by instructional material was great and the usage of Desmos application improved student's skills (68%). Next, student enjoys using Desmos application in learning functions and improved skills using Desmos application (62.5%), student need to learn mathematical software better (56.3%), the learning material was interactive, improved student's understandings and students feel that Desmos application are difficult to use (50%). Meanwhile the lowest percentage is the instructional material was easy to use and understand clearly with 43.8%.

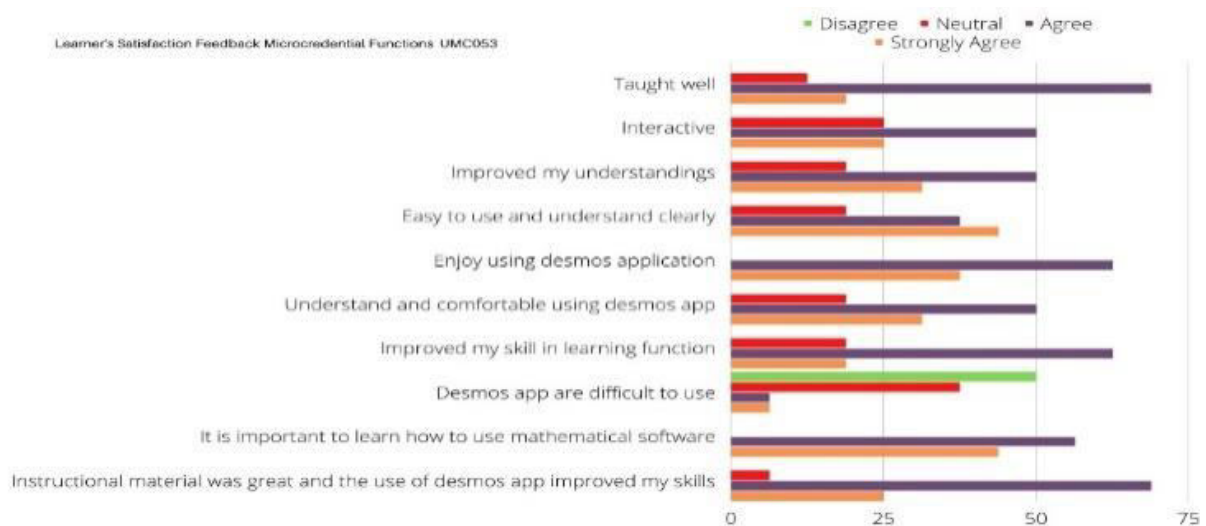


Figure 2: Bar chart of learner's satisfaction on Micro-Credential Function

From the finding, it is shown that learners satisfied with the learning experience with Micro-Credential and hence this module is suitable to be used as online distance learning. The materials developed in this Micro-Credential have also been submitted for the Copyright application. As the market for this Micro-Credential is broad, the potential commercialisation of this module is large. The benefit of the module contributes to the society in terms of encouraging lifelong learning.

CONCLUSION

This Micro-Credential Functions module is one of the alternative online lifelong learning that supporting our government mission toward Sustainable Development Goal (SDG 4) in which to give the quality education for nation. It also benefits to people in gaining knowledge and skills in various fields. This module can be done in a flexible time

and the duration of this course is also shorter. This module has given a big advantage not only to students but also to workers to upgrade their skills.

ACKNOWLEDGEMENT

The authors would like to express gratitude to Universiti Teknologi MARA Campus Johor for their support.

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Arabiyatuna Board Game

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ABSTRACT

This research focuses on a novel approach to learning Arabic through the Arabiyatuna board game. The board game includes 50 comprehension and grammar problems in Arabic. According to earlier studies, pupils' comprehension of language learning improves when they play games. The research's goals are to assess students' understanding of the Arabic language at the basic level and to link such knowledge to an interactive learning method. This board game is currently undergoing testing and will be released as an app in the future and will have a big impact on future Arabic language acquisition. It is believed that this study will improve students' grasp of Arabic and their attitudes about the language.

Keywords: Arabiyatuna; arabic language; board game

INTRODUCTION

Gamification using a board game is remarkably easy to use and catching eyes when playing the games while the brain is trying to process and grasp the information on the board itself. The scholars had agreed that the gamification as be defined as “Gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems” (Kapp, 2012; Taspinar et al., 2016).

Board game is cheaper to produce, arguably easier to design, while promoting an inclusive and social aspect to the gaming experience, as it is remaining a viable alternative for electronical gamification (Yan et al., 2012; Epstein et al., 2021). Games also may annex the social skills of students as well as improve their skills in understanding and solving problems (Kirikkaya et al., 2010; Liu & Chen, 2013)

This board game is the answer of three main research questions; 1- What are the gamification features needed for Arabic learning? 2- How is the process of designing the game model "Arabiatauna" carried out? 3- What is the students' acceptance of the game model "Arabiatauna" in Arabic learning?

Arabiyatuna is an Arabic compound noun comprises of 2 parts; “Arabiyat” and “Na” translated as “Our Arabic”. The idea of creating Arabiyatuna was inspired with various board games in the market. Excitingly, the strength of Arabiyatuna is lies on its unique learning where it incorporates with various elements of life, from basic knowledge to the geography of the Arab world. On top of that, the players also can gain experience dealing in business while playing the board game (Rupert et al., 2017).

Board

The Arabiyatuna game-board was designed of forty spaces containing twenty-eight properties—twenty-two streets (grouped into eight distinct color groups), four railroads, and two utilities—three Chance spaces (فرصة), two Community Chest spaces (الصندوق الاجتماعي), an Entertainment Tax space, an Income Tax space, and the four corner squares: Go, (In) Jail/Just Visiting, Free Parking, and Go to Jail as figure 1.

The distinct feature of this board is an additional card deck featured on the board – Fine card (غرامة), the card that impose on the players if they answered the chance card or any question posted on the board incorrectly.

The properties on the board are based on the Arabic world capital cities such as Riyadh, Amman, Mecca, and Cairo.



Figure 1: Arabiyatuna Board Game

Money

Arabiyatuna Board Game included with 7 following denominations as follow:

- 1 Riyal (turquoise)
- 5 Riyals (purple)
- 10 Riyals (green)
- 20 Riyals (blue)
- 50 Riyals (orange)
- 100 Riyals (turquoise)

Each player begins the game with their token on the Go square (امش) and be provided 1,000 Riyals prior. The segregation as follows:

- 5×1 Riyal
- 5×5 Riyals
- 5×10 Riyals
- 5×20 Riyals
- 5× 50 Riyals
- 5 ×100 Riyals

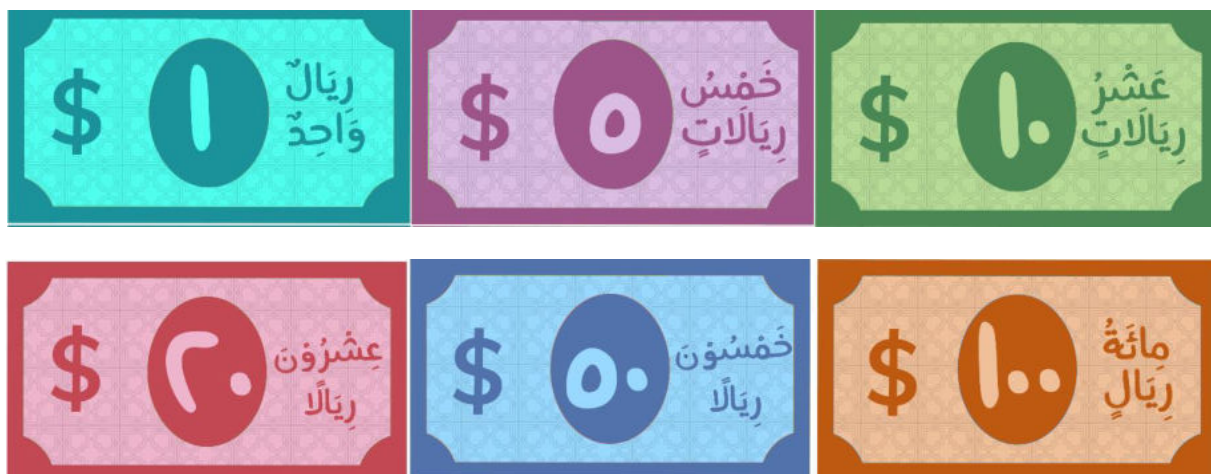


Figure 2: Money

INNOVATION DEVELOPMENT

This innovation started in August 2021 where the researchers conducted the need analysis on the students. The process was done among 103 learners, whereby the evaluation on user testing session was conducted among 4 lecturers at the Centre for Foundation Studies, International Islamic University Malaysia (IIUM).

After analysed the need analysis, the researchers had few brainstorming sessions to deliberate the result and discussed the preliminary ideas whereas scrutinizing the idea with the result.

Back in November 2021, the design of Arabiyatuna board game started and completed in December 2021. Along in the process, the researchers had faced certain issues while designing including labelling the properties and design the question for the chances card.

The researchers agreed on putting the Arabic major capital and cities as it nurtures the players about Arabic world and, they were agreed on putting the basic Arabic grammar and vocabularies to bolster the students' knowledge in the Arabic language.

The project was demonstrated on the students in January 2022 by asking them to play the board and seek their feedback on it. They are enjoyed with the Arabiyatuna Board Game and hoped that they can play it in future with another set of questions.

The project was firstly illustrated in the public via Pertandingan Inovsi Inter-Asasi Matrikulasi Kali ke-2 (PIITRAM 2022) which was hosted by National Defence University of Malaysia (UPNM) in March 2022. This innovation managed to archive a gold medal.

Principles of Effective Learning

While designing the Arabiyatuna Board Game, the researchers follow the ten principles of effective learning (Ten Principles of Effective Teaching | Bradley University, 2022):

Create An Active Learning Environment

Focus Attention

Connect Knowledge

Help Students Organize Their Knowledge

Provide Timely Feedback

Demand Quality

Enhance Motivation to Learn

Communicate Message in A Variety of Ways,

Help Students to Productively Manage Their Time

Develop The Entrepreneur Soft Skill

COMMERCIAL POTENTIAL

Undeniable that Arabiyatuna Board Game is potentially commercialized in various way. The public can fully utilise the board to learn the Arabic at the basic level addition to the ministry may use the board to be an additional educational tool. The lecturers manage to adopt the board as supplementary tool in the class.

CONCLUSION

Overall, the students love to play Arabiyatuna game board and at the same time, they managed to revise the Arabic grammar and learn the geography of Arab world. They are also able to manage their soft skills on financial.

Impact Of Learning of the Arabiyatuna Board Game

The finding of the product discovers that majority of the students were positive about learning “Arabiyatuna” which increased their learning desires and motivation, while at the same time improve their understanding and performance in learning this subject.

Respondents also agreed to the fact that Arabiyatuna has allowed them to experience self-learning. Explanation, exercises, and gamification designed has increased their interest in learning. Therefore, learning “Arabiyatuna” is now easier and brings positive results to students, as Malaysia embraces its newly announced Education Blueprint: Globalized Online Learning.

Arabiyatuna is a board game for Arabic language learners everywhere, and suitable to be used by all; students, university level students and Arabic teachers and lecturers as it is easy and quit recap for teaching and learning purpose.

ACKNOWLEDGEMENT

The researchers would wish to extend special thanks to Quranic Department, Centre for Languages and Pre-University Academic Development (CELPAD) and Centre for Foundation Studies (CFS), International Islamic University Malaysia for giving us this opportunity to join this competition.

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Innovation of Smart Hiking Stick for Tourists and Visitors to Promote Green Tourism During Endemic COVID-19

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ABSTRACT

The recreation activities are demanding after the Malaysia government waived the movement control order (MCO) due to the spreading of COVID-19. The public need more outdoor activities for mind therapy due too many indoor or stay at home during MCO. The opportunity of waived MCO is making every individual choose for recreation activities especially hiking at parks or forests. For safety, comfort & ease problems during hiking our team planned smart hiking stick for visitors and tourists. The smart hiking stick is built up to help for those individuals who are hiking at day or night. A smart hiking stick based on various functions that may help hikers to perform recreation activities easily. The smart hiking stick is a reliable option for outdoor activities for example mountain hiking, brisk walking, trail running or climbing. The smart hiking stick have 7 different tools, iron tip, screwdriver, spork, serrated knife, a survival whistle, led torch light and fire starter. And it is lightweight and durable, the smart hiking stick perfect equipment for beginner and advance hikers for any outdoor adventure, even the toughest ones. The iron tip for gripping rough, slippery surfaces, two extension poles, a screwdriver for assembly or repairs, a serrated knife for cutting, a spork for eating and a survival whistle to alert others to your location if you're lost. It also has a built-in compass for navigational purposes and the pole itself serves as a self-defence tool against wild animals or thieves. This makes the smart hiking stick a handy tool during rough outdoor adventures.

Keywords: Smart hiking stick; Green Tourism; multiple tools; self-defence; safety accessories

INTRODUCTION

After the movement control order (MCO) introduced by the Malaysia Government, most of the Malaysian population were in inactive in physical activities and create a major health problem [1]. A shortage of duration and a lack of inexpensive fitness equipment are normally as constraints to physical activity. In constraints walking has been indicated as an attainable workout method for people who desire to improve their fitness and walking has a low impact activity, cheap and it can be done almost anywhere at any time [3]. Routine walking can result to several health supports such as raised exercise aptitude, declined pressure of circulating blood, and improved glucose control [4]. Through walking activities can reduced stress level and stable emotional wellbeing. By walking strengthen walking speeds and improve a cardiovascular effect but should be done without extremity injuries [6]. As a solution the usage of walking with stick is advisable as an option to avoid high impacts to knee and feet. Walking with stick used by hikers to comfort in climbing up and down hill, over the rugged terrain, support the walkers on the spine, increase balance, and minimize the impact on the body [7]. The walking stick used as a balancing to control the gravity and as stabilization. The ideas of balance reflexes, strength, postural effects, and postural monitor were said as balancing in walking activities [8]. To maintain balance and body posture, is accomplished through the

interdependent work of the muscle, bone, ligament, physiological system, and the nervous system.

This innovation aimed to introduce the multiple features of the walking stick for hikers, tourists and at the same time to encourage green tourism in Malaysia [6]. The benefit of walking undeniable after spreading of COVID 19 and the trend of walking exercise becoming more and more demanding this walking stick was design to assist for balance and keep fitness after getting vaccines or booster during endemic [8]. The hikers walking with stick should apply a few techniques and walk naturally. While walking the hikers' shoulders position should relaxed and keep the stick closer to the body. A stick should be one foot and hold at opposite arm and swing backwards as the leg move forward [9]. The use of stick for hiking may reduce the risk loading and reduces injuries, the add some beneficial effect of hiking stick additional features have been attached to secured unexpected risks and to increase the hiker's safety when hiking deep in the forests [10].

INNOVATION DEVELOPMENT

The smart hiking stick special features are built in with qibla direction Muslims carry out the prayers in the forest facing towards the correct qibla direction would be the only one of the practical issues for the Muslims hikers. Most of other design did not include compass especially qibla compass attached the smart stick. This model would assist Muslim hikers to carry out the prayers with confident and feel direct himself towards the qibla correctly. The spiritual prerequisite can be done within physical activities. The smart hiking stick was design with a holding a flashlight at night, the headlamps eliminate the need to hold on to a light source, consequently allowing to put hands to better use. This design adds in high-quality headlamps build in inside the hand holder and comfortable experience, especially when long periods of time. The fire stater uses like setting up firewood, cooking and as a light source at night. When backpacking, space and weight are crucial, the hikers need to fit as many devices as possible in the bag to have a successful adventure, and at some situation the hikers had to wear a mask or respirator that offers greater protection in certain situations. The mask folder was design built in inside the smart hiking stick for these purposes and make it clean and dry. The emergency whistle built in inside the smart stick for the purpose of need help, to locate hikers that gotten separated and less tiring that calling out to someone. An Air Tag attached at the smart hiking stick it connects to other devices on the Find My network using Bluetooth is connect to a close-by device also on the Find My network it works for both iPhone and Android devices of third persons.

COMMERCIAL POTENTIAL

COVID-19 has drastically changed people lives over the past 2 years from the way people interact with other people to the way to work. It has even changed the way people exercise, smart hiking stick probably as a fitness tool that made exercise more accessible than ever because hiking is low cost and can be done any time. For many people, that means going back to the healthy lifestyle and regularly exercise after getting the vaccine. However, it does not mention any danger because of exercising and prolonged, mild- to moderate-intensity walking exercise could improve the body's immune response, walking increases blood and lymph flow, which helps circulate immune cells. As these cells move around the body, more likely to increase metabolic, biochemical, neuroendocrine, circulatory [10]. The smart hiking design is not all about technologies and functions, it should care for the emotions while hiking. It was believed that the walking stick can effectively prevent their falling because of their weak muscle power, visual and hearing decline as well as the environmental obstacle influence. As a

subdivided category, the intelligent walking sticks are meant for multiple target market. The youth how love adventure, the adult to prolong and maintain their health and the elderly for general walking for the elderly and smart hiking stick target market meet the diversified and latent demands from many users.

The Prototype Design of smart hiking Stick with dismantle features

It began analysis on four requirements: user-friendly interactive relations, useful functions, proper materials, and accessibility. Next it determined the design direction of intelligent hiking walking stick, and built the product prototype features safe, reliable, applicative; the additional functions should adapt environmental and user characteristics. Additionally, the user experience was optimized, and the modelling was designed in line with the Muslim needs. The general design concept focuses on the healthy lifestyle, minimalism, and safety requirements. It attempted to integrate the advantages of safety and comfort in hiking traveling, adaptability, solidity and elegancey together. It divided the stick body into upper part and lower part. The length of hiking stick was therefore adjustable as per user's stature. The size of stick head was relatively larger, so it was convenient for holding plus led light. The lower part of the stick head was designed as slip-resistant groove to prevent it slipping out of the hand; the icon design on the operational buttons were easily recognized and remembered. As personal belongings, a hidden tools were added at the handle of hiking stick. A front light source was added on the stick. When the hikers walk at night with the intelligent stick, they can switch on the low beam or high beam in wake of actual environment thus reducing their accident incidence in dim places with adjustment buttons. Air Tag bult in for help, in case falling, sickness or any other accidents occurs. The whistle it then makes sound to draw the attention of other hikers by. In the meantime, the stick automatically sends the location data to third person through GPS navigation system. The overall weight is so light that the hikers can save effort when they use it. Moreover, as the major part, the stick body used metal material to provide secure support and its foot pad adopted anti-slippery rubber material to increase friction. Its general modelling was simple and steady. It adopted classic black and silver/red colours to create a visual sense of reliability and safety.



Figure 1: Innovation prototype

CONCLUSION

It is expected the smart hiking stick is marketable and because of health concern after the COVID-19. According to the average results of COVID-19 cases, those with health problems have a high risk of getting sick that may cause to death. The healthy lifestyle seems very important during the endemic and regular exercise seems very demanding and indirectly the usage of smart hiking stick would increase due to this healthy trend among Malaysian. The regular walking was very low cost and less risk and can be done at every age. The use of smart hiking stick is advisable decreased risk while hiking to a moderate level than those who were not using a smart hiking stick [11]. For long term there was a significant difference between balance scores while using and when not using a smart hiking stick. It was recorded that hikers preferred to use a walking stick to support their balance and independence while walking, by self-decision. Since there was no significant difference between the ideal and preferred length of the walking sticks length, it was thought that the hikers could make the best decision and could choose an appropriate walking stick for themselves. It has been determined that the body mass index may affect the balance and it becomes more difficult to maintain postural stability as the BMI increases. It was found that there was a significant difference in BBS scores between those with and without walking sticks according to BMI in our study. Maintaining the balance during hiking is quite different from the posture in standing. While standing, the purpose is to keep the center of gravity within the support surface. However, walking disturbs the stability of the body and adaptation is required according to alterations in the gravity line.

ACKNOWLEDGEMENT

Author would like to express her appreciation for the support of the innovations and her innovation is under the Faculty of Hotel and Tourism Management Melaka, Universiti Teknologi MARA, Malaysia.

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Insan Sejahtera Modules as the Foundation for Comprehensive Excellence

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ABSTRACT

The International Islamic University Malaysia have formulated a comprehensive framework for education called Sejahtera Academic Framework (SAF) in its effort to humanise education. Insan Sejahtera, as the ultimate end of the framework, is a manifestation of a well-balanced individuals integrated with good faith, knowledge and good character for sustainable development of Malaysia, Muslim ummah and global population. At the Centre for Foundation Studies, the concept of Insan Sejahtera is formally introduced to the students during their orientation programme. The Insan Sejahtera modules, which focus on the concepts of KhAIR, are set to expose the students on the Sejahtera Academic Framework (SAF) of the university and serve as an alignment tool to shift their paradigm to a comprehensive framework of IIUM. Arguably the first integrated modules for orientation, the modules are tailored to the aspiration of IIUM, making the modules as a part of the continuous processes in nurturing an Insan Sejahtera. Being adaptable and universal, the modules can be developed further as a model for implementation in all institutions. By that, a mutual understanding between the students and institution can be established earlier on and eventually will serve as a common platform for the humanising education processes.

Keywords: Integration; humanising education; orientation; comprehensive excellence

INTRODUCTION

At the Centre for Foundation Studies, IIUM Ta'aruf Week (orientation for new students) has been conducted for every student's intake. It consists of a series of academic and non-academic briefing aimed to familiarise students to the nature of their studies and the university's aspirations. It also aims to help students adapt to their new environment and educational setup. However, it has been conducted routinely without much revision leading to several problems. Among the problems are orientation programmes and activities were restricted to one-way method of communication leading to dictating dos & don'ts. This method is not suitable for Generation Z's learning styles [3,6]. They are content creators not merely consumers of information. They require opportunities to express their ideas and thoughts and feel the need to communicate constantly through any possible means of communication [4]. They take the initiative to use the available resources of learning. They are actively seeking activities that

make them feel involved, which help them to develop themselves and finally, that are dynamic and involve creativity.

Orientation is packed with technical briefings such as registration of subjects, study modules etc. and also motivational slots. Due to packed and demanding sessions, students were tired and cannot fully benefit from the sessions [8]. The University aspirations (Philosophy, Missions and Visions) were usually presented up to only theoretical statements. Thus, there is a need to conduct orientation that suits the learning styles of current students which include opportunities to express themselves [8]. Besides, to have sessions that are appropriate to students' energy and attention span and generate activities that translate the university aspirations. Therefore, Insan Sejahtera Modules are developed to cater to the above needs.

INNOVATION DEVELOPMENT

The International Islamic University Malaysia have formulated a comprehensive framework for education called Sejahtera Academic Framework (SAF) in its effort to humanise education [2]. Insan Sejahtera, as the ultimate end of the framework, is a manifestation of a well-balanced individuals integrated with good faith, knowledge and good character for sustainable development of Malaysia, Muslim ummah and global population [1]. At the Centre for Foundation Studies, the concept of Insan Sejahtera is formally introduced to the students during their orientation programme starting from the 2020/2021 session.

In the modules, there are specific activities which allow the students to express their thoughts and opinions. For example; in Module Iqra', the students are asked to share their understanding of Surah al 'Alaq (96:1-5) in relation to the quest for knowledge [5]. In Module Amanah, they are requested to post something in relation to gratefulness on their own social media such as Instagram, Facebook and Twitter, and share the link with other group members. In addition, in Module Khalifah, they are given 15 minutes during the session to write a short life story about themselves on leadership. Below (Figure 1) are samples of students' works.



Figure 1: Samples of students' works

Meanwhile, the university's aspirations are translated into activities throughout the modules which enable the students to grasp and understand them better. The modules employ, among others, narrative-based learning by using inspirational stories to deliver the message. For instance, the adab of seeking knowledge in Module Iqra' is discussed through the story of Prophet Musa A.S and Prophet Khidr A.S. Besides, activities for Rahmatan lil 'alamin module, where students brainstorm ideas together for Community Service manifests collaborative

learning. Both approaches, the narrative-based learning and collaborative learning, promote constructivism of knowledge among the students [7].

Table 1: Insan Sejahtera Modules

MODULES	TOPIC	STIMULUS	ACTIVITIES	OUTCOME
KHALIFAH	The leader in you	Tadabbur al Quran (2: 247-252) Story of Talut	Students to present their leadership quality and attributes.	Students to reflect on the leadership quality and attributes.
	Be responsible	Video on Islam and Protection of Environment.	Discussion on the video.	Awareness on the holistic concept of responsibilities in life.
AMANAH	Honesty and integrity	Tadabbur al Quran (28: 27-29) Story of Umar r.a.	Group discussion on the lessons of the verses and story.	Reflect on the value of honesty and integrity.
	Seeking barakah	Story of Abu Qilabah al Jarmi	Students to post their responses in social media.	Students to reflect on the concept of gratefulness (shukr)
IQRA'	Passion for knowledge	Tadabbur al Quran (96: 1-5)	Students to search and present stories related to seeking knowledge.	Students to reflect on the needs for seeking knowledge.
	Adab in seeking knowledge	Tadabbur al Quran (18: 60-82) Story of Musa A.S.	Students to share opinions on adab.	Students to reflect on the importance of adab.
RAHMATAN LIL 'ALAMIN	Sejahtera@Heart	Sejahtera Academic Framework Falsafah Pendidikan Kebangsaan (JERIHAS)	Group discussion on holistic education.	Students to understand the importance of holistic development.

COMMERCIAL POTENTIAL

The commercial potential of the modules can be seen through the responses from the students and community at the Centre for Foundation Studies, IIUM. At individual level, the results of a survey conducted among the students after the completion of the modules has shown positive feedback from the students (Figure 2).

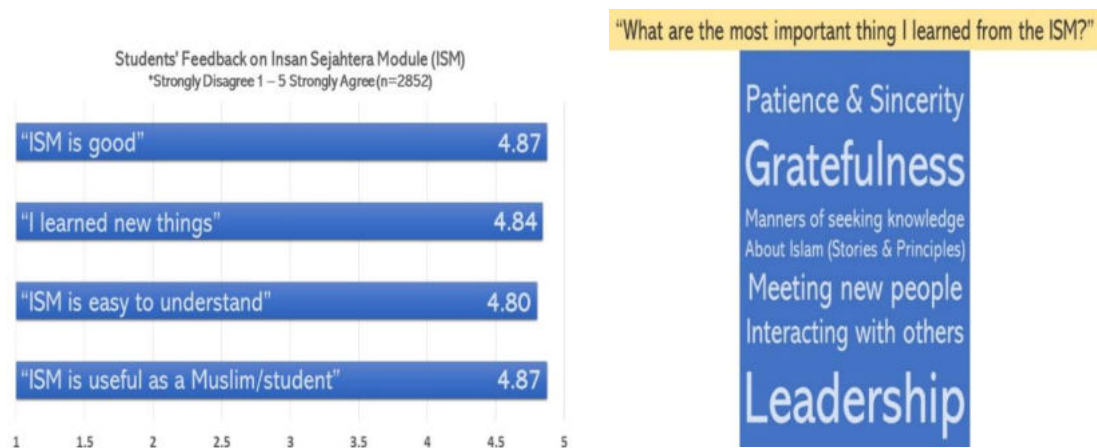


Figure 2: Positive results on the implementation of Insan Sejahtera Modules.

At community level, the ripple effect of Insan Sejahtera Modules can be consistently felt after the conclusion of the orientation programme. Programmes inspired by the modules are conducted throughout the semesters. It was recorded that a significant 325 programmes related to Insan Sejahtera Modules were conducted between September 2021 until February 2022. This has proven the popularity of the modules among the community.

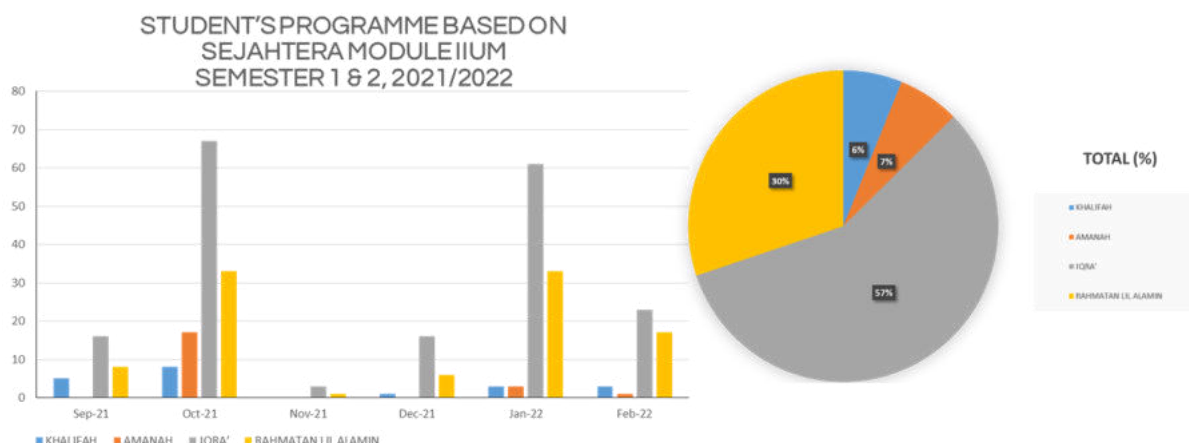


Figure 3: Programmes related to Insan Sejahtera Modules (after orientation).

With all the positive responses related to Insan Sejahtera Modules, it shows that these modules may appeal to other universities and learning institutions. Other institutions may adapt and adopt the modules to their specific needs in order to improve their branding image in the eye of the community which at the end would increase institutional revenue. As Insan Sejahtera Modules are founded on values, the modules are adaptable and flexible to changes and alterations.

CONCLUSION

In conclusion, the Insan Sejahtera Modules fulfils the three above-mentioned objectives which are: modules that allow students' expression, flexible and collaborative, and filled with strategic activities translated from the university's aspirations. The modules can be further

improved through hiring content creator specialists to make it more appealing to other universities and even companies.

ACKNOWLEDGEMENT

Management, International Islamic University Malaysia and Management, Centre for Foundation Studies, IIUM.Br. Taifunisham Taib, Deputy Dean, Student Development and Community Engagement, Centre for Foundation Studies, IIUM.Lecturers, facilitators and students, Centre for Foundation Studies, IIUM.

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KhAIR as a Model for “Learning to Become”: Implementation Model for AED0644 Introduction to Built Environment at the Centre for Foundation Studies, IIUM

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ABSTRACT

Learning to become is an initiative by UNESCO to address the issue from an educational perspective. In line with the above initiative, IIUM has come out with SAF (Sejahtera Academic Framework) that aims to produce balanced and becoming students. One of its components is KhAIR; Khalifah (Vicegerent), Amanah (Trust), Iqra' (Knowledge), and Rahmatan lil 'Alamin (Mercy to the Universe). The manifestation of KhAIR is represented in the AED0644 Introduction to Built Environment course. In conducting the study, the KhAIR model is integrated into the four components of the curriculum i.e., aims and objectives, subject matters/contents, learning activities, and evaluation. This innovation offers an integrated implementation model for Learning to Become in the context of preparing professionals for built environment practices. It also presents the integration process of KhAIR model undertaken by AED0644 Introduction to Built Environment in trying to achieve the level of Learning to Become. The result of the implementation can be vividly seen in the students' works for the studied course, the AED0644 Introduction to Built Environment as well as in other courses offered by the department i.e., AED0626 Introduction to Design, AED0654 Presentation Skills.

Keywords: KhAIR; learning to become; integration

INTRODUCTION

IIUM has come out with SAF (Sejahtera Academic Framework) that aims to produce balanced and becoming students [1]. One of its components is KhAIR; Khalifah (Vicegerent), Amanah (Trust), Iqra' (Knowledge), and Rahmatan lil 'Alamin (Mercy to the Universe) [2]. However, at the Centre for Foundation Studies, this framework is usually presented up to only theoretical statements and not integrated into the curriculum holistically. The curriculum for instance, AED 0644 Introduction to Built Environment focuses on the first three of the UNESCO principles of learning which are learning to know, to do and to be. Thus, the emphasis is given to knowledge and skills while values and virtues are not incorporated in the curriculum [5]. Thus, there is a need to integrate the KhAIR model into the four components of the curriculum i.e., aims and objectives, subject matters/contents, learning activities, and evaluation. It aims to produce balanced and becoming students who understand their responsibilities as vicegerents and servants of Allah. Realise and manifest the university aspirations through curriculum leading to the internalisation of the spirit of KhAIR among

students and the realisation of Learning to Become. Therefore, the integration of the KhAIR model into the curriculum is needed to cater the above needs.

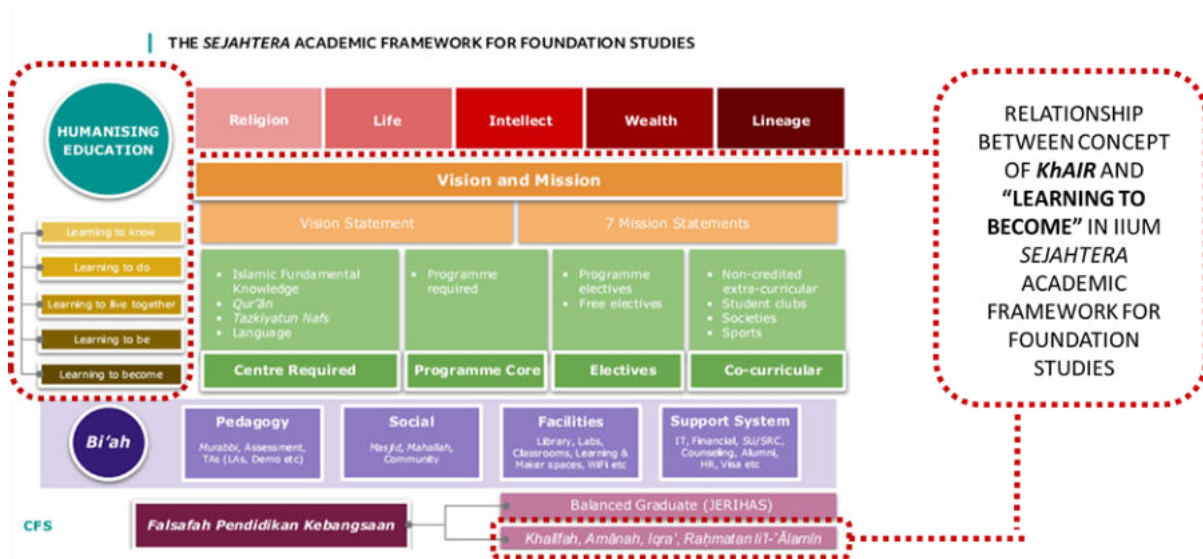


Figure 1: The Sejahtera Academic Framework for foundation studies.

INNOVATION DEVELOPMENT

KhAIR as one of the components of the Sejahtera Academic Framework embodies the responses of the frameworks towards several educational issues highlighted by the UNESCO. The issues are humanising education, sustainable development, learning to become and the visions and missions of IIUM [3]. It is formulated to address and nurture the current generation of IIUM students to become a well-balanced individuals integrated with good faith, knowledge and good character for sustainable development of Malaysia, Muslim ummah and global population [3,6,7].

The domains of KhAIR, namely Khalifah, Amanah, Iqra' and Rahmatan lil 'Alamin are embedded into the four components of the curriculum for AED0644 Introduction to Built Environment, without the need for a curriculum review. The embodiment of KhAIR is made in such a way that the domains are highlighted and emphasised within the current curriculum setting [8].

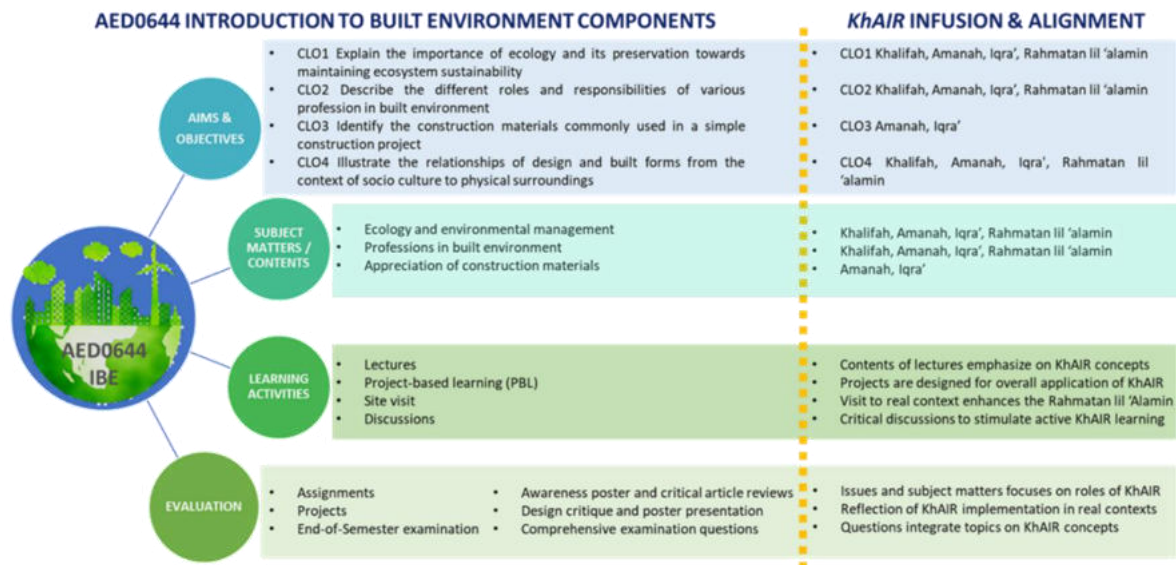


Figure 2: The implementation model of KhAIR into AED0644.

COMMERCIAL POTENTIAL

The implementation model of KhAIR into AED0644 Introduction to Built Environment can be commercialised in two different ways. As an educational model on change Khair model is a good example of moving towards a new framework of education as highlighted by the UNESCO. It is a model founded on change, in addressing the limitation and problems of the current educational models. As an adaptable Outcome-Based Education (OBE) educational model KhAIR model, as an OBE educational model is adaptable and flexible in nature. The foundation of KhAIR is its value-based educational model, thus making it easier for other institution to emulate.

CONCLUSION

In conclusion, although KhAIR model is a pilot project in integrating the Sejahtera Academic Framework into the curriculum at the Centre for Foundation Studies IIUM, the result of the implementation is very encouraging. The next step is to formally embed the whole framework into the curriculum through periodical curriculum review process.

ACKNOWLEDGEMENT

Management, International Islamic University Malaysia (IIUM). Management, Centre for Foundation Studies, IIUM (CFSIIUM). Department of Architecture & Environmental Design, CFSIIUM. Department of Islamic Revealed Knowledge, CFSIIUM. Lecturers and students, CFSIIUM.

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Jurisophy: An Educational Card Game for Legal Theories

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ABSTRACT

Legal theories and legal concepts are essential subjects for law students to learn and understand the legal system. Due to its contents, it is perceived to be a dry and heavy subject. The student must understand and apply the theories to various legal problems to thoroughly comprehend them. They are often taught to examine and analyse using the ILAC format (Issue, Law, Application, and Conclusion), one of the universal formats used by all law students worldwide. However, due to how ILAC is taught in a class, students still find it challenging to comprehend the legal concepts. The students become bored and lose interest due to the lack of engagement, making it difficult to grasp the idea. Consequently, the card game 'Jurisophy' was innovated by fusing five concepts or legal theories with legal problems creatively and engagingly. One set of Jurisophy consists of 83 cards, including two instructions and guide cards, ten legal problems cards, and 71 element cards consisting of issues, definitions, jurist opinions, legislation, case law, and concepts that must be gathered to solve one legal question. The uniqueness of this card game lies in the way it is designed to assist students in understanding the concept of legal theories in legal situations in a more effective, simple, and enjoyable manner. Therefore, this kind of card game will stimulate students' interest and minds to understand better and make memorising experiences more straightforward and exciting.

Keywords: Legal Theories; legal concepts; problem solving; card games; ILAC format

INTRODUCTION

The usage of games in education significantly impacts students' learning development. A game can be used as a supporting tool to complement traditional teaching methods to improve learners' learning experience. Incorporating games into education is more effective than conventional teaching techniques to enhance student motivation, active involvement, and concentration [Liu & Chen, 2013]. As a result, educators may use their enthusiasm and creative thinking to create game-based learning that increases student performance.

The Jurisophy card game is the first educational card game that focuses on three crucial areas; legal concepts, legal theories, and legal problem-solving. These are essential areas for law students to understand since they serve as the foundation for other legal courses. However, it is challenging for a student to comprehend it easily. It is proven by a survey conducted in which 73.3% of respondents stated that legal theories are tough, dry, and heavy subjects. On the other hand, students find it difficult to apply specific ideas due to the complexity of legal problems. In the traditional method, they must apply theories by utilising the ILAC format as a guide to answer questions about a legal issue. However, how ILAC is taught and utilised may be tedious, making it difficult for certain students to grasp the concept. It is supported by a survey in which 58.3% found it challenging to use the ILAC format in problem-based questions.

Consequently, the Jurisophy card game was developed with specific objectives in mind. The objectives of Jurisophy's invention are as follows: (1) to increase students' understanding of the concept with the ILAC technique; (2) to develop a tool of learning for a student to memorise legal theories more efficiently; and (3) to learn legal theory and its application in a fun way.

INNOVATION DEVELOPMENT

2.1 Originality and novelty of the product

Jurisophy is a unique educational law card game based on legal theories and concepts that have significantly affected today's laws. Most individuals today understand the foundations and legal actions that must be done; nevertheless, only a small percentage of people understand the reasoning behind the rules. As a result, Jurisophy may be the first tool to teach the public about the various schools of philosophy in a fun and engaging way.

Jurisophy, on the other hand, is a creative educational approach for studying legal concepts with educators in the classroom. Other legal card games are considered unsuitable for educational purposes owing to their non-syllabus content; however, Jurisophy was created solely for academic reasons and may be used by teachers to teach areas of law effectively. Students will be more motivated to compete against one another by playing the Jurisophy card game. Consequently, they will do their best to apply the rules to the situations to achieve the maximum possible score. This method would help students understand things in the classroom better [Zirawaga, Olusanya, & Maduku, 2017].

Jurisophy is also unique in gameplay. Players may analytically construct their reasonings to apply the laws rather than relying on a single limited answer provided by all law card games. Jurisophy will engage players' creativity and thinking abilities, critical for their cognitive growth (Plass, Homer, & Kinzer, 2015). Furthermore, Jurisophy is an ideal method for educators to first-hand present legal theories to students to create a fun and engaging environment around the topic (Kok et al., 2017). In addition, due to its flexibility and universality, Jurisophy may be played by anybody and is not limited to law students.

2.2 Development of the educational card game

The Jurisophy card game was developed in three stages: stage 1 was the identification of the contents, which included legal theories and concepts; stage 2 was game creation, and stage 3 was game validation. The stages are described as follows:

Stage 1 It is referred to as the preliminary stage. The current learning approaches were evaluated with the current demands and challenges in the teaching-learning process. The identification of learning material, such as positivist and naturalist schools of thought, morality, justice, equality, and freedom.

Stage 2 includes designing, creating, and testing the Jurisophy card game. It also provides for the selection of legal problems for each selected content and the content level, card design, colour contrast, size, and game rules.

Stage 3 To validate the game and its rules, five students were chosen to play a Jurisophy card game.

2.3 Description of card game and its rules

The innovation, called Jurisophy, is a card game that improves understanding of legal concepts and theories. The objective of Jurisophy is to collect all of the required element cards and appropriately apply them to solve the legal problem.

Number of players : 5 and 10 players.

Contents : 83 cards that consist of:

- 1) Rules/Guide Cards;
- 2) 10 Situation Cards;
- 3) 18 Naturalist/Positivist Cards,
- 4) 12 Morality Cards,
- 5) 13 Justice Cards,
- 6) 14 Equality Cards and
- 7) 14 Freedom Cards.

Game rules: The game begins with each player receiving one pink cover situation card, representing one legal concept and its own specified colour, as illustrated in Figure 1.



Figure 1: Sample playing cards, Left, front card; right, the situation card.

The purple cover element cards should then be randomly given to all players in equal numbers, as indicated in Figure 2. It comprises an issue, a definition, a jurist's opinion, legislation, case law, and a concept.



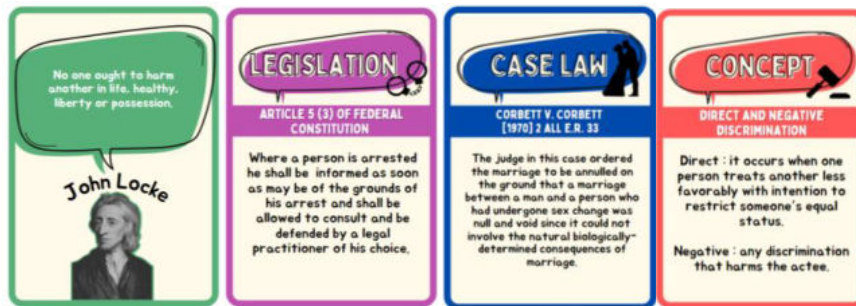


Figure 2: Sample front card for element cards (purple); other elements cards

The first player then begins by requesting other players for the exact element cards required to solve their situation card. If the other player has the requested card, they must give it up; if they do not, they must state so. The process was repeated until all required element cards were collected to solve the situation cards. Once a player has gathered all of the same colour element cards for the situation, they must correctly apply for the element cards and conclude their problem card according to the guiding card supplied. If he succeeds, he will win the game. If he fails, he has to wait till the next round. Figure 3 depicts the complete solution for one situation card.

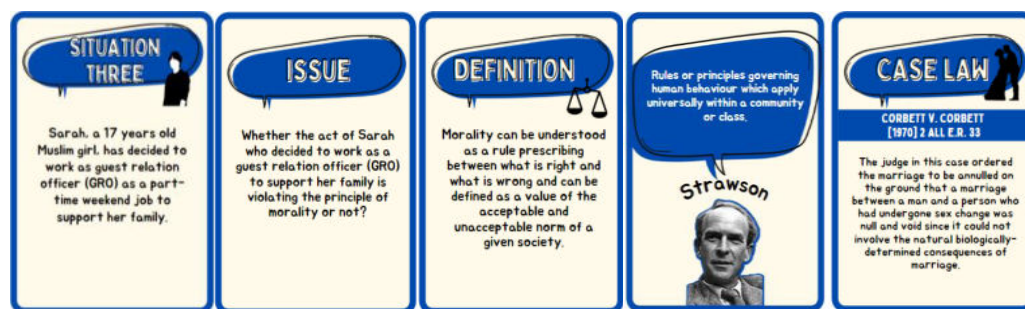


Figure 3: Sample complete answer for one morality's situation card

COMMERCIAL POTENTIAL

3.1 Relevance of the invention

Jurisophy is the first legal theory-based card game available on the market. Law students may quickly comprehend and memorise these legal concepts and theories because playing with friends and classmates is accessible and entertaining. By playing Jurisophy, students may better understand concepts by employing colourful visuals and engaging methods. The colourful concepts and theories presented on the card will aid learners in remembering them. According to Jamal [2016] and Aisami [2015], students retain information better when graphically displayed. Jurisophy is designed in a small size so that students may carry it and may play it anywhere they choose. The game is straightforward and not overly technical, making it ideal for students to enjoy. This is why students should get Jurisaphy, which is easy but effective.

3.2 Marketability and selling price

Jurisophy is already available for purchase and may be pre-ordered. The target market for this product comprises mostly pre-law, lecturers, other students interested in studying law, bookshops, and any educational institutions. Each box of the Jurisophy card game costs RM 45.50. It is a very reasonable and affordable price. Jurisophy is significantly less costly than

other educational card games available on the market. Here is a formula for calculating the selling price for Jurisophy:

Cost:	Selling Price
(Printing) RM 28.00 + (Box) RM 4.50 = RM 32.50 Profit 40% = RM 13.00	RM 32.50 + RM 13.00 = RM 45.50

For the record, Jurisophy has already been sold to the students. They give positive reviews, claiming that this card game is useful and enjoyable. They would also suggest it to other law students because it offers several benefits to them.

3.3 Intellectual Property Recognition (IPR)

Jurisophy's copyright application has already been filed to the Intellectual Property Corporation of Malaysia (MyIPO) and has been assigned the registration copyright number, LY2022W00493.

CONCLUSION

The Jurisophy card game is an innovative product that positively impacts students. This product has met all three previously indicated objectives based on the observations, research, and ongoing activity. For future development, different and current situation cards will be added to the game to reflect the everyday situations. Additionally, the Jurisophy card game will be developed into an online and digitised card game that anyone can download as an application and play whenever they wish. A digital game-based learning strategy can assist students in improving critical thinking, decision-making, and problem-solving abilities and maintain a healthy mental and psychological balance [Anastasiadis, Lampropoulos, & Siakas, 2018]. Finally, this product focused on addressing legal problems using the ILAC format; the authors would also recommend further studies on educational card games concentrating on the legal jurist's viewpoint.

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JURISDICTIO: LEARNING COURT JURISDICTION IN MALAYSIA THROUGH FUN CARD GAMES

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ABSTRACT

Learning about the courts' jurisdiction enables one to know about the functions, types, and various jurisdictions of the Malaysian courts. However, court jurisdiction is not an easy subject for students to learn because it involves various levels of courts with different jurisdictions. Thus, an alternative approach of teaching can be adapted through game-based learning. Through this card games known as Jurisdictio, it can increase not only students' interest in the topic of court jurisdiction in a fun way, but also enhance their soft skills. Jurisdictio is the first card game activity of its kind on Malaysian court jurisdiction. In this newly invented card game, the court's jurisdiction is explained in infographic handbook. The gameplay is explained in the manual. Students play the game by answering the questions on the attractive cards which later will be verified by a judge based on the answer list. Being the first card game on Malaysian court jurisdiction making Jurisdictio unique. Hence, it has the potential to be sold commercially to those interested in law subject especially court jurisdiction. Overall, through this game, active learning is motivated through competition, fun, and excitement. Importantly, researches show that card games increase students' performance in the learning process.

Keywords: Court jurisdiction; jurisdictio; game-based learning; card games; active learning

INTRODUCTION

The court is one of the organs of government in charge of administering justice. Learning about the courts' jurisdiction enables one to know about the functions, types, and various jurisdictions of the Malaysian courts. Court jurisdiction is not an easy subject for students to learn because it involves various levels of courts with different jurisdictions. It involves many legal provisions and is a dry topic. Even lecturers usually opt for traditional lectures to teach court jurisdiction. The traditional method of teaching is however usually less interactive and ineffective [1]. Thus, an alternative approach of teaching can be adapted through game-based learning. Game-based learning is a combination of educational and play activities [2]. There are many types of educational games; however, card games are really good in enhancing students understanding [3]. Realising the benefits of using card game in learning activities, this innovation aims to use card game in exploring court jurisdiction in Malaysia. The aims of this innovation are to increase not only students' interest in the topic of court jurisdiction in a fun and engaging way, but also enhance their soft skills such as communication and problem-solving skills. Further, this card game offers flexibility of learning anywhere and anytime beyond the traditional classroom activities. Further, through this type of game, active learning is motivated through competition, fun, and excitement [4]. Educational games have a positive

impact on education as there are many researches that emphasise on how games provide positive impacts on students and increase students' performance in the learning process as compared to a traditional method of teaching [5][6].

INNOVATION DEVELOPMENT

Jurisdiction is the first card game activity of its kind on Malaysian court jurisdiction. It is a combination of educational and play activities. This game consists of the following components as can be seen as follows:



Figure 1: Jurisdiction

Jurisdiction consists of six (6) components as marked from no.1 to no.6 in Figure 1. Image no.1 is a card game box that keeps the whole card games. Image no.2 is a set of fifty (50) situation cards which state questions for the players to answer. Image no.3 is a set of twenty (20) surprise cards that give advantages or disadvantages to the players to make the game more interesting. Next, image no.4 is a manual card game that explains how Jurisdiction is played. Then, image no.5 is an infographic handbook that contains information about court jurisdiction. Lastly, image no.6 is an answer list that state the answers to the fifty (50) questions stated on the situation cards. The details of this card game are explained by breaking down it into setup, roles and gameplay.

Setup

The first thing that needs to know about Jurisdiction is its game setup. In general, the game can be played by two (2) to four (4) players, with one extra individual as a judge.

Roles

Next, the roles of those involved in this game, which include a judge, players, and card masters are explained. A judge basically decides whether the answer to a question is right or wrong and keeps record of time; does not take part in the game. Meanwhile players are the one

who play the game by answering the situation cards. Then, the player whose turn is next will be the card master of the current turn. The card master randomly chooses the situation card for the first/previous player to answer.

Gameplay

Before the game starts, the judge shuffles the situation cards and surprise cards. Then, ten (10) situation cards will be dealt out to the players. Every player starts with ten cards from the situation card deck. The cards are dealt with the scenarios facing down. The player's turn to play is determined by using any mutually agreeable method. The rest of the situation cards are to be put aside with the judge. The other deck of cards is the surprise card deck. It contains cards that give advantages or disadvantages to the players to make the game more interesting. These cards will be referred to as "surprise cards".

Once the turns are decided, the game will start. The card master (the player whose turn is next), will choose a situation card randomly from the current player's hand (players must not show their situation cards to others). Once the card master has chosen the card, the judge announces that the turn has begun and starts keeping track of time. The player must then answer the situation card within thirty (30) seconds. The judge will verify their answer based on the answer scheme. If the answer is correct, the player is able to discard the situation card and hand it over to the judge to be put aside. If the answer is wrong, the player's turn will end and they must keep the card. For every three (3) rounds, after all players have answered the questions, they must pick a surprise card according to their respective turns. If a player receives one/ two situation cards but there is no situation card left in the deck, he will not receive any situation card. If there is a situation card left and the player receives two situation cards, he must take the card. A player who manages to discard all their cards first wins.

COMMERCIAL POTENTIAL

All in all, Jurisdiction can capture the interest of students with its colourful graphics. Not only that, but the gameplay is also simple, and the game's overall content is engaging. Being the first card game on Malaysian court jurisdiction, makes Jurisdiction unique as compared to other card games in the market. Jurisdiction is not game per se, but is a combination of legal education and play activities. It is designed to provide interactive way of learning court jurisdiction in Malaysia through competition, fun, and excitement. Hence, it has the potential to be sold commercially to the public particularly students who are interested in law subject especially court jurisdiction via online or offline. In terms of the copyright, the copyright application of this work was submitted to MyIPO on 17.2.2022 with the application no. LY2022E00553.

CONCLUSION

Overall, through this game, active learning is motivated through competition, fun, and excitement. Importantly, researches show that card games increase students' performance in understanding. Moving ahead, to collaborate with other game-based learning business players in order to reach a mass market and sell this product. It is also planned in the future to diversify this product by also selling an infographic handbook which also includes 50 questions and answer list as an additional product originating from Jurisdiction. This is to cater to the needs of different types of learners.

ACKNOWLEDGEMENT

The authors would like to thank the Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor Kampus Dengkil for the financial support given for this research paper.

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DIGITAL HEALTH EDUCATION ON “MATI PUCUK”

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ABSTRACT

Erectile dysfunction (ED) is a sexual dysfunction disorder where the inability to acquire and maintain an erection long enough to achieve sexual satisfaction. It has a significant prevalence and causes negative impacts on men and their partners. However, the disease is still underdiagnosed, and a low number of men sought treatment from a medical professional. One of the factors is health literacy among men. The traditional education method via printed brochures to disseminate information has received less popularity among the public. This is because of the increasing usage of digital platforms. Thus, the objective of this innovation is to develop an interactive erectile dysfunction digital education material in the Malay language. Literature review on ED was performed. The education tool was developed using the online software “Canva”. The tool can be accessed online and shared widely, at less cost, and the engagement can be evaluated. It can disseminate widely information on health education and promotion to target male audiences concurrent with the advancement of technology and digitalization of health. The use of digital education material for health promotion may encourage treatment-seeking and promote the health services available for ED.

Keywords: Erectile dysfunction; digital; health education; Malay; interactive

INTRODUCTION

Erectile dysfunction (ED) is defined as the persistent or recurrent inability, for at least 3 months duration, to achieve and/or maintain an erection sufficient for satisfactory sexual performance[1]. ED has a wide range of global prevalence in between 13.1-71.2% depending on the tool used and the methodology of the research[2]. The prevalence higher with increasing of age, 20% for age less than 30 years old, 25% at age 30 to 39 years old, 40% at age 40 to 49 years old, 60% at age 50-59 years old, 80% at age 60-69 years old, and 90% at 70 years old[3]. In Malaysia, according to the National Health Morbidity Survey in 2019, the prevalence is 78.7% among men aged 18 years increasing from 60% in 1998[4]. Meanwhile, the prevalence of ED in studies done in primary care clinics or outpatient departments showed a prevalence of 69.5% to 81.5% [5, 6]. One of the factors that contribute to the increasing cases of ED is the increase of non-communicable diseases such as Diabetes mellitus, hypertension and dyslipidemia. In National Health Morbidity Survey, noted an increasing trend in diabetes prevalence over time from 11.2% in 2011 to 18.3% in 2019. Hypertension and hypercholesterolemia also showed high prevalence with 30% and 38.1% respectively in 2019[4].

ED can cause substantial negative effects on men’s health such as depressive symptoms and anxiety related to sexual performance and avoiding engaging in sexual relations. It also

affects the partner, if a man has erectile dysfunction, his partner might report decreased libido because of anticipating a negative sexual experience rather than a positive one [8]. Erectile dysfunction negatively affects a man's quality of life (family life, work-life, relationship, sex life, health and general happiness) compared to men without ED problems [9]. Besides that, evidence showed that symptom of ED precedes symptomatic angina by 2-3 years and major adverse cardiovascular events by 3-5 years. This window period is an opportunity for modification of risk factors and possibly delay the cardiovascular complication [7].

Despite the negative effects and opportunities, men, in general, have a lower level of treatment-seeking behaviour compared to women [10]. Treatment seeking behaviour (TSB) can be defined as a "sequence of remedial actions that individuals undertake to rectify perceived ill-health"[11]. Multiple factors determine health-seeking among men and one of them is health literacy. According to the Centers for Disease Control and Prevention (CDC), health literacy can be defined as the degree to which individuals can find, understand, and use information and services to inform health-related decisions and actions for themselves and others. Not only the public but a knowledgeable healthcare provider also influence the help-seeking behaviour among men, besides such as the belief that ED is a normal consequence of the ageing process, masculinity, being too embarrassed, competency of healthcare provider, the importance of sexual relationships, severity of the disease, and accessibility of health facilities [12-15].

A study of treatment-seeking behaviour for general illness among men in Malaysia showed that 64.6% of men have inappropriate TSB such as not getting treatment, late in seeking treatment, at a severe level of disease, and inappropriate channels like seeing a pharmacist instead of a doctor, and not completing the treatment course accordingly [16]. A similar problem is seen in ED, even there is significant prevalence however, there is a low number of men seeking treatment [12]. Thus, to optimize men's health outcomes and reduce the likelihood for long-term and costly interventions, where possible, prevention is favoured over treatment through a health promotion approach.

Problem Statement

Erectile dysfunction is often under-diagnosed [17] with only 25.8% and 46% of doctors intending to ask about sexual dysfunction in the follow-up and health check-up visits in primary care clinics respectively[18]. Low utilization of health services among men with ED, as shown by a huge gap between the prevalence of self-reported ED 69.5%-81.5%[5, 6] and those who sought treatment 10.5%-33%[9, 12]. There is a lack of interactive digital education material on erectile dysfunction in the Malay language. This newly developed tool can increase the screening of ED and utilization of sexual reproductive health care services by delivering health information.

Objective

To develop an interactive erectile dysfunction digital education material in the Malay language as a health education tool.

INNOVATION DEVELOPMENT

The available education material online through the Ministry of Health website was searched and obtained. The materials are in the form of a brochure, flip chart, poster and a portal online article in the Malay language. A thorough literature review was conducted to search the available education material on erectile dysfunction in the Malay language and to identify relevant items for the ED interactive digital education material. Interactive educational materials are interactive resources that may comprise a single or more page that can combine any text, images, audio, video including screencasts, animations and other interactive activities.

The design of the education material was created using the software Canva which is available freely online. The items included in the education material are an original illustration of “mati pucuk”, the definition of ED, factors associated with ED, brief epidemiology, complication and treatment of ED in the Malay language. The original drawing illustration of “mati pucuk” in the material gives added values compared to the usual illustration of a genital image as a representation of ED. The drawing of “mati pucuk” aims to reduce the feeling of stigma or embarrassment. The black and white drawing symbolizes a depressed tree shown by its gloomy face that produced dead shoots. It attempts to represent the term “mati pucuk” in a less sexual way (Figure.1). In addition to that, there will be a physical brochure with a QR code (Figure. 2) that directs the mobile phone user to the developed interactive digital education material through the platform YouTube. The user can share the digital content with other users on another digital platform using the share button on YouTube. The digital form has video explanation and animation as in Figure 3.



Figure 1: Original drawing illustration of “Mati Pucuk”

Langkah Pencegahan

Amalkan Gaya Hidup Sihat

- Menjadi lebih aktif
- Tidak merokok
- Mendapatkan berat badan ideal
- Pengurusan stress yang baik
- Memastikan penyakit seperti diabetes dan tekanan darah tinggi terkawal

Rawatan Ubat-Ubatan

- Ubat-ubatan dalam bentuk pil dan suntikan
- Alat vakum khas
- Pembedahan Implan

(Sebarang rawatan perlu mendapatkan nasihat doktor)



IMBAS QR CODE
E-RISALAH

Kesihatan Anda Keutamaan Kami

Maklumkan masalah anda di klinik kesihatan atau hospital terdekat.

Rujukan:

- Ab Rahman, A. A., Al-Sadat, N., & Yun Low, W. (2011b). Prevalence of erectile dysfunction in primary care setting, Malaysia. *Journal of Men's Health*, 8(5), 550-553
- NIH. (2019). National Health and Morbidity Survey 2019. Non-communicable disease, healthcare demand and health literacy.
- Yusef, M. D. b. C., Bachik, N., Soon, L. F., & Kiau, H. B. (2019). Mati pucuk. *portal myhealth*. Retrieved from <http://www.myhealth.gov.my/mati-pucuk/>



MATI PUCUK



Jabatan Perubatan Kesihatan Awam
Fakulti Perubatan

10.5%

Hanya 10.5 % Lelaki yang Mempunyai Masalah Mati Pucuk mendapatkan rawatan*



Definisi MATI PUCUK

Ketidakupayaan dalam memperoleh dan mengekalkan ketegangan yang cukup lama untuk mencapai kepuasan hubungan seksual



Di Kalangan Lelaki Dewasa di Malaysia

7 daripada 10 mungkin mengalami masalah mati pucuk

3 daripada 10 mengaku sangat sukar untuk mencapai ketegangan zakar yang mencukupi dengan pecahan mengikut umur seperti dibawah:



Hasil Kajian Mengikut Pecahan Umur

Faktor - Faktor Risiko

- Mempunyai masalah perubatan
- Mengalami masalah neurologikal
- Mengamalkan gaya hidup tidak sihat
- Pengambilan ubat-ubatan tanpa pemantauan doktor

Komplikasi Mati Pucuk

- Mengalami kemurungan
- Kebimbangan semasa melakukan hubungan seksual
- Punca kepada masalah rumah tangga
- Kehilangan keyakinan diri
- Kualiti hidup menjadi rendah

Figure 2: Brochure of ED



Figure 3: Interface digital form of ED health education material on YouTube platform

COMMERCIAL POTENTIAL

Health promotion is defined as the process of enabling people to increase control over their health and its determinants, and thereby improve their health. As time advanced, the use of digital media and digital products in health promotion has increased greatly in the past decades. There are many potential benefits of digital health promotion. First is, the use of an online digital platform such as YouTube able to widen its access and allow it to reach the community at large. The second is reduce cost, as the digital form can be used repeatedly and shared with many users without extra costs such as printing, papers and others. This will give good environmental health impacts. In addition to that, it can be easily updated according to the current knowledge.

Besides that, we will also be able to evaluate the engagement of the digital education material through the metrics (views, likes, dislikes, and subscriptions) in the YouTube platform which reflects how many times a video or content has been interacted with. Besides the digital form, the hard copy education material will be available in health facilities for those who have limitations to access the digital platform. In addition to that, ED is a sensitive topic that carries a stigma among men. Therefore, this platform brings advantages to the user because they can

view this digital platform in privacy. In addition, the authors have registered the e-brochure for Intellectual Property (LY2022E00832) via myipo.

CONCLUSION

Erectile dysfunction is one of the sexual dysfunction disorders among men. It has highly prevalent and causes negative consequences to the men and their partners. However, even though it has a high prevalence but the proportion who sought treatment is still low. One of the reasons for the low seeking of treatment among men is health literacy. Thus, the development of interactive erectile dysfunction digital health education tool will give a lot of benefit to the public including expanding the accessibility of the information, being able to save cost and ultimately delivering health information to the target group in a fast, and interactive manner. For future recommendations, the development of the digital programme in a form of a mobile app or mobile health (mhealth) equipped with virtual medical consultations may give more accessibility and help more men with the disease to seek medical help.

ACKNOWLEDGEMENT

The authors would like to thank the Ministry of Health NMRR-21-826-59345 (IIR) and UiTM ethics committee who has granted permission to conduct a study on Treatment seeking behaviour for erectile dysfunction.

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A MEMS Capacitive Microphone for Ultrasonic Frequency Detection

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ABSTRACT

The problem to detect sound at ultrasonic range is a major challenge nowadays. Ultrasonic range requires special designed sensors because this frequency range is higher than the human hearing range. The human hearing range is between 20 Hz to 20 kHz, while the ultrasonic frequency range is more than 20 kHz. This project proposes silicon carbide (3C-SiC) as a membrane's material because this material shows good mechanical strength i.e high Young's Modulus which is higher than silicon. The membrane is the most important part of a MEMS capacitive microphone as it senses induced pressure from the sound waves. If membrane is not included as a part of MEMS capacitive microphone, this sensor cannot detect any pressure and totally not function. The modification of the shape and dimension can be done against membrane. The shape can be in circular or square, flat or corrugated. The dimension (side length or radius) of the membrane can be change depends on the application purpose and suitability. Silicon carbide as a membrane's material is our novelty. Due to its mechanical properties, this material can operate at high frequency and temperature. The conventional silicon-based microphone not suitable for high frequency applications because of the limitation its mechanical and electrical properties that can degrade below temperature of 500°C. There is no finding on silicon carbide as a membrane for MEMS capacitive microphone. This silicon carbide-based membrane manages to give good frequency performance for MEMS capacitive microphone because this sensor can detect the frequency up to 30 kHz. The device can be used to detect gas leaking (ultrasonic frequency) at harsh environment (high pressure) such as oil and gas platform and petrol station.

Keywords: Silicon carbide; MEMS capacitive microphone; ultrasonic frequency

INTRODUCTION

Silicon carbide (SiC) has great potential as a material for micro-electromechanical systems (MEMS) due to its superior mechanical properties such as high hardness [1], excellent wear resistance [2], high Young's Modulus [3,4], excellent chemical inertness [5,6] and operation at high temperature [6,7]. The basic MEMS capacitive microphone consists of a parallel-plates structure, which is separated by an air gap. The top moveable membrane is made of back-etched silicon carbide (SiC) thin film. The fixed bottom plate (or commonly referred to as backplate) is made of Si wafer. This Si wafer contains acoustic holes to reduce acoustic damping. Anodic bonding is used to join the SiC and Si wafers together. When the acoustic wave is applied to the top diaphragm, this SiC-based membrane will deflect vertically. The

change of the distance between the top and bottom plates is transduced into the change in the capacitance being measured at the contact pads of both plates.

The modification of the shape and dimension can be done against membrane. The shape can be in circular or square, flat or corrugated. The dimension (side length or radius) of the membrane can be change depends on the application purpose and suitability. Moreover, the mechanical and electrical performances of the MEMS capacitive microphone can be improved by optimize the size of acoustic holes on the backplate and the thickness of the air gap between membrane and backplate. MEMS capacitive microphone can be used in varies application, such as for hearing aid, smartphone, handheld devices, medical devices and Internet of Things (IoT) [9]. The design of the microphone is based on its application. Our MEMS capacitive microphone is suitable to apply in harsh environment such as in oil and gas platform and petrol station to detect gas leaking.

INNOVATION DEVELOPMENT

Various detector or sensors were commercialized to operate at high frequency, but none of them use MEMS capacitive microphone principle. Common MEMS capacitive microphone used Si as the movable membrane. This material is incapable to operate at high frequency. The innovation of the membrane by using superb material, such as SiC lead this sensor to utilize at high frequency and high temperature. This proposed MEMS capacitive microphone has wide potential to use in oil and gas industry and patrol station (or any gas pipeline related industry). The membrane is the most important part of a MEMS capacitive microphone as it senses induced pressure from the sound waves. If membrane is not included as a part of MEMS capacitive microphone, this sensor cannot detect any pressure and totally not function. Figure 1 shows SiC-based membrane for MEMS capacitive microphone and Figure 2 show side and top views of the product.

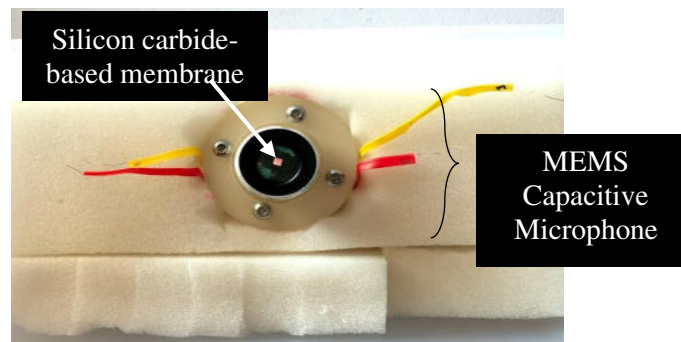


Figure 1: SiC-based membrane

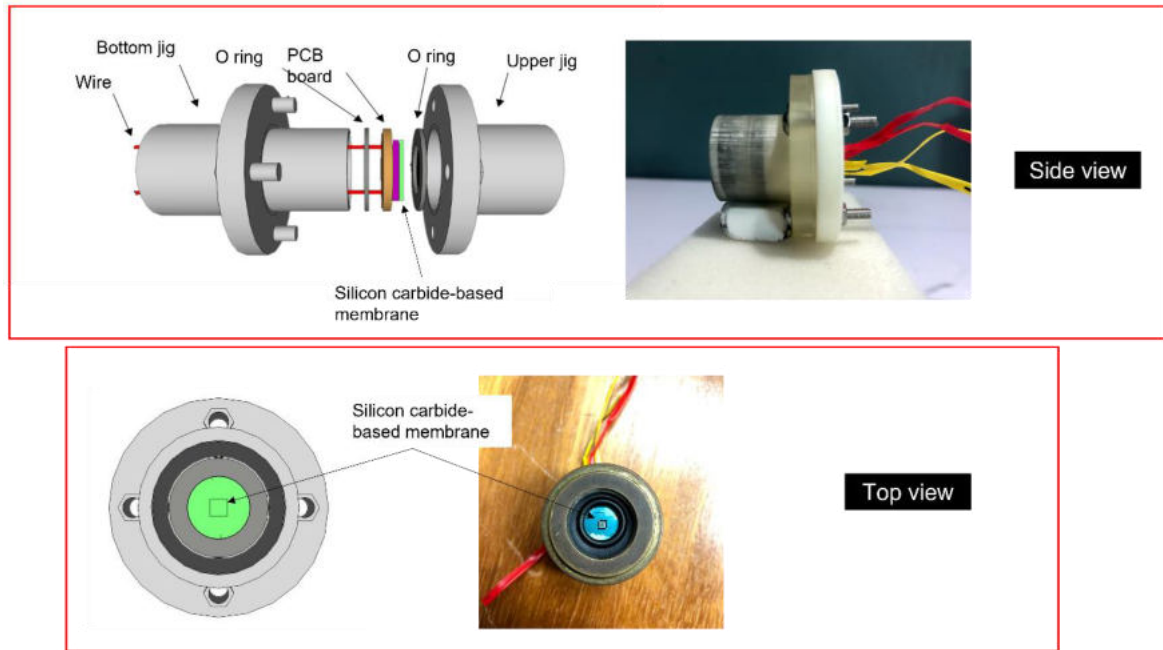


Figure 2: MEMS capacitive microphone

COMMERCIAL POTENTIAL

The reliable detection and localization of gas leaks is essential for ensuring safety and minimizing property damage. In industry, a primary approach for detecting gas leaks is based on the physical phenomenon of absorption of infrared energy by combustible gases such as methane, propane, or ethane. Another approach is to measure the current generated by electrochemical cells or catalytic sensors to determine the amount of toxic or combustible gas present. The relatively new method is detecting the acoustic wave emitted during a gas leak. As opposed to the other detection methods described, acoustic gas detection cannot, yet measure the amount or type of gas from an observed signal. However, and again unlike the other detection methods, the acoustic method can be developed to locate the source of a leak.

Publication

There are 7 publications were published for this work, including 3 proceeding papers and 4 journals (Q2). List of the published papers are below:

S.A. Zawawi et. al, (2016). Mechanical analysis of condenser microphone based on silicon carbide diaphragm for sonic detection. Proceeding IEEE.

S.A. Zawawi et. al, (2017). Mechanical performance of SiC based MEMS capacitive microphone for ultrasonic detection in harsh environment. Proceeding SPIE.

S.A. Zawawi et. al, (2018). Dynamic behavior of condenser microphone under the influence of squeeze film damping. Proceeding ICSE.

S.A. Zawawi et. al, (2019). Nano-indentation of cubic silicon carbide on silicon film. Japanese Journal of Applied Physics (Q2).

S.A. Zawawi et. al, (2020). A review of MEMS capacitive microphones. Micromachines (Q2).

S.A. Zawawi et. al, (2020). 3D finite element analysis of corrugated silicon carbide membrane for ultrasonic MEMS microphone applications. *Microsystem Technology* (Q2).

S.A. Zawawi et. al, (2020). The fabrication and indentation of cubic silicon carbide diaphragm for acoustic sensing. *Micromachines* (Q2).

Intellectual Property Recognition (IPR)

Based on the novelty of our product, this MEMS capacitive microphone was successfully pattern with title MEMS Capacitive Microphone based on Silicon Carbide (SiC) for Human Audible Range and Ultrasonic (Ref: UK101/90354-PT)

CONCLUSION

We performed the fabrication and characterization of SiC-based MEMS capacitive microphone. Our product manages to give good frequency performance for MEMS capacitive microphone because this sensor can detect the frequency up to 30 kHz. The performance of this product was characterized by using C-V analyzer, Impedance Analyzer and Microphone Calibration Comparison System. The device is sufficient to be used as an acoustic sensor to detect gas leaking (ultrasonic frequency) at harsh environment (high pressure) such as oil and gas platform and petrol station.

ACKNOWLEDGEMENT

I would like to express my gratitude to Pusat Asasi, UiTM Kampus Dengkil for the financial support to join this innovation carnival. This work was performed in part at the Institute of Microengineering and Nanoelectronics (IMEN), Universiti Kebangsaan Malaysia and Queensland Micro- and Nanotechnology Centre, Griffith University.

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e - INVEST

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ABSTRACT

The e-INVEST application is a database program that is designed specifically for investors. Normally investors will do some evaluation and analysis on the company before making their investment decision. The widely used strategies are fundamental analysis and technical analysis. However, it is rather tedious for the investors to manually evaluate and analyze the financial performance of potential companies that they intend to invest in as there are many criteria or financial ratios that need to be taken into consideration. Fortunately, the evaluation can be simplified by using an automated system called e-INVEST that is able to rank companies based on their financial performances. The e-INVEST application which is developed using the technique for order performance by similarity to ideal solution (TOPSIS) approach is proven in assisting investors in many ways. This system helps the investors in making their investment decisions in a short period of time and exploits great opportunities of making a huge profit.

Keywords: e-INVEST; financial performance; investment decision; TOPSIS

INTRODUCTION

Investment refers to obtaining an asset with the intention that the asset will appreciate in value and grow over time. With that, wealth created can be used to fulfil many financial objectives such as giving extra income, saving up for retirement, paying debt and obligations, payment of tuition fees, purchase of other assets and so on. Historically, stock market investments has delivered wonderful returns over time. Moreover, over the long term, no other types of investment tend to perform better than stock investment. This was proven by one of the world's richest men, Warren Buffett, who had become rich through stock investing. However, being successful in the stock market is an extremely difficult task. The basic concept in stock investing is to find “cheap” or “undervalued” stocks and sell “rich” or “overvalued” stocks to get capital gain (profit). Most of the time, stock market investors need to conduct a fundamental and technical analysis to decide on which stocks to invest in. These kinds of evaluations require a lot of expertise and also consume a lot of time. However, investors can utilize a simple yet powerful decision technique named Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) in making investment decisions. TOPSIS, which was

proposed by [1], examines a number of alternatives according to a pre-specified criterion, identifies each criterion's weight, normalises each criterion's score, and between each alternative, it ultimately calculates the geometric distance and the ideal option, see also [2-7]. According to [8-13], financial ratios are crucial because they can be used to assess the competitive advantage and the level of companies' sustainability within industries. Relevant studies that utilised TOPSIS as the methodology can be seen in the paper by [14-15]. The fact that the TOPSIS method allows attributing weights to the level of importance of each criterion and at the same time considers the uncertainty, subjectivity, and complexity of the decision process lead the investors to rank companies from worst to the best.

Hence, the objective of this product (e-INVEST) is to simplify the evaluation and analysis process done by investors before reaching their investment decision. The e-INVEST application which is developed using the technique for order performance by similarity to ideal solution (TOPSIS) is able to rank companies based on their financial performances. This system is proven in assisting investors in many ways especially in making their investment decisions in a short period of time and exploits great opportunities of making a huge profit. The remainder of this article is arranged in the following manner: Section 2 summarises the innovation development, followed by commercial potential, and the final section concludes with recommendations for further research.

INNOVATION DEVELOPMENT

This section discusses the construction of e-INVEST. The e-INVEST application is available on Android and syncs with desktop, so investors can make smart decisions for their investment no matter where they are. The e-INVEST can build a personalized plan where investors could choose preferred companies based on sector, timeline and tolerance of risk. Guidelines to use e-INVEST on desktop and mobile apps are as follows.

DESKTOP VERSION

Step 1: The e-INVEST application is a passcode-protected application. User needs to login by key-in username and password as shown in Figure 1.

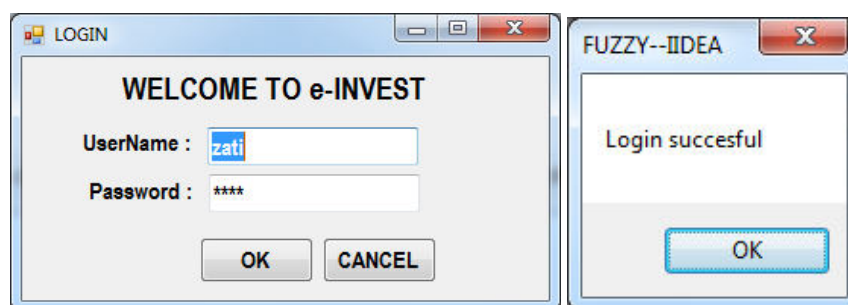


Figure 1: Login Page

Step 2: The User needs to Click Here to start to view e-INVEST Menu list (refer Figure 2).

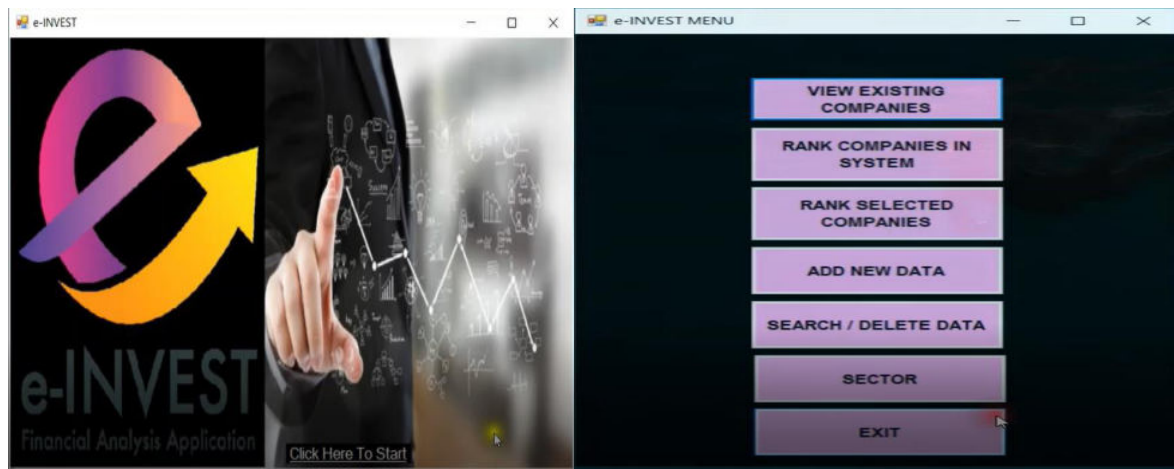


Figure 2: Menu List

Step 3: User clicks on sector on main menu to view potential companies listed in each sector to make investment as shown in Figure 3.



Figure 3: Investment Sector

Step 4: The system as in Figure 4 will show all companies listed in the sector with financial information such as debt ratio and ROE according to criteria selected in financial evaluation technique. User needs to click on the Main menu button on the top of the application to return to the main menu page.

e-INVEST

LIST OF EXISTING COMPANIES SHOW MAIN MENU

Company Code	Company Name	CR	DY	PE	Gross Profit Margin	ROE	Total Debt %Total Asset	EPS
C1	ADVENTA BHD	2.17	0.00	-19.90	-12.99	-19.22	23.19	-0.077
C2	APEX HEALTHCARE BHD	2.82	1.05	29.89	21.21	12.55	4.48	0.118
C3	CAREPLUS GROUP B	1.28	0.14	9.09	28.50	68.29	7.00	0.228
C4	DUOPHAMA	3.06	1.63	39.95	40.92	9.99	28.89	0.085
C5	HARTALEGA HOLDINGS	2.67	0.81	53.40	25.36	18.08	8.41	0.129
C6	IHH HEALTHCARE	1.31	0.73	242.50	20.27	0.90	31.26	0.023
C7	KOSSAN RUBBER	2.27	1.00	10.59	44.81	57.06	15.70	0.425
C8	KOTRA INDUSTRIES BHD	2.65	3.01	14.25	66.12	16.33	13.00	0.204
C9	KPJ HEALTHCARE BHD	0.87	1.20	38.74	37.65	5.60	52.47	0.026
C10	LKL INTERNATIONAL	3.41	0.00	35.43	34.32	7.37	14.28	0.010
C11	LYC HEALTHCARE BHD	0.92	0.00	-5.81	23.96	-43.73	50.24	-0.029
C12	MALAYSIAN GENOMICS	11.12	0.00	2.09	-636.61	130.60	0.00	0.165
C13	NOVA PHARMA SOL	6.07	0.77	37.77	41.35	-6.37	0.93	-0.004
C14	OPTIMAX	2.68	0.00	47.56	68.90	16.00	31.53	0.025
C15	PHARMANIAGA BERHAD	0.78	2.50	19.92	2.48	8.14	43.91	0.105
C16	SMILELINK HEALTH	2.00	0.57	54.10	47.27	2.87	19.40	0.004
C17	SUPERMAX CORP BHD	1.27	0.00	40.04	42.78	39.57	10.32	0.196
C18	TMC LIFE SCIENCES	2.66	0.26	14.54	9.05	2.08	9.30	0.009
C19	TOP GLOVE CORP	2.01	4.90	1.73	39.40	47.32	21.26	0.219
C20	YSP SOUTHEAST ASIA	4.76	3.07	2.38	42.00	6.55	12.78	0.157

VIDEO

Figure 4: List of Companies

Step 5: User needs to click on the rank selected companies main menu to rank companies as illustrated in Figure 2. System will calculate and evaluate the financial performance to determine the rank.

Step 6: Next user needs to click the rank button on the top of the application then click on the show button to view the company's ranking in ranking columns (Figure 6).

LIST OF EXISTING COMPANIES RANK SHOW MAIN MENU

Company Code	Company Name	CR	DY	PE	Gross Profit Margin	ROE	Total Debt %Total Asset	EPS	CI	Ranking
C6	IHH HEALTHCARE	0.005	0.014	0.135	0.101	0.035	0.040	0.021	0.500	1
C19	TOP GLOVE CORP	0.011	0.093	0.011	0.104	0.072	0.027	0.062	0.500	2
C7	KOSSAN RUBBER	0.013	0.019	0.016	0.105	0.080	0.020	0.105	0.493	3
C12	MALAYSIAN GENOMICS	0.090	0.000	0.011	0.000	0.138	0.000	0.050	0.454	4
C8	KOTRA INDUSTRIES BHD	0.016	0.057	0.018	0.108	0.048	0.017	0.058	0.445	5
C3	CAREPLUS GROUP B	0.004	0.003	0.015	0.102	0.089	0.009	0.063	0.438	6
C20	YSP SOUTHEAST ASIA	0.035	0.058	0.011	0.104	0.040	0.016	0.049	0.430	7
C17	SUPERMAX CORP BHD	0.004	0.000	0.031	0.104	0.066	0.013	0.057	0.421	8
C4	DUOPHAMA	0.020	0.031	0.031	0.104	0.043	0.037	0.034	0.415	9
C15	PHARMANIAGA BERHAD	0.000	0.047	0.020	0.098	0.041	0.057	0.038	0.414	10
C5	HARTALEGA HOLDINGS	0.016	0.015	0.038	0.102	0.049	0.011	0.043	0.405	11
C9	KPJ HEALTHCARE BHD	0.001	0.023	0.030	0.104	0.039	0.068	0.021	0.405	12
C14	OPTIMAX	0.017	0.000	0.035	0.108	0.047	0.041	0.021	0.399	13
C2	APEX HEALTHCARE BHD	0.018	0.020	0.026	0.101	0.045	0.006	0.041	0.384	14
C16	SMILELINK HEALTH	0.011	0.011	0.038	0.105	0.037	0.025	0.017	0.374	15
C13	NOVA PHARMA SOL	0.046	0.015	0.030	0.104	0.030	0.001	0.015	0.372	16
C10	LKL INTERNATIONAL	0.023	0.000	0.028	0.103	0.040	0.018	0.018	0.363	17
C18	TMC LIFE SCIENCES	0.016	0.005	0.018	0.099	0.036	0.012	0.018	0.336	18
C11	LYC HEALTHCARE BHD	0.001	0.000	0.007	0.102	0.000	0.065	0.010	0.329	19
C1	ADVENTA BHD	0.012	0.000	0.000	0.096	0.019	0.030	0.000	0.297	20

Figure 6: Rank of Companies

Step 7: To log out from the system, the user needs to click on the exit button as shown in Figure 2.

MOBILE APPLICATION

This is a guideline on how to use e-INVEST mobile applications on android.

Step 1: Download the mobile application on google play store and install it. Then, the user needs to add the mobile apps on the home screen.

Step 2: Users need to login by key-in username and password in order to access account information.

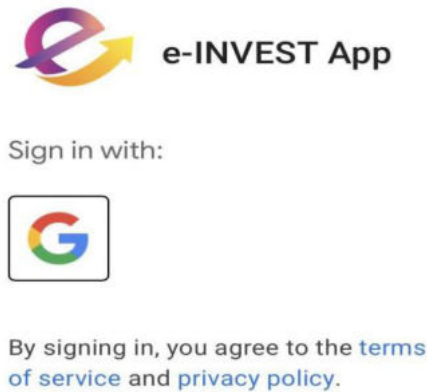


Figure 7: Login page

Step 3: User can click the companies button on the bottom of the application to view all companies listed in this application as illustrated in Figure 8.

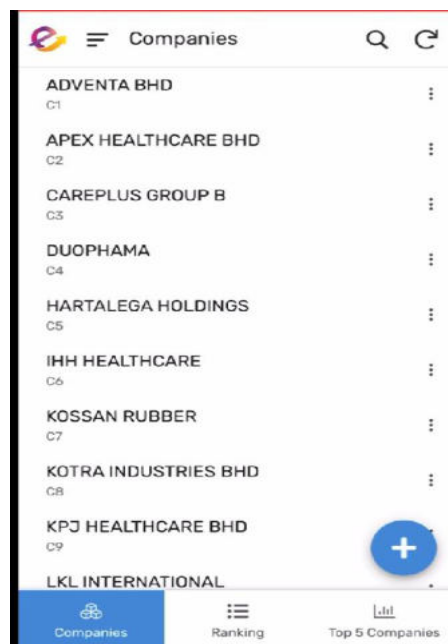


Figure 8: List of Companies

Step 4: User can click on each company's name listed in the apps or by typing the companies name on search button to view the financial information such as current ratio, debt ratio, dividend yield and other financial information.



Details	
COMPANY NAME	KOTRA INDUSTRIES BHD
COMPANY CODE	C8
CR	2.65
DY	3.01
PE	14.25
GROSS PROFIT MARGIN	\$66.12
ROE	16.33
TOTAL DEBT % TOTAL ASSETS	13.00
EPS	0.20

Companies Ranking Top 5 Companies

Figure 10: Companies Details

Step 5: User can click on the ranking button to view the ranking of all companies in the sector based on financial performance.



COMPANY NAME	CODE	RANK ↑
TOP GLOVE CORP	C19	1
HH HEALTHCARE	C6	2
GOSSAN RUBBER	C7	3
KOTRA INDUSTRIES BHD	C8	4
AREPLUS GROUP B	C3	5
SP SOUTHEAST ASIA	C20	6
SUPERMAX CORP BHD	C17	7
UOPHAMA	C4	8
HARMANIAGA BERHAD	C15	9

Figure 11: Companies Ranking

Step 6: To view the top 5 companies ranking, the user can click on the top 5 companies' button.



COMPANY NAME	RANK
TOP GLOVE CORP	1
IHH HEALTHCARE	2
KOSSAN RUBBER	3
KOTRA INDUSTRIES BHD	4
CAREPLUS GROUP B	5

Figure 12: Top 5 Companies

Step 7: To log out from the mobile apps, users need to click the logo of e-INVEST on the top of apps and then click the logout button.

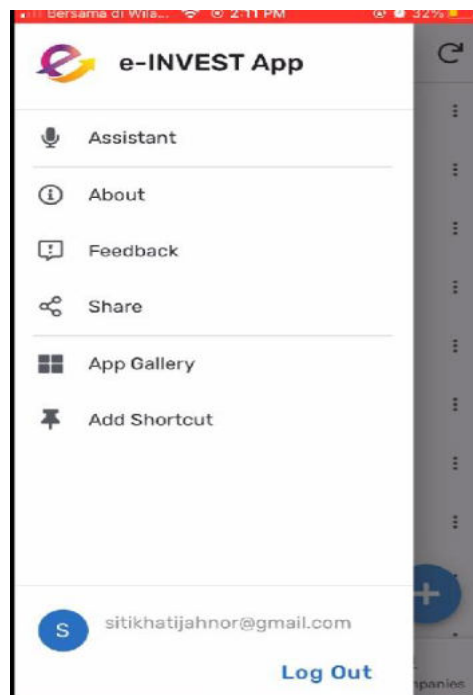


Figure 13: Logout

COMMERCIAL POTENTIAL

Malaysia recorded a total of RM164 billion in approved investments through 4,599 projects in the primary sectors, manufacturing, and services in 2020. These investments are expected to create 114,673 new jobs in various sectors of the economy once implemented. Thus, this system will provide a great database platform for huge potential market opportunities especially to the stock market investor and analysts worldwide. Normally investors will do some evaluation and analysis on the company before making their investment decision. The widely used strategies are fundamental analysis and technical analysis. It is very tedious for an

investor or company to manually evaluate and analyse the financial performance of potential companies that they intend to invest in due to many criteria or financial ratios that need to be taken into consideration. Therefore, the e-invest system which is user-friendly manages to provide a ranking of the best company to invest rather than a complicated method of analysing and it is a real time system that performs real-time application functions. The price range of the application is USD50 per year which is considered competitive if compared to the benefit for the investor. In fact, there have been a few articles published in renowned journal focusing on TOPSIS method to rank a company in based on financial performance analysis such as article titled Investing in Malaysian Healthcare using Technique for order preferences by similarity to ideal solution that published in Indonesian Journal of Electrical Engineering and Computer Sciences on March 2022.

CONCLUSION

In conclusion, the invention of e-INVEST has fulfilled its objective to evaluate companies using the TOPSIS multi-criteria decision-making method. The application which utilizes financial ratios as the criteria, has managed to evaluate the companies' financial performances and ranked them accordingly. It is found that the application has assisted investors in their analysis thus helping them in making hefty profit. It is recommended that the e-INVEST application can cater not only to the stock market but also other types of financial securities. Further studies should also consider confirming the ranking results using TOPSIS techniques with a different set of methodology. With that, the system would be more dynamic and compelling.

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Cash Transfer-Based Entrepreneurship Model for B40

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ABSTRACT

Due to COVID-19, many Malaysians in the M40 group have fallen into the B40 group thus contributing to the increased number of vulnerable groups in the country. Hence, the government have allocated and distributed cash transfer like household living aid (also known as Bantuan Keluarga Malaysia), Bantuan Prihatin Nasional, Bantuan Khas COVID and many more. These one-off financial aids give a short-term financial relief to the recipients but with some modification it can be turn into an entrepreneurship model. Thus, this model illustrate how cash transfer-based entrepreneurship can be practiced in Malaysia and other emerging economies. Based on the extensive document reviews, we have conceptualized the model using zakat and waqf-based entrepreneurship model as the framework. The cash transfer-based entrepreneurship model serves as an initial model for B40 and the household living aid recipients to involve in the entrepreneurial activities. Eventually, the policy maker i.e. the government can implement this model so that the financial aids given could have a long-term impact to the recipients. In the long run, the B40 household will be able to escape the poverty and improves their quality of life.

Keywords: Business capital; B40; cash transfers; entrepreneurship; poverty

INTRODUCTION

According to Department of Statistics Malaysia (DOSM), the bottom 40 or the acronyms, B40 is defined as those with household income below MYR4,850 per month. Based on a recent study conducted by DOSM, the number of poor households increased to 22.4% from 639.8 thousand households in 2020 as compared to 405.4 thousand households in 2019 [1]. Moreover, [1] reported that 20% per cent of M40 households with income between RM4,850 and RM10,959 has shifted to the B40 group. This situation prompted the government to assist the vulnerable groups by giving various kind of aids consisting of cash transfers, grants, and the like. Cash transfers refer to a form of payment given by the government or non-government organizations to the recipients with the aim to eradicate poverty and solve social problems in the society. In Malaysia, household living aid and other financial aid are a one-off payment which were given to provide a short-term financial relief to the recipients. Although it is useful,

the incentives did not help to reduce poverty among the B40 groups [2]. Thus, this model illustrate how cash transfer-based entrepreneurship can be practiced in Malaysia and other emerging economies.

INNOVATION DEVELOPMENT

Firstly, the model development process starts with exploring the cash transfer program (CTP) from different continents namely, Asia, Africa and America. The objective is to investigate whether there is any CTP that focuses on self-employment and entrepreneurship activities. The finding shows that most CTP aims on social problem like educations, healthcare, and nutrition. Table 1 illustrate the summary of the sample of CTP categorized into their targets.

Table 1: Summary of CTP in America, Africa and Asia

Continent s	Entrepreneursh ip & self- employment	Children's educations	Healthcare & nutrition	Necessities/Livi ng aid	Women's empowerme nt
Latin America & Caribbea n	-	-Bolsa Fam'ilia	-Bolsa Fam'ilia - Oportunidad es -Mi Familia Progres -Chile Solidario	-Chile Solidario	-Chile Solidario
Africa	-Rural Entrepreneur Access Program (REAP) -Youth Opportunities Program (YOP)	-Kano Conditiona l Cash Transfer for Girls' Education -Child Support Grant - Communit y-Based Conditiona l Cash Transfer	-Program for Destitute Persons -Productive Safety Net Programme	-Livelihood Empowerment Against Poverty (LEAP)	-
Asia	-	-Pantawid -Female Secondary School Assistance -Program Cambodia Education Sector	-Nutritional Conditional Cash Transfer - Janani Suraksha Yojana -Pantawid	-Bantuan Langsung Tunai (BLT) -Bantuan Keluarga Malaysia (BKM) -Bantuan Prihatin Rakyat (BPR)	-Female Secondary School Assistance Program

		Support Project -Child Support Program			
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Next, we proceed with reviewing the research that advocated entrepreneurship with cash transfer. Even though most CTP targeted at social issues, several scholars found that the cash transfer indirectly contribute to entrepreneurial activities. In Latin America for instance, [3] discovered that CTP has indirectly increased the number of small entrepreneurs by 10%. Similarly, in Asia, recipients in urban area have higher tendency to involve in entrepreneurship upon receiving the cash transfer [4].

Finally, we examined models like input-output model [5], asnaf entrepreneurship model [6] and waqf-based entrepreneurship model [7] in other to create our framework for the cash transfer-based entrepreneurship model. Essential elements were also added to the model comprises of institutional setting, business support system and organizational context to support the model. Figure 1 shows the cash transfer-based entrepreneurship model for B40. The cash transfer-based entrepreneurship model is illustrated in a cycle process. The business input component comprises of financial, marketing, machine and equipment and the entrepreneurial activities. Meanwhile, the output component comprises of value creation, income, profit, employment, and asset. Firstly, the initial capital for this model comes from the household living aid and other financial aids like zakat and Bantuan Prihatin Nasional. These cash assistance was primarily used for necessities and saving [8]. Thus, this is considered as a subtraction of the amount of capital obtained. Next, the government should identify the suitable candidate through a selection and screening process. The suitable candidate should be the middle and upper level in B40 group as they have more financial resilience as compares with the lower level B40 household. Ideally, the entrepreneurship model is also appropriate for the unemployed B40.

After the selection process, the candidates will be given training. Afterward, they will be given business assistance like financial, marketing and infrastructure facilities to help them start up the business. The successful candidates will proceed with the entrepreneurship activities under the monitoring of a government agency. Ultimately, the aim is to generate income for the entrepreneurs i.e. the B40. Hence, the model output comprises of value creation, asset, wealth, and profit. However, beyond that, the entrepreneurs can be self-employed and raise their household income. Finally, the income creation can be re-distributed to the business entity and the government.

In the centre of the model, three essential aspects are emphasized. The first aspect is institutional setting. The institutional setting refers to the agency that regulates and overseeing the process. In Malaysia, the Inland Revenue Board of Malaysia is responsible for the distribution of the household living aid. Thus, in this model the monitoring process should be done in the federal and state level i.e. via collaboration with the Ministry of Entrepreneur Development and Cooperatives (MEDAC). Business support system can be categorized as the monetary and non-monetary assistance. For monetary assistance, the government may provide additional financial incentives for the recipients that involved in the business. Other than this, non-monetary supports like financial knowledge, marketing, advisory, technical and infrastructure also is crucial for business start up and growth. Finally, the organizational context helps entrepreneur to identify its business. The recipients can use the capital to start their own business or to invest the money in others' businesses. For micro enterprises, the initial capital

is usually minimal but requires time, effort, and expertise. Alternatively, they invest in the cooperatives and received a profit-sharing as a return which require less time and effort. Examples in Nepal and Portugal shown that this form of business positively affect the social and economic wellbeing of the community [9][10].

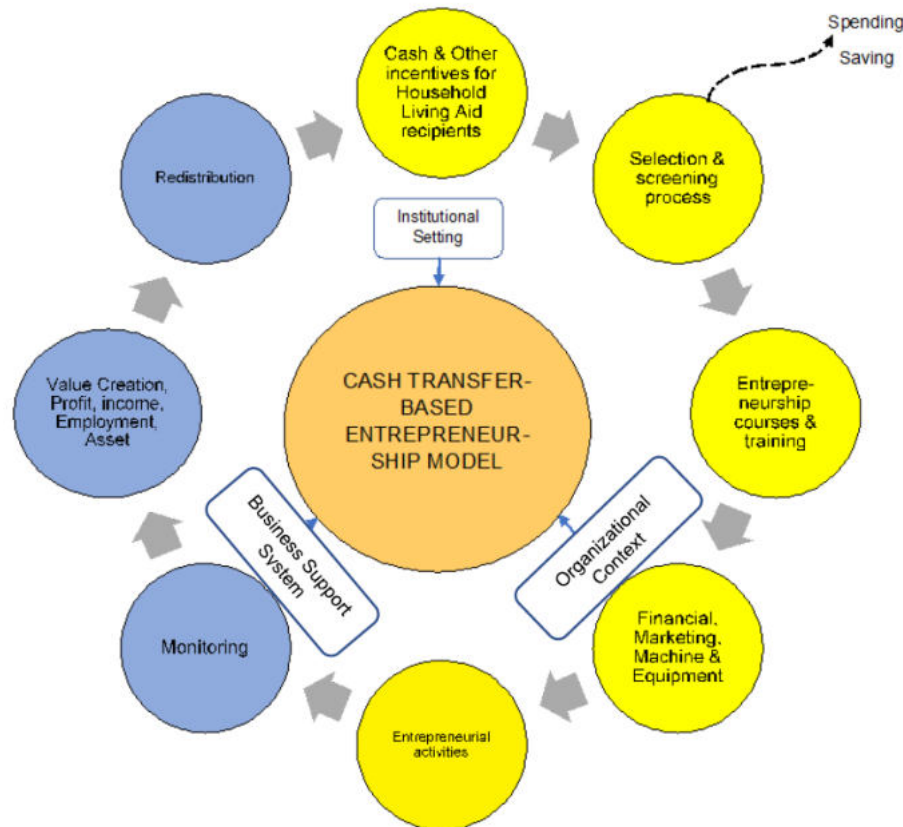


Figure 1: Cash Transfer-Based Entrepreneurship Model for B40

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COMMERCIAL POTENTIAL

The cash transfer-based entrepreneurship model has been protected under Intellectual Property Recognition (IPR) with copyright number CRLY2021E03118. This model serves as an initial model for B40 and the household living aid recipients to involve in the entrepreneurial activities. The policy maker i.e. the government can implement this model so that the financial aids given could have a long-term impact to the recipients. Ultimately, the B40 household will be able to escape the poverty and improves their quality of life.

CONCLUSION

In sum, by using the zakat and waqf model as the frameworks, the cash transfer-based entrepreneurship model is developed. The model highlighted that the cash transfer has the potential to be utilized for income generating purposes even though they were mainly used for necessities. With some assistance and government intervention, the model can be practiced by the B40 and the household living aid recipients. Although the model is specifically focussing on the household living aid, other form of cash transfer like

unconditional cash transfer can adapt this model for use. However, this model is solely developed based on the conceptual idea, thus further empirical analysis is needed to validate the model.

ACKNOWLEDGEMENT

We thank fellow colleagues in Universiti Teknologi Mara Perak Branch, Malaysia and Universiti Pendidikan Sultan Idris, Malaysia for their sound advice and contribution to this paper. This work was supported by the Fundamental Grant Research Scheme (FRGS) [Grant No:600-IRMI/FRGS 5/3 (274/2019)]. Thus, we would like to express our appreciation to the Ministry of Higher Education Malaysia for the research support.

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EZWORKOUT: The Mobile App to Workout Easy and Safely in Post-Pandemic Era

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ABSTRACT

On 18th September, 2021, the Malaysia government has allowed the gyms and fitness centres to resume their operation under National Recovery Plan (PPN). The Standard Operating Procedure (SOP) has been introduced utterly for the safety measures; to circumvent the spread of COVID-19 among the users while workout in the gyms and fitness centers. Therefore, EZWORKOUT mobile app is designed as an intermediary application (iapps) to assist the gyms and fitness operators and users to adhere with the SOP. Several mobile app features are designed for SOP necessities such as advance online booking and health declaration. Besides, the added features i.e. selecting gyms and fitness centres location, online payment and workout tips would offer a new business model for fitness industry in Malaysia to endure the post-pandemic era.

Keywords: COVID-19; SOP; mobile app; gyms; workout

INTRODUCTION

The fitness industry has been severely affected by COVID-19 pandemic since the outbreaks which officially declared by WHO (World Health Organization) on 12 January 2020 [1]. In addition, during the pandemic, COVID-19 not only disrupts the gyms and fitness operations but lead to chain reactions ranging from unwaged personal trainers to the cessation of sport activities [2]. Thus far, the Coronavirus remains hazardous and still affected the fitness industry especially for gyms and fitness centers with the main issue; most of their customers are reluctant for returning to work out due to lack of confidence towards safety measures in handling COVID-19 [3].

In Malaysia, the fitness industry endured the same situation in facing the pandemic of COVID-19. The series and versions of MCO (Movement Control Order) implemented by the government contributed to the difficulties for most gyms and fitness operators to sustain their businesses [4]. Although, the main concerned of Malaysia government is justifiable; to curb the COVID-19 virus from spreading to among the users, but the losses of more than RM 110 million were unbearable for the gyms and fitness operators [5]. Finally, on 18th September, 2021, the government has allowed the gyms and fitness operators to resume their operations with strictest Standard Operating Procedure (SOP) and ventilation guidelines [6]. By some means, it gives the hope for fitness industry to recuperate from the losses and start over with a new strategy.

By this time, Malaysia government is determined to recover and strengthening the economy in post-pandemic era which echoed to the retrieval of fitness industry. This means,

the operations of the gyms and fitness centers are remained as usual without negating the SOP. However, the gyms and fitness operators should be aware that users still might feel unsafe while workout in the center due to overcrowding users. In the same time, the upcoming of a new COVID-19 variant Omicron, in which more contiguous from previous variants could make worse to users [7]. Therefore, there must be an effective element that enable to consolidate the safety measures in the centers to bring the users' confidence for coming in-person without hesitation. For that reason, the objective of this project is to design the mobile app that can act as intermediary in bringing assistance for the gyms and fitness operators to manage operations that reflects to the safety of users. Besides, the involvement of digital technology is required since it becomes a new strategy for fitness industry to sustain and grow in post-pandemic era [8].

INNOVATION DEVELOPMENT

The idea of EZWORKOUT mobile app is presented through conceptual framework, in which the mobile app has becomes as an intermediary application (iapp) since it shows significance adoption in our world nowadays. Furthermore, EZWORKOUT mobile app is designed with app builder/maker by following the design thinking model comprises of empathies, define, ideate and prototype, but no testing measures for this stage yet [10]. In this case, this app is still a demo version for the purpose of introducing the initial innovation idea that could work in the future.

Based on the design thinking model, several important features has been designed and added in mobile app i.e. an advance online booking, health declaration and general information about do's and don'ts for users before, while and after workout. These features are capable to facilitate the gyms and fitness operators and users to abide with SOP of COVID-19; mainly in controlling the capacity of users and keep them safe from COVID-19 infections. Besides, there are also the value-added features i.e. selecting the gyms and fitness location, online payment and workout tips to fulfill the needs and options for users. Figure 1 shows the conceptual framework, design methods and the mobile app features will be linked together for better representation of idea and concept in innovation development.

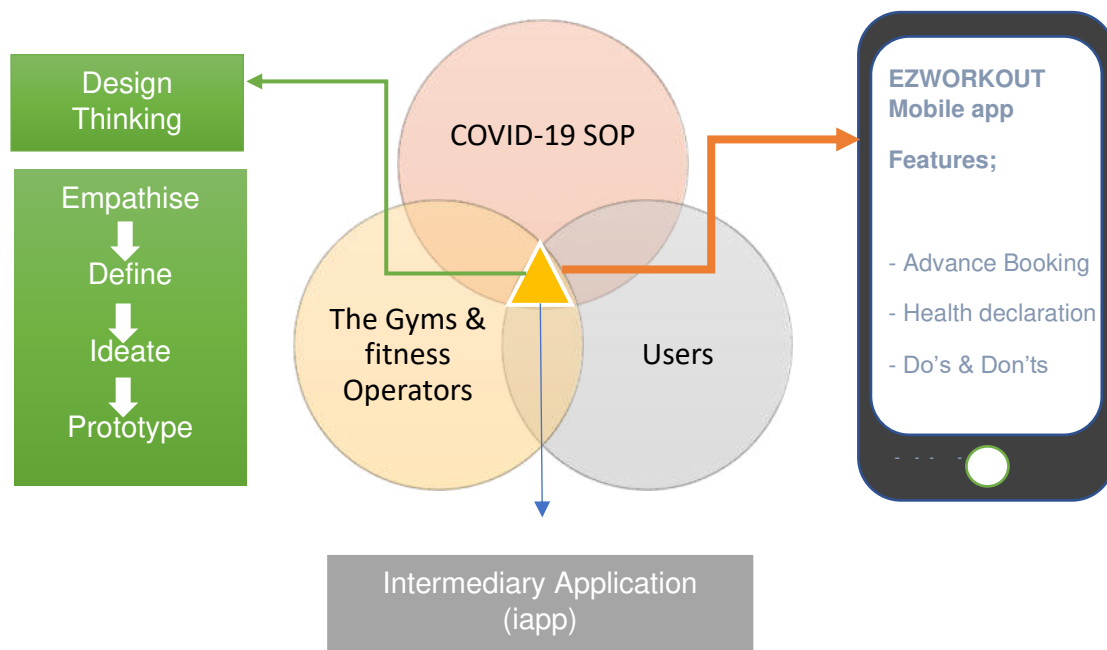


Figure 1. The conceptual framework and design method of EZWORKOUT mobile app

COMMERCIAL POTENTIAL

As mentioned earlier, EZWORKOUT mobile app offers solutions for the gyms and fitness operators in managing their operations to adhere with SOP of COVID-19 and keeping users' safety and workout easily in the centres. In addition, users will likely use EZWORKOUT mobile app as it is convenience to them in managing their workout session without facing too many people around them. Besides, this mobile app would increase users' confidence to work out in the centres since early safety measures are seemly put in place.

Nevertheless, the design of EZWORKOUT mobile app is relevance to the intensification of "app ecosystem"; the model for software development and distribution, in which substantial for commercialization attainment [10]. Therefore, EZWORKOUT mobile app has a great commercial potential especially for fitness segment. As estimated in 2021, the smartphone users in Malaysia will reach up to 29 million and it should include the current and potential gyms and fitness users [11]. Besides, the users' penetration in using fitness app will increase to 8.96% in 2022 and expected to hit 11.83% by 2026 [12].

On the other hand, since the losses of the gym and fitness operators are horrendous during the pandemic of COVID-19, the new business strategy is required for sustaining the competitive advantage; by gratifying customer's preference and satisfaction through the best practises i.e. services, general terms and conditions, marketing etc. [13]. Therefore, the use of mobile app as an integrated ecosystem is seems capable to lead customer's engagement by enhancing the quality of experience [8]. In this sense, the quality experience is supposed to let users to workout easy and safely; to do an advance online booking, tranquil health validation and online payment, to name a few that can easily operate from their own mobile phone.

Furthermore, besides providing valuable benefits in fulfilling the consumers and producer's needs, intermediary application also capable for profit-driven to the creators or operators in digital business [14]. Therefore, this mobile app could be succeed like Food Panda or Grab mobile app but only focusing on fitness enthusiast that need to workout easy and safely. In sum, EZWORKOUT mobile app could be an effective digital business to elevate the fitness industry in Malaysia for more years to come.

CONCLUSION

In conclusion, the design of EZWORKOUT mobile app will become a solution for the gyms and fitness operators and users in facing the post-pandemic challenges i.e. in managing the safety measures in the centers, and upsurge users' self-assurance to workout easy and safely. Since this mobile app is still a prototype mode, there will be more improvement for the future in terms of Intellectual Property (IP), app interface design, software, programming and value-added features. Besides, more research will be conducted to improve the content of the mobile app for better functionality which offers more benefits for both operators and users.

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M+M Coagulant

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ABSTRACT

Coagulants are essential in purifying raw water for safe drinking purposes. Aluminium sulphate is the most common and effective chemical coagulant for water treatment. On the other hand, these chemical coagulants are toxic and harmful to the environment and create severe health issues, including cancer and neurologic disorders. Therefore, the natural plant-based coagulant can be utilized in the coagulation process for the water treatment to enhance the quality of the water. The research focused on utilizing plant-based materials using *Moringa oleifera* seed and maize seed as coagulants for coagulation. From the results obtained, *Moringa oleifera* seed and maize seed can reduce the turbidity by 92% removal rate (mixed of *Moringa oleifera* seed and maize seed), the chemical oxygen demand (COD) of 95% reduction rate using *Moringa oleifera* seed, biochemical oxygen demand (BOD) for 88% removal (*Moringa oleifera* seed), the ammonia-nitrogen removal rate of 12% (*Moringa Oleifera* seed) and total suspended solids (TSS) of 100% reduction rate using mixed of *Moringa oleifera* seed and maize seed in the effluent water sample. It can be denoted that *Moringa oleifera* seed and maize seed can be a substitute for chemical coagulants for long-term sustainable treatment.

Keywords: Coagulation; *Moringa oleifera*; maize; natural coagulant

INTRODUCTION

Apart from human use, water is required for aquatic life for their necessity. High water quality is important for human health, environment, ecosystems, social and economic development, which comprise all aspects of life. However, the increase of urbanization and demands for higher agricultural production has detrimental effects on the quality of our water supply [1]. Along with pollution issues nowadays, it is becoming more difficult to get clean and sufficient quantities of high-quality water. Moreover, the problem of water scarcity is not a taboo issue and affects the majority of the world's population, which is unable to obtain clean drinking water [2].

The expansion of industrial sectors with uncontrollable effluents from this primary source has significantly reduced water quality. Inefficient pre-treatment of the effluent will pass through the seepage and discharge into the river nearby and cause severe pollution. Moreover, the conventional methods for wastewater treatment did not include tertiary treatment. Therefore, this method is essential to upgrade the quality of the effluent to the river channel. Here, the coagulation process has been proposed to enhance the quality of the effluent with plant-based coagulants instead of chemical ones [3].

INNOVATION DEVELOPMENT

Therefore, the innovation of the plant-based coagulant using *Moringa oleifera* seed and maize seed has been developed as the substitute for the chemical coagulants in the market. This plant-based coagulant will be extensively used in the coagulation process to treat the effluent of wastewater in tertiary treatment. From the results obtained in the research, the combination of the plant-based coagulant that is *Moringa oleifera* seed and maize seed is capable of enhancing the quality of the effluent significantly, especially the turbidity and total suspended solids (TSS).



Figure 1: Innovation for prototype of M+M Coagulant

COMMERCIAL POTENTIAL

The innovation product of the plant-based coagulant is a sustainable green product that can be cost-effective as the substance can be easily obtained. The processes of making the coagulant are straightforward. This plant-based coagulant is safe to be consumed and environmentally friendly. This natural coagulant is potentially used in water treatment, especially to enhance the quality of the water bodies for safe drinking purposes.

CONCLUSION

It can be deduced that the natural coagulant of *Moringa oleifera* seed and maize seed can replace the harmful chemical coagulant in the market due to the results obtained from the research study. Moreover, applying the natural coagulant by this substance will sustain the environment and be considered a best management practice in water systems.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to the School of Civil Engineering staff, College of Engineering, Universiti Teknologi MARA, Shah Alam and Pusat Asasi, UiTM Cawangan Dengkil for their assistance throughout the research study.

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Concept Map: Blaming Game, Fix the Audit Misconception

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ABSTRACT

Auditor plays a crucial role in the financial system of any country in promoting confidence on the reliability and quality of audited financial statements (FS). Auditing Standards in any jurisdiction, for instance, the International Standard of Auditing (ISA) and Malaysian Companies Act 2016 (CA 2016) describe the fundamental roles of an auditor regarding FS audit. However, users' perception of the auditor's roles has always been misperceived. Users expect auditors to be perfect and make them liable for corporate collapse and financial scandal. This misconception eventually has caused auditors to be brought to the court like in the case of 1Malaysian Development Berhad (1MDB), Serba Dinamik and Silver Bird Group. To mitigate this expectation gap and correct the misconception, users understanding of auditor's roles must be unlocked and perhaps the best way is through education. However, educating people on standards always be challenging. That is why the issue of audit misconception that has been discovered since 1974 by Liggio has still been debated even until now. Most probably because of the jargon of auditing standards which may cause users, particularly people from non-accounting backgrounds to misinterpret and form their own assumptions on auditors' responsibilities. This issue must be fixed immediately. Hence, we are proposing this project titled "Concept Map: Blaming Game, Fix the Audit Misconception" in providing a clear understanding about the auditor's statutory roles and responsibilities. This project would be beneficial to accounting students, accounting practitioners, management of audit clients and the public at large. It is hoped that a way forward the misconception can be corrected as an effort to create harmony and a healthy financial system in the country.

Keywords: Audit; audit misconception; auditor; auditor role; financial system

INTRODUCTION

Auditing is supposed to add credibility and reliability to the financial statements. With independent auditors providing reasonable assurance on the financial report, users, such as investors, will have some level of certainty in relying on the figures presented in the financial report for decision-making [7]. However, users' expectations of the auditor's role are too demanding and far away from the statutes and auditing standards. This issue has resulted in an 'audit expectation gap'.

The common understanding among the public is they perceived auditor to be the fraud detector, which in fact is the responsibility of the management of the audited company. Additionally, people tend to blame auditors and make them accountable in cases of financial scandal and corporate collapse because they have the wrong expectation that the auditor will

detect all errors, fraud and illegal activities within the client's business. This implies that people expect the audited financial statements to be hundred percent free from error and fraud as if the auditor is giving absolute assurance, not a reasonable one [8]. In fact, auditing can never be perfect as the audit work is conducted based on sampling, not on the total population. User should be realistic about the auditor's role since auditors are working under time pressure to meet the reporting deadline, hence it is impossible to check everything presented by the management in the financial statements. Cost constraint is another factor to be considered in conducting rigorous audit testing. Audit work also required the auditor to rely on the work of independent experts, for example, valuer and actuary that may contain error, and in most cases, the auditor may need to exercise their professional judgment which will increase the detection risk in expressing audit opinion. There is also an element of inherent risk that arises from the client's circumstances that cannot be eliminated in the auditing process due to the client's business nature and environment.

These misconceptions and unreasonable expectations on auditor's role had resulted in public distrust on auditors' credibility and competency. It has subsequently led to widespread critiques and litigation aimed against the auditors and concurrently tarnish auditors' reputations. No exception to the Malaysian financial market. Recently, corporates in Malaysian have been shaken by the recent dispute between giant corporations and auditors in issuing audited FS. The most recent and controversial one is the case of Serba Dinamik (SD), Malaysia's leading oil and gas service company. It all started when KPMG, SD's former auditor flagged RM 4.54 billion questionable transactions with customers and asked for an independent review in signing the audited report for the year-end 2020 [2]. In their response, SD had taken legal action against its auditor for bringing the issue to the public by lodging a report to the security commission that then caused a significant drop in SD's share price. SD also questioned on the auditing process performed by KPMG [6] that they claimed were not at par with their status as one of the Big Four and did not commensurate with the substantial audit fees paid. This shocking news has shed the light on the statutory roles of external auditors and the client's management. The public is digging about what are supposed to be the roles and responsibilities of an auditor. Therefore, it creates a motivation for this project to fix the audit misconception and to repair the auditor's reputation in the eyes of financial market players. This project aims to disseminate information about auditor roles using the simplified term in facilitating reader understanding and avoiding chaotic financial markets.

INNOVATION DEVELOPMENT

The misconception on auditor's roles must be corrected now, perhaps the best through educating people [3,8] about statutory duties of both parties. So that, it will be crystal clear on who to be held responsible for any financial scandal that happens in the country. But educating people on statutes, laws and standards always be challenging as it is highly influenced by many factors including the level of education, people's perception, experience and awareness [4,10].

Currently, some efforts have been taken by the auditor in educating the public about the auditor's role. For example, the auditor has been addressing this issue by expanding the audited report [9] and including a paragraph emphasizing on auditors' and management roles and responsibilities in educating the users and public. But with overwhelmed information disclosed in the audited report, users tend to overlook the paragraph specifies about auditor's roles. Moreover, audited reports mostly are using accounting jargon and quoting language structure from auditing standards that sometimes a layman cannot comprehend. Accounting students taking auditing courses also face difficulties in understanding these fundamental roles of key

parties in the auditing process as they are yet to be exposed to the real working environment on how this mechanism works.

Therefore, this project, “Concept Map: Blaming Game, Fix the Audit Misconception” comes to the rescue in addressing the issue of users’ misconception on auditor’s roles. Before explaining the auditor roles on the second page of the concept map, two types of assurance levels will be first explained to highlight the audit misconception. According to the ISA 200, the auditor is supposed to provide reasonable assurance on the FS truthfulness and fairness, instead of giving an absolute assurance. The logic behind this statute is also explained on the first page of the concept map so that users can process the reasoning behind the standards outlined. The content of the first page of the concept map is presented in Figure 1 below.

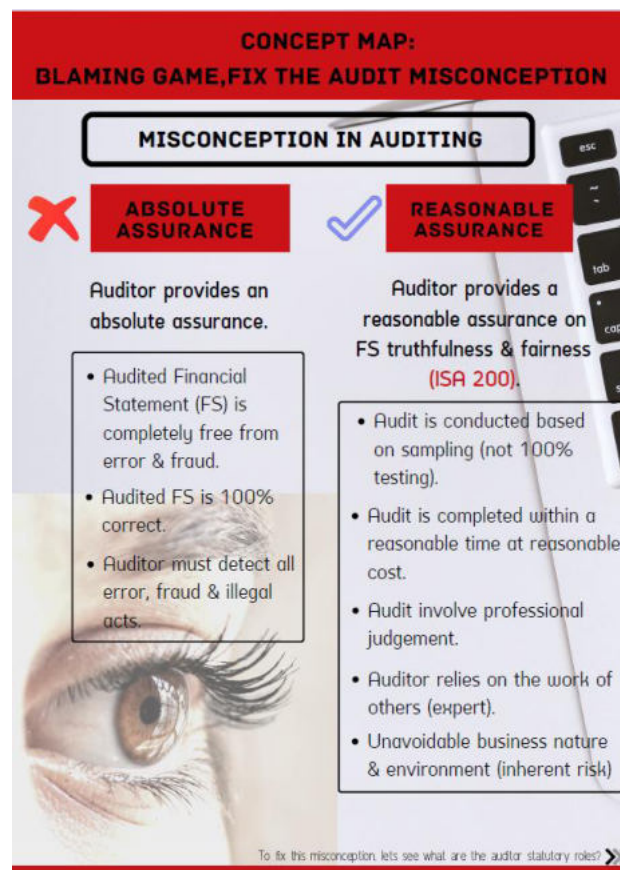


Figure 1: Page 1-Misconception in Auditing: Absolute vs Reasonable Assurance

Then the second page as illustrated in Figure 2 describes the statutory roles of auditors in comparison to management roles to provide a clearer picture of the division of each party’s roles. The layman term is used by quoting the relevant ISA and CA2016 to facilitate the user’s understanding. Management roles are also included to portray the role of fraud detectors rest on the management instead of on the auditor. Having the diagram about the misconception in the earlier part of the concept map is believed to help users to grab the idea on the misconception before comprehending the statutory roles of auditor and management in FS audit. This is also the reason why the project is named “Concept Map” as it links up the problem identified with its solution.



Figure 2: Page 2-Management vs Auditor Roles

COMMERCIAL POTENTIAL

The proposal of this concept map is hoped to facilitate users' understanding on the roles and responsibilities of the auditor as well as the client's management. It will be very helpful for the accounting students, accounting practitioners, management of audit clients and the public at large with any level of education and experience to understand the division of auditor roles as the wording used has been altered to increase its simplicity without changing the interpretation about the standards. It is hoped that a way forward the audit misconception can be fixed by this invention of a simplified educational approach.

Our focus is to utilise this concept map for learning purposes at the tertiary level. To be specific, it can be featured in any auditing class session. As it presents the fundamental understanding of the auditing course, it will be very effective to build students' understanding of the basic idea before pursuing to the more sophisticated phase of auditing. For instance, students taking code AUD 339, Auditing course for Diploma in Accountancy (UiTM) can make full use of this concept map in grasping the idea behind the overall auditing process. All these students will be the future faces of financial market players, regardless of what role they dive in either to be the regulator, auditor, account executive or finance manager, having the right and clear mindset from the very beginning about what is supposed to be delivered by the auditor and what is the auditor's expectation from the client will somehow determine their future

business relationship and environment. Thus, the blaming game occurs in the corporate sector could be addressed if any disagreement or dispute arise in the future.

Managing public expectation on auditor roles is also another focus of introducing this concept map. Perhaps, this concept map can be included in any business or accounting magazine or blog to deliver this fundamental knowledge to the public at large. The public possibly could be the potential investor of any public listed firm and may be part of the user of FS someday. Therefore, their understanding is crucial to create a harmonised financial market. The idea behind this project looks pretty simply yet the concept brought up is indeed fundamental to the user's understanding of the audit environment. This is because the auditing standards are the foundation of auditing. Hence, the misconception of the standard on auditor roles will result in a chaotic financial system if it is not corrected now. As this is the first time the proposal on this project is made, the problem statement is identified from the current issue happening in the Malaysian financial market, thus no research publication has been produced yet. The example of newspaper headlines related to this project were included in Figure 3 below. However, the statutory declaration has been approved and Intellectual Property Recognition (IPR) has been applied to ensure the novelty and originality of the project introduced.

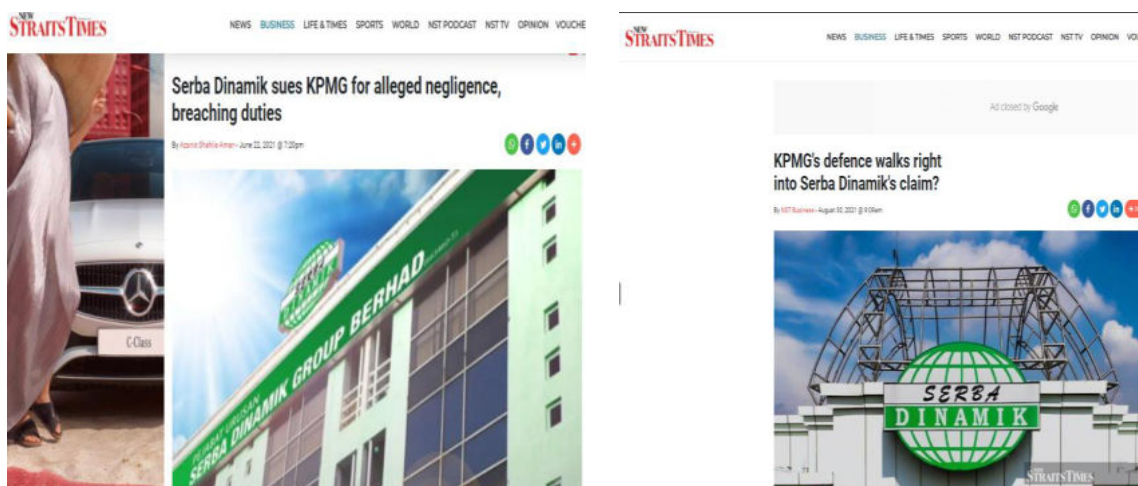


Figure 3: Newspaper Headline (Source: New Straits Times Newspaper Article)

CONCLUSION

The purpose of conducting a statutory audit is to increase the audited FS credibility and instil users' confidence in the financial system. The professional opinion expressed by the independent auditor will be the reference to the users in any of their decision-making because the only publicly available report is the audited FS containing the audit opinion on the truth and fairness of the FS. This implies how crucial the role of auditors in the financial market. However, the issue of misconception on auditor roles makes it difficult for the auditor to bear all the unrealistic expectations in the case of corporate failure. Therefore, by disseminating the statutory auditors' role in correcting the audit misconception through the introduction of this concept map, hopefully, the blaming game between the auditor and the client's management can be stopped and public confidence towards the auditor's credibility and trustworthiness can be regained. Accounting students' understanding can also be retained as a preparation to enter the real working field.

The current project is focusing on the FS audit, particularly regarding the auditor roles on the figure reported in the FS by the management. In the future, the audit misconception in another area can be explored to include other public biasness towards auditor roles like “auditor is a nuisance” and auditor roles in relation to illegal activities. This project could also be extended to focus on the auditor roles in providing non-assurance services.

ACKNOWLEDGEMENT

The authors thank Allah, the Lord of the universe, who always bestows his grace along with guidance so that the authors can complete the writing. Special thanks to all co-inventors for their contribution, time, commitment, and support to each other that made the innovation possible.

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O' basil: Miles of Smiles

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ABSTRACT

Tissue conditioner (TC) is a short-term soft liner used to improve the fit and function of an ill-fitting denture by rehabilitating the traumatized tissue of the mucosal underlying the dentures or obturators in patients respectively. It provides an even distribution of masticatory force, moulding itself to the changes which occur during the healing of lesions intraorally. However, an increase in surface roughness of aging TC will promote colonization by *Candida albicans* (*C.albicans*). Objective: To provide a natural, easily applied and compatible antifungal combined with the tissue conditioners for treatment of candida infection on a denture. O'basil is a modified version of *Ocimum basilicum* essential oil which is invented as an alternative antifungal for infection among denture wearers. To the best of our knowledge, this project is the first to display the anticandidal efficacy of O'basil as additives in tissue conditioner with antimicrobial and antibiofilm activities that significantly inhibit the *C.albicans*. Commercialization potential: The ability of these products to penetrate the Malaysian market is expected to be very high due to their efficacy. Moreover, O'basil could offer more opportunities in the development of SMEs and enhance the growth of the Malaysian made-products. Conclusion: Therefore, O' basil, an alternative antifungal in preventing and managing, additionally improving the material is in need for fungal infection in denture.

Keywords: Antifungal; denture; essential oil; O'basil; tissue conditioner

INTRODUCTION

Candida albicans is an oral commensal fungus found in 40% of people that aids in the formation of denture plaque, with *C. albicans* being the most common pathogenic agents isolated.[1] A tissue conditioner with antifungal activity could be a great advantage for patients with a high risk of denture stomatitis as adherence and accumulation of microorganisms, especially *Candida sp*, is the most important factor in traumatic infections for denture wearers [1, 2].

Well established studies have been carried out to incorporate antifungal agents into tissue conditioners with excellent antifungal effects for denture stomatitis. [1, 2] The benefits are the action of the drug was prolonged, thus adding fungicidal agents directly to the tissue conditioners or denture liners can be a low-cost, successful method and tissue recovery from

trauma was encouraged.[3] Incorporation of different antifungal agents such as zeolite, chlorhexidine, fluconazole, nystatin, itraconazole, miconazole, ketoconazole, and clotrimazole has been conducted with a different positive result.[3, 4] Therefore, it has been widely targeted for incorporation into tissue conditioners and showed a favourable result for the inhibition of candida growth. Using topical antifungal agents are effective on the fungi that invade superficial tissues however may be associated with a few unwanted effects such as objectionable taste and need for frequent applications. In terms of efficacy and effective duration of antimicrobial incorporated to tissue conditioners, there is a wide range as researchers have reported variable effective durations depending on the antifungal agent used and tissue conditioners [3, 4].

On the other hand, the recent craze in natural health has contributed to the growing interest in neuropathic remedies with medical plant extracts as an alternative treatment [5-6]. Extracts and essential oils had been used for antimicrobial action, antifungal, insecticide, anti-inflammatory, antioxidant, anticarcinogenic, antiviral and for food, cosmetic application. [6] Based on several studies, neem, garlic, propolis, rosemary, cinnamon, lemongrass, thyme, miswak, origanum, tea tree and *Ocimum* were reported to have good efficacy of antimicrobial activity [5-7]. Furthermore, some of these natural remedies antifungal activity reported due to effect the fungal membrane susceptible to disruption, causing disturbances in the structure and function of membranes or organelles, inhibiting the synthesis of proteins and material nuclear, causing death or inhibition of sporulation and germination of fungi [7]. However, most studies relate the antimicrobial action of essential oils components in bacteria, less explored action in fungi and yeasts and are limited, the majority has done with the acrylic denture base. Therefore the objective of our innovation is to invent natural oral health care products, which is effective as an adjunct to tissue conditioner for denture wearers.

INNOVATION DEVELOPMENT

Ocimum basilicum from the family Lamiaceae, a genus species of plants that are found in the tropical regions of Asia, Africa, Central America, and South America is a medicinal plant widely used in traditional medicine.[8] A study done by Adigüzel in 2005, showed that *O. basilicum* extracts possess compounds with antimicrobial properties against *C. albicans* and some bacterial pathogens.[8] The major advantages of natural medicinal plant extracts as antimicrobial agents include enhanced safety and stability without side effects.[6] It would be valuable to know the effect of *Ocimum basilicum* essential oil on fungal activity when incorporated into tissue conditioner. Although was found to have antifungal activity, its use in denture base and liners has not been well explored. Therefore, this project was invented a modified version of *Ocimum basilicum* essential oil as an alternative antifungal for infection among denture wearers. This project is the first to display the anticandidal efficacy of *O'basil* as additives in tissue conditioner with antimicrobial and antibiofilm activities that significantly inhibit the *C.albicans*. It also acts as an additive to a tissue conditioner and effect on its properties.

Novelty

To the best of our knowledge, our data research in this project is the first to display the anticandidal efficacy of *O.basilicum* essential oil as additives in tissue conditioner. The antimicrobial and antibiofilm activities of *O.basilicum* essential oil significantly inhibits the *C. albicans* as one of the causatives of oral candidiasis and denture stomatitis [Figure 1]. Active ingredient *O'Basil* [Figure 2]. Modified of *Ocimum basilicum* essential oil (5%), The active ingredient of *O'basil* will be released throughout the time the tissue conditioner is placed. The

mixture will prohibit the growth of fungal and inhibit the following consequences like denture stomatitis for the patient.

Instruction to use

- 1) Remove 1 drop of tissue conditioner's liquid by using the provided dropper.
- 2) Take 1 drop of O'basil (using the provided dropper) and mix it into the liquid.
- 3) Mix well the powder and liquid.
- 4) Apply the mixture on the fitting surface of the denture

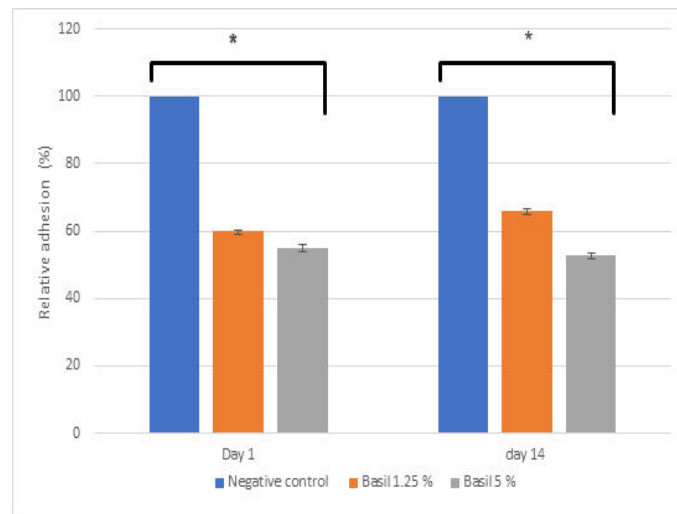


Figure 1: Qualitative observation of the biofilm formation on the surface of TC incorporated with O'basil



Figure 2: O'Basil prototype

COMMERCIAL POTENTIAL

The ability of these products to penetrate the Malaysian market is expected to be very high due to their efficacy. Moreover, O'basil could offer more opportunities in the development of SMEs and enhance the growth of the Malaysian made-products.

The benefits of O'basil

Significantly treat fungal infection in for patient that needs to wear tissue conditioner. Suitable for traumatized tissue and infection on denture worn by elderly people or cancer patients.

CONCLUSION

Therefore, O' basil, an alternative antifungal in preventing and managing, additionally improving the material is in need for fungal infection in a denture.

ACKNOWLEDGEMENT

We would like to thanks the staff Faculty of Dentistry, UiTM for making this project a possible.

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Crescent Lying-down Nursing Pillow

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ABSTRACT

Breastfeeding is a challenging activity which requires full dedication from the mothers. Incessantly, mothers must commit to this activity depending on the demand of the babies. The most crucial period for breastfeeding is at night where the baby has more intensity to spend as frequent as once for every two hours to breastfeed. One of the obstacles is maternal discomfort which has been experienced by the mothers due to the common breastfeeding position like sitting down. This position requires the mothers to wake up at night and disturbs the quality of sleep, thus causing sleep deprivation especially among working mothers who have another routine the next day. Recently, lying down position for breastfeeding has been promoted as nursing goals to ensure successful and continuation of breastfeeding practice. This position is introduced to help mothers to get enough rest while breastfeeding. Inspired by crescent shape of the moon, 3D drawing using Solidwork 2021 software has been used to design the prototype of this pillow. The difference between Crescent Lying-down Nursing Pillow compared to other nursing and maternity pillows is in its design. The shape is specifically designed to support the backbone and side lying-down nursing posture to avoid backpain, shoulder and neck impingement. This pillow will give an ultimate comfort to mothers all night while breastfeeding. As public community awareness towards successful breastfeeding practice keeps increasing, this innovation product is believed to solve one of the mothers' hurdle and obstacle along breastfeeding journey.

Keywords: Breastfeeding; nursing pillow; side-lying; crescent

INTRODUCTION

Different conventional breastfeeding positions such as cradle hold, koala hold, rugby-ball hold require breastfeeding mothers to sit rather than lying down [1,3]. Mothers are required to stay awake while breastfeeding and most are struggled to keep the 'sleep and wake-up' routine for every breastfeeding session at night. Previous study has reported that sitting position resulted in mothers; discomfort in the back and lower abdomen, shoulder and arm with intense spine and muscle tightening leading to fatigue while sitting too long during breastfeeding [4,5,6]. Even though side-lying position is an ideal breastfeeding position, but without physical support, it is uncomfortable and painful hurtful to the mothers as they may experience back and neck pain to remain in the same posture and position over the night. It was supported in the previous study that by using Body Part Discomfort Scale (BPDS), there was a significant reduction in maternal discomfort with the use of nursing pillow with $p < 0.05$ [3,4]. Suitable supporting materials of the nursing pillows which are specialized for nursing position are necessary to improve maternal comfort to encourage breastfeeding continuation and optimize nutrient supply for the baby [4].

Side lying-down position of breastfeeding is beneficial for the mothers to have more convenience breastfeeding experience [3]. Mothers can have a rest and even sleep while breastfeeding, thus breastfeeding on demand becoming so easy. However, several considerations must take place with this position. Customarily, a pillow must be placed behind the back, under the head, and between the legs. It's crucial to make sure that the mothers' weight is supported by the pillows, as not put too much strain on mother's hips and lower back.

INNOVATION DEVELOPMENT

This innovative design of the pillow has been developed while considering all the risk factors faced by the breastfeeding mothers and their babies in the lying-down position. Considering the lying-down posture, it is important to keep the spine in a straight position as much as possible (Figure 1). Supportive pillow is always useful to support the neck and the back while sleep in this position. As the mothers lying on one side with the knees bent, the pillow must be placed in between the knees (Figure 2). However, for this position, baby posture must be in V-shape from the mothers without any supportive material surround the baby to avoid Sudden Infants Death Syndrom (SIDS). The crescent shape inspired the whole design of the pillow to support the curve posture of the mothers' body while breastfeeding in this position.

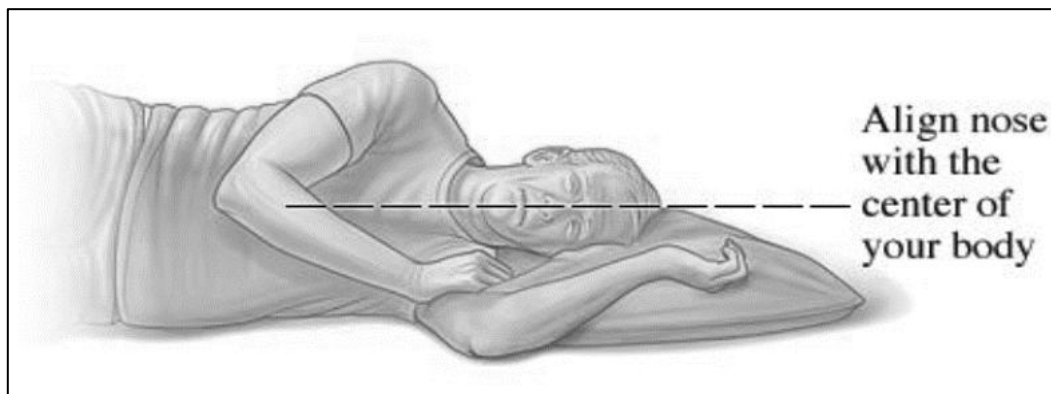


Figure 1: Side-Lying Sleeping Posture (As cited by www.southwestyorkshire.nhs.uk)



Figure 2: Knees bending with pillow support in between (As cited in <https://sisterlilian.co.za/2018/06/18/how-to-breastfeed-while-lying-down>)

COMMERCIAL POTENTIAL

Even though side lying-down position is supported for efficient breastfeeding practice especially while sleeping, it is often leads to shoulder pain and discomfort to the mothers without appropriate pillow support. The ergonomic design of this Crescent Lying-down Nursing Pillow highlights every requirement needed to give the best support to body posture of the mothers while optimizes sleeping comfort.

Ergonomic 3D design

The Crescent Lying-down Nursing Pillow has a unique shape perfectly to maintain the optimum side sleeping position. As shown in Figure 3, the grove at the head and neck side is important to keep the head comfortable and aligns the neck, shoulders, and upper body.

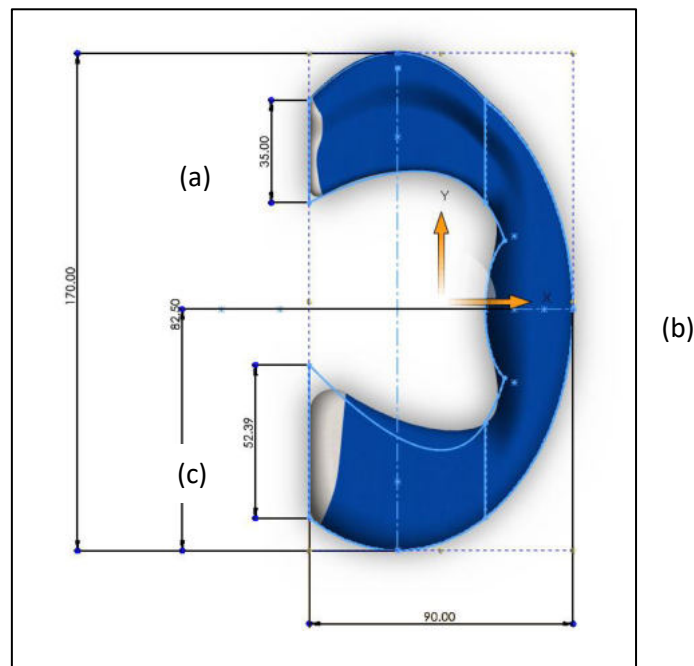


Figure 3: 3D Drawing of Crescent Nursing Pillow Measurement

(a) determine the width of the head rest (35cm) with specific neck curve measurement as in Figure 4. (b) was designed with the crescent shape with the total length of 170cm which suitable to fit the average height of Asian women with 157cm tall. (c) determined the width of the pillow between the two knees. Figure 5 determines the dimension of front dimension of the pillow at the knee segment.

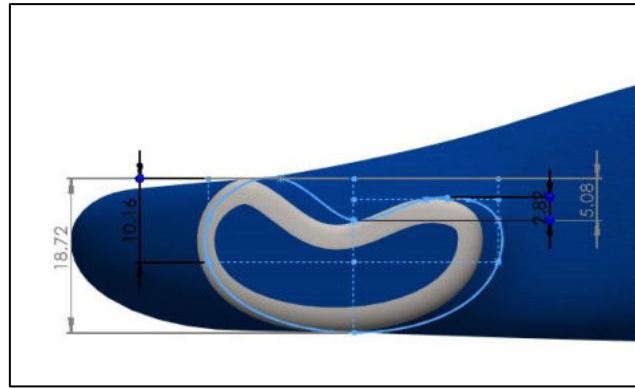


Figure 4: Front Dimension of head rest and neck curve

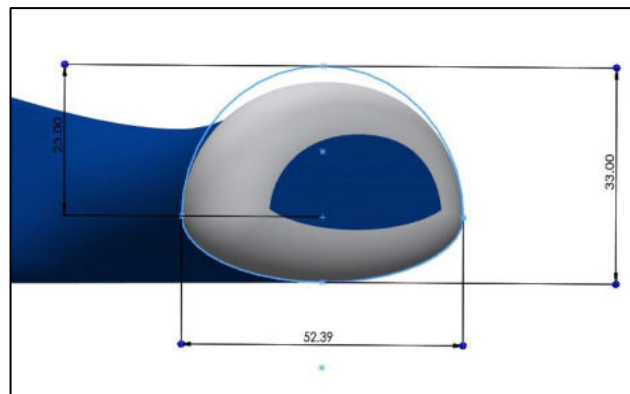


Figure 5: Front dimension of the pillow at the knee segment.

The back side is designed to have a contouring support to the spine which can reduce pressure build-up while maintain spinal alignment. The final design of Crescent Lying-down Nursing pillow prototype is shown in Figure 6.

A Multipurpose Pillow

This nursing pillow also can be used not just to support side-lying breastfeeding but also useful as maternity pillow. During pregnancy, side lying position is encouraged to provide best blood circulation of the foetus and the mother. Furthermore, during post-partum stage, mothers who have been through caesarean section can use the pillow to support breastfeeding position comfortably. Any person with the risk of spinal injury is also suitable to use this pillow compared to conventional pillow as it supports the crucial part of the body such as the neck, shoulder, back and knee by just using only one pillow.

Pillow Material

Common maternity and nursing pillow using cotton or latex fill. However, this pillow is designed to use memory foam, which is known to deliver great contouring support and well-suited for most individuals. The outer cover, will be made of cool cotton fabric which is removable and machine-washable as the memory foam cannot be submerged in water.



Figure 6: Crescent Lying-down Nursing Pillow 3D Prototype

CONCLUSION

As a conclusion, the innovation of the 3D design of the Crescent Lying-down Nursing Pillow meets the objective to support the side lying down of breastfeeding position. This product will revolutionize breastfeeding routine especially at night.

ACKNOWLEDGEMENT

Author would like to thank Universiti Teknologi Mara (UiTM) Kampus Dengkil for supporting and opportunity to join Creation de UiTM 2022.

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Al Jumal's Cube

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ABSTRACT

This research focuses on a novel approach to learning Arabic through the Al Jumal's Cube. This cube evolved from the standard cube in market with additional words on each side on the surface. Based on literature, the game can boost up students' comprehension towards learning language. The research's goals are to engage the students with leaning Arabic language while implementing the concept of gamification and to assess students' understanding of constructing sentences using the Al Jumal's Cube in addition to demonstrate upon them the differentiate between nominal and verbal sentences in the Arabic language. This innovation developed based on ADDIE Model and will have a substantial impact on future Arabic language acquisition. It hoped that this current innovation will improve students' grasp of Arabic and their attitudes about the language.

Keywords: Al Jumal's Cube; Arabic language; sentence construct

INTRODUCTION

The standard Rubik's cube invented in 1974 by a Hungarian professor named Emo Rubik. He invented the cube within a year, but it took six years to popularize across the globe until now (Okamoto, 2021). The cube has a six-sided surface with assorted colours; white, red, orange, green, blue, and yellow. Nevertheless, the development of the cube has evolved ever since and gain popularity worldwide. Many sciences have discovered numerous new perspectives of knowledge while using the cube such as medical image analysis (Zhu et al., 2020), algorithm (Steinparz et al., 2019), vocabulary (Saraswati et al., 2020) and practicing spatial space among students (Valerie, 2020), in addition to the knowledge of the cube itself has made a tremendous number of research in the academic world (Okamoto, 2021; Johnson, 2018; Liu et al., 2019).

Al Jumal's Cube, on the other hand, is the mixture of Arabic grammar and gamification where the students need to solve the cube prior constructing the sentences by using the words on the cube. The fasters among the students to solve the puzzle with the most correct sentences will win. This innovation focused on engaging the students with leaning Arabic language while implementing the concept of gamification and at the same time, it will be able to assess students' understanding of constructing sentences. It also demonstrates upon them the differentiate between nominal and verbal sentences in the Arabic language.

INNOVATION DEVELOPMENT

Cube

The Al Jumal's cube developed based on the ADDIE Model of Educational Technology. It started with the first stage, A (Analyse), whereas the researchers conducting the need analysis on the learners. Based on the analysis, the process continued to second stage, D (Design).

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بِالْحَافِلَةِ	الْمَدْرَسَةِ	إِلَى	الْمُجْتَهِدِ	الطَّالِبِ	يَذْهَبُ	Sentence A
اللَّيْلِ	فِي	الدَّرْسِ	الْمُجْتَهِدِ	الطَّالِبِ	تُرَاجَعُ	Sentence B
الفصل	فِي	العربية	اللغة	المعلم	يُدْرَسُ	Sentence C
زُمَلَائِهِمْ	مَعَ	الجيد	الدرس	الطلاب	يُنَاقِشُ	Sentence D
الورقة	على	المهم	التقرير	المعلمة	تَكْتُبُ	Sentence E
الرياضة	عَنْ	الرَّايِغِ	الكتاب	الاستاذة	تَقْرَأُ	Sentence F

Figure 1: Write words from six different sentences on stickers.

Each sticker should have only one word.

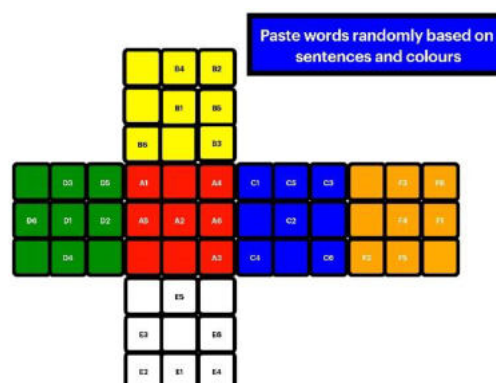


Figure 2: Structure of the cube

At the third stage, D (Develop), the researchers place words from one sentence on the same colour. The individual word should be randomly placed and not according to the order in a sentence.



Figure 3: Developing the Al Jumal Cube

For the fourth stage, I (Implementation), the researchers had implemented it on the students in the class. The students divided into few small groups and the competition were held among small groups. The fastest in the group in solving the cube and form correct sentences will received a gift from the teacher.



Figure 4: Implementing the Al Jumal's Cube in the class

The final stage of the model, E (Evaluation) was conducted in two methods, verbal and written. The researchers asked the learners directly after they finished the game and distributed a questionnaire to know their feedback. The researchers learned that the game could boost up the students understanding of verbal and nominal sentences, its differences, and its functions in the sentences.

Principles of Effective Learning

While designing the Al Jumal's Cube, the researchers adhere to the ten principles of effective learning (Ten Principles of Effective Teaching | Bradley University, 2022) as it is important to the development of education:

Create An Active Learning Environment

Focus Attention

Connect Knowledge

Help Students Organize Their Knowledge

Provide Timely Feedback

Demand Quality

Enhance Motivation to Learn

Communicate Message in A Variety of Ways,

Help Students to Productively Manage Their Time

Develop The Entrepreneur Soft Skill

COMMERCIAL POTENTIAL

Indisputable that Al Jumal's Cube is highly potential commercialized in the market. It is beneficial to the students to learn and practice in constructing the Arabic sentence, nominal, and verbal sentences. The teachers and lecturers can make useful of the cube by making it as supplementary educational tool in the class especially for the beginners. The public may buy it for their household uses and it may be a tool for bonding between family. On the further perspective, the ministry may use it for additional educational tool.

CONCLUSION

In the nutshell, the students love to play Al Jumal's Cube and, they be able to revise and learn the nominal and verbal sentences simultaneously. Consequently, the learners can construct any type of sentence without omitting any grammatical mistakes in writing.

Impact of Learning of the Al Jumal Cube

The finding of the product discovers that majority of the students were positive about learning Al Jumal's Cube which increased their learning desires and motivation, while improving their understanding and performance in learning Arabic sentences at one go. Respondents also agreed to the fact that Al Jumal's Cube has allowed them to experience self-learning. Explanation, exercises, and gamification designed has increased their interest in learning. Therefore, learning Arabic sentences is now easier and brings positive results to students, as Malaysia embraces its newly announced Education Blueprint: Globalized Online Learning. Al Jumal's Cube is suitable to all; students, university level students and Arabic teachers and lecturers as it is easy to play.

ACKNOWLEDGEMENT

The researchers would wish to extend special thanks to Quranic Language Department, Centre for Languages and Pre-University Academic Development (CELPAD) and Centre for Foundation Studies (CFS), International Islamic University Malaysia for giving us this opportunity to join this competition.

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Mahsuri-The Legend Continues

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ABSTRACT

Mahsuri, the Legend Continues is a package that consists of a book about a legend that was inspired by true events in Langkawi. Langkawi is a beautiful island and is one of the most popular tourist attractions because of its legend. Mahsuri is the main character in this Malay legendary story about a woman who was wrongly accused and was sentenced to death for something she did not do. Legend is one of the genres that functions as a tool to preserve our cultural identity from fading. The aim of this project is to document the creative process of the book which includes three objectives : (1) the process of retelling the story in Malay according to the children's target group, (2) the process of doing the illustrations that are suitable and match the text and (3) the process of promoting and marketing the Legenda Mahsuri package. This legend was retold, illustrated, and translated into Tamil Language and was launched in India in 2020. Besides the book, a set of Legenda Mahsuri merchandise that consists of a tote bag, a pouch bag and a pencil case with the image of the book cover can also be purchased online and delivered to the specific address. In 2021, the book won 4 categories of awards, namely Author Award, Illustrator Award, Editor Award and Publisher Award from the International Board on Books for Young People (IBBY) Malaysia. The book also received bulk purchase orders and were distributed to primary schools in selected locations and to public libraries. This book was originally written in Malay language with Tamil translation and is currently in the process of translating to other languages. It is a suitable reader for children which aims to promote traditional and cultural values besides spreading the national heritage worldwide.

Keywords: Malay legend; Mahsuri; cultural values; children literature

INTRODUCTION

Legend is one of the genres that functions as a tool to preserve our cultural identity from fading. Oxford English Dictionary defines a legend as "a story from ancient times about people and events, that may or may not be true" (Oxford Dictionary., n.d.) The aim of this project is to document the creative process of the book which includes three objectives : (1) the process of retelling the story in Malay according to the children's target group, (2) the process of doing the illustrations that are suitable and match the text and (3) the process of promoting and marketing the Legenda Mahsuri package. This paper documents the creative process and development of the Legenda Mahsuri project. It started with the literature search on the legend of Mahsuri from Langkawi Island in Kedah. As a retold version, previous versions of Mahsuri, both in the Malay and English language were collected, read and analysed generally. The motivation to choose Mahsuri was initiated during the researcher's experience doing a water

colour plein air session with a group of fellow artists in Langkawi. During that session, all artists were required to paint on site in front of the view. The researcher who was one of the artists had chosen a view which has become the last page; on page 16 of the book. From the initial motivation to capture the beauty of Langkawi Island, the various versions and stories about Mahsuri were collected. The story board were then created in the Malay language before being edited and proofread. At the same time, the visual images were being sketched to match the texts. The process of translation into the Tamil language was done by Dr. Krishanan Maniam.

INNOVATION DEVELOPMENT

There were several stages involved in the development of the innovation process. Besides focusing on the story line, the characteristics of Mahsuri and her physical features were also identified. Background search on the costumes during the 18th century era was done and was matched by her preference to wear black. This became the inspiration to create the cover page of the book that shows Mahsuri on a black shawl decorated with jasmine flowers motifs. The designs and motifs used in traditional costumes became the inspiration to do the sketches. Adaptations were also done to suit the illustration styles. To meet the age group level, the illustrator had chosen pencil colour medium to create the naïve look of the illustration. A unique circle frame for the illustration were used for each illustration page to direct the readers' attention on the images.

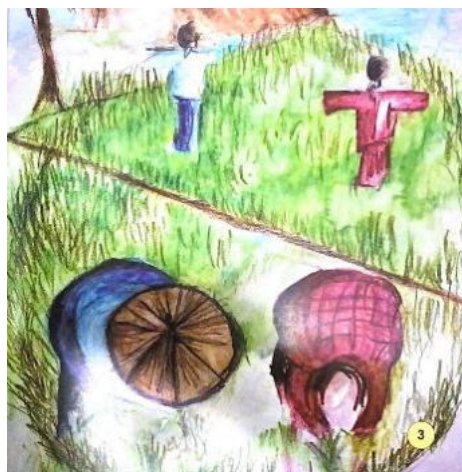


Figure 1: Images of scarecrows

Figure 1 on page 3 shows the images of scarecrows that match the costumes of Pandak Mayah and Mak Andak bending and working at the paddy field. The focus on the two characters bending to portray working hard at the paddy field that sets the setting of the story.



Figure 2: The image of rice

The Figure 2 on page 4 shows the image of rice and the narrative informs the readers about the sound of like a baby crying and later Mak Andak was pregnant while Pak Andak found a bird's nest that became the source of income for the family.



Figure 3: Mysterious images of birds on a bird's nest

Figure 3 on page 7 shows the mysterious images of birds on a bird's nest.

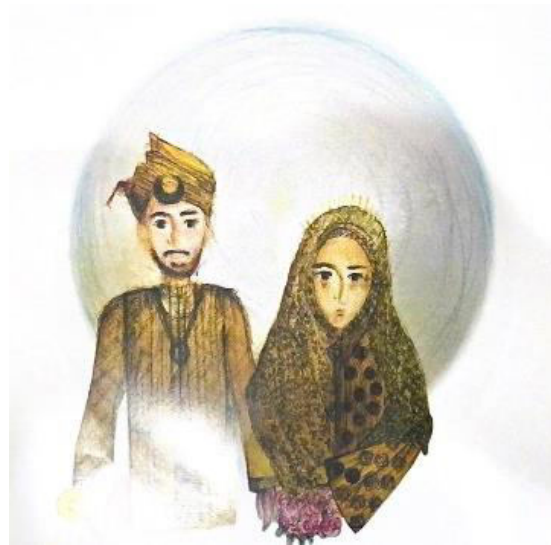


Figure 4: The wedding images of Mahsuri and Wan Deris

Figure 4 on page 8 shows the wedding images of Mahsuri and Wan Deris on yellow and black traditional costumes with ornaments.



Figure 5: Look of the pregnant Mahsuri looking at the moon and stars while being apart from Wan Deris

Figure 5 on page 10 shows the longing look of the pregnant Mahsuri looking at the moon and stars while being apart from Wan Deris who had to fight with the Siamese army that had attacked Langkawi at that time.



Figure 6: The image of Mahsuri being tied at a tree for punishment

Figure 6 on page 12 shows the image of Mahsuri being tied at a tree for punishment on the accusation of her wrongdoings that she did not do.



Figure 7 and 8: Destruction in Langkawi

Figure 7 on page 14 shows the destruction in Langkawi. Figure 8 on page 15 has used the similar image with additional images of white blood.



Figure 9: The original water colour painting

Figure 9 on Page 16 was added as it was the original water colour painting that initiated the story. The next stage of the book production was the printing stage while the image of the book cover was also produced as merchandise on Figure 10.



Figure 10: Image of the book cover as merchandises

COMMERCIAL POTENTIAL

The commercial potential of Mahsuri, the Legend Continues fits the title itself. The endless potentials were found while carrying out this project. The hardcopy version of Legenda Mahsuri

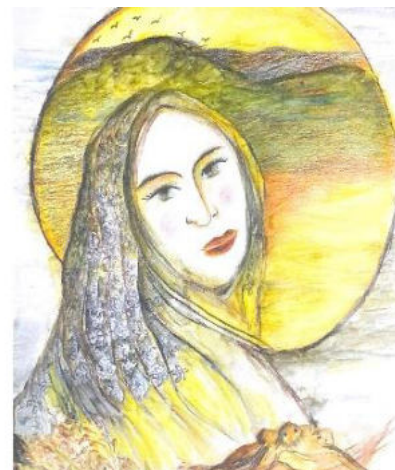


Figure 11 and 12: The original sketch in progress version of pencil colour drawing

Figure 11 and 12 shows the original sketch in progress version of pencil colour drawing stage. The book and the merchandise with the image of Legenda Mahsuri book cover were brought to Kerala, India and introduced during the opening ceremony of the book launch as shows in Figure 13.



Figure 13: The book and the merchandise with the image of Legenda Mahsuri

CONCLUSION

The documentation of the creative process of Legenda Mahsuri has been achieved. It started with the literature search on Mahsuri and compiling the literature search before creating the suitable illustrations. As a retold version, previous versions of Mahsuri both in the Malay and English language were also referred to. From the initial stage of art excursion in Langkawi, the idea emerges into children's Malay book with Tamil translation and further creation of several types of merchandise. The printed version was read aloud in a video competition with 3 categories that was read in Malay. Future projects will include the publication of the translated version in other languages which are now being edited. Reading aloud competition in Malay language and Tamil language was also part of the plan. The translation into other languages and the reading aloud can help to promote the legend of Mahsuri worldwide. Finally, in line with the current technology, the book will also include the augmented reality technology with the inclusion of QR code scanner to listen to the recorded sounds. Converting into an e-Book is one of the possibilities too.

ACKNOWLEDGEMENT

We would like to express our gratitude to YB Datuk Seri Santhara Kumar Ramanadu for supporting the bulk purchase of the book. Deepest gratitude to the administration of UiTM Johor, Segamat, especially to Associate Professor Dr Saunah binti Zainon for the continuous support that was given. Special thanks to Dr Krishnan Maniam for translating the book into Tamil language. Last but not the least to PENA (Persatuan Penulis Nasional Malaysia) for publishing the book.

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GoBiD: Testing Readiness of Big Data Adoption in Higher Education Institution

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ABSTRACT

Compared to other sectors, Big Data (BD) adoption in higher education is still at initial stage. Due to the lack of studies on the BD adoption, higher education does not realize the benefits of BD. Previous studies of BD cover more of the technical part and the development of the system, which leads to fewer studies to propose the right theoretical framework for BD adoption in higher education. Therefore, the introduction of GoBiD is expected to provide information on the current situation concerning the level of readiness for BD adoption as well as feedback that people can use for improvement by looking at the description for each percentage acquired. In the context of commercialization, this project will propose a new theoretical framework for BD adoption in higher education institutions and help other organization that have not yet tested big data adoption. GoBiD also aids an organization in cost-saving related to BD adoption by observing the result of readiness among the people before proceeding with the implementation stage. In a nutshell, the GoBiD will assist an organization in analysing the readiness level for big data adoption and providing the necessary action that needs to be taken based on the result obtained.

Keywords: Big Data; higher education institutions; big data readiness; big data adoption

INTRODUCTION

Higher education is an important institution in preparing students for the future. Thus, universities are under scrutiny from accrediting agencies, government, and other stakeholders for their roles. Therefore, the university needs to adopt the technology where it will improve the process in teaching and learning (Tulasi, 2013). To adapt to the 21st learning century, changes are a must for the higher institution. The new teaching paradigm expects the student to have skills such as critical thinking, adoption of technology, teamwork, and self-regulated learning (Al Elfy, Gomez & Dani, 2018). According to Dresner Advisory Services (2017) education sector is one of the sectors that actively producing expansive amount of data. Hence, the integration of Big Data into education sector is very crucial.

In discussing future education, technologies offered are always related to computing devices and flexible classrooms. However, data available in higher education is the most

impounding aspect that is overlooked which can be fully utilized (Tulasi, 2013). The revolution of Big Data, which can generate massive data from e-learning and web-based technologies in higher education, has made it possible for higher education to detect student's risk, student's progress, predict individual learning needs, and expose potential determinants of student's academic achievement, making it undeniably attractive to this sector (Al Elfy, Gomez & Dani, 2018). Besides, other impacts of BD include encouraging tutor inquiry, supplying prospects to analytically explore teaching activities and discovering methods for outlining improved learning contexts, offering insights to reflect teacher's teaching practice as well as how it is affecting the learning outcomes (Al-Rahmi, Yahaya, Aldraiweesh, Alturki, Alamri, Saud, Kamin, Aljeraiwi & Alhamed, 2019)."

The Big Data era has brought attention not only to the industry but also to academia. Increasing organizational performance such as high revenues and gaining faster insight has attracted the organization to invest in BD. The significance of adoption Big Data in education sector also being thrust forward nowadays with the massive amount of data can be collected due to online learning (Oi, Yamada, Okubo, Shimada, & Ogata, 2017). Therefore, the tremendous potential by managing the data using Big Data can help in various educational problems (Sorensen, 2018) such as timely feedback on students' performances (Zheng & Bender, 2019; Black & Wiliam, 2018). However, the implementation of BD in the organization requires careful planning. The implementation is different from other technologies where the project is risky and costly to the organization. To become the winner of BD, the organization needs to be ready to face the challenges of BD itself where it required not only commitment to new technology, but also support with the organizational approach (Al-Sai, Abdullah & Husin, 2020).

INNOVATION DEVELOPMENT

A pilot study has been conducted in Universiti Teknologi MARA (UiTM) Cawangan Pahang, where the results of the awareness as in Figure 1.

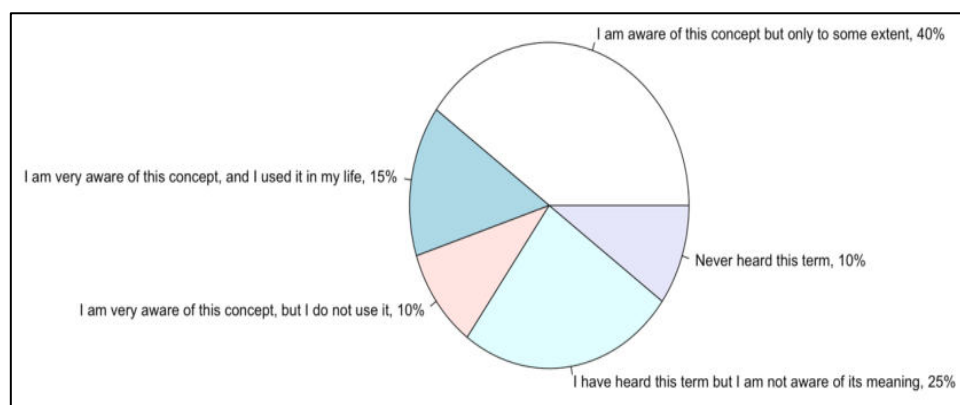


Figure 1: Awareness of staff UiTM Cawangan Pahang on big data

Only 25% of the staff aware of this concept, while the rest do not aware of this concept. Further analysis to forecast the readiness from the level of awareness needed in this study. However, various items were used to measure the readiness such as Diffusion of innovation, Unified Theory and Use of Technology (UTAUT) and Technology Organization Environment (TOE). Traditionally, the result of the survey is in raw data which call for further visualization technique and analysis. Hence, to simplify the process a testing instrument (GoBiD) which provide a structured outputs based on the questionnaire as in Figure 2 and 3 was developed.

Hence, GoBiD (Go Big Data) is a testing instrument that was developed to analyse the level of readiness among top management, academic staff, and support staff on big data adoption.

This testing instrument is used in a discussion between top management, academic staff, and administrative staff as consensus which scale is appropriate for each criterion as shown in Figure 2. Once all the criteria have been answered, the result of the level of readiness for big data adoption will be obtained (refer to Figure 3). In this context, at the end of the testing instrument, the top management will not only get detailed information on the current situation related to the level of readiness for big data adoption among people in Universiti Teknologi MARA (UiTM) Cawangan Pahang but also have feedback on the next step or mechanism that the people can take for improvement by looking at the description for each percentage obtained as shown in Figure 4. The testing instrument, GoBid clearly give a structured output easier to understand compared to raw data obtained from the questionnaire.

Diffusion of Innovation (DOI)	Answer	SCALE MEASUREMENT
Relative advantage		
Big data lead to easy retrieval of information	1	NOT_READY
Big data can replace manual work	1	NOT_READY
Big data provide of searching in special field	1	NOT_READY
Big data management information system dalam bidang kejuruteraan	1	NOT_READY
Big data provide searching to frequent and related documents	1	NOT_READY
Big data management information system dapat menggantikan	1	NOT_READY
Big data provide retrospective reporting	1	NOT_READY
Big data management information system mempunyai	1	NOT_READY
Big data provide a wider amount of information	1	NOT_READY
Big data management information system dapat menggantikan	1	NOT_READY
Big data lead to better hand to create better education management systems	1	NOT_READY
Big data dapat menggantikan sistem sistem pengurusan pendidikan yang sedia ada	1	NOT_READY
Compatibility		
Being having professional activity in university, I know how to use big data	1	NOT_READY
Big data management information system dalam bidang kejuruteraan	1	NOT_READY
Knowledge coverage of big data is match with my professional and scientific activity	1	NOT_READY
Pengetahuan saya tentang big data adalah selaras dengan bidang profesional dan akademik saya	1	NOT_READY
Information in big data is consistency like past evidence	1	NOT_READY
Informasi dalam big data adalah konsisten dengan bukti-bukti yang pernah saya dapati	1	NOT_READY
Big data is use accurate without time and place restriction	1	NOT_READY
Big data boleh digunakan tanpa terhad masa dan tempat	1	NOT_READY
Using big data isn't against moral, cultural, and religious values	1	NOT_READY
Memakai big data tidak bertentangan dengan nilai, budaya, dan kepercayaan agama	1	NOT_READY
Learning big data is very hard	1	NOT_READY
Mengetahui big data adalah sangat sukar	1	NOT_READY
Perceived ease of use		
Using big data is very difficult	1	NOT_READY
Mengetahui big data adalah sangat sukar	1	NOT_READY
Comparing big data with past materials is necessary in deciding to use big data	1	NOT_READY
Membandingkan big data dengan bahan-bahan yang lalu adalah diperlukan untuk memutuskan big data	1	NOT_READY
Big data analysis is difficult to perform using traditional data analysis	1	NOT_READY
Analisis big data adalah sukar dijalankan menggunakan analisis data tradisional	1	NOT_READY

Figure 2: Some of the criteria in the GoBiD Testing Instrument



Figure 3: Interface of result from GoBiD Testing Instrument

	LEVEL OF READINESS	DESCRIPTION
NOT READY	0% - 20%	There is a gap in awareness and understanding of the concept, including a lack of data maturity levels, data management practices, support and facilities.
	21% - 40%	Slightly aware of and familiarized with the concept, facilities, resources, and practices that have been provided accordingly.
POTENTIALLY READY	41% - 60%	Have to understand some aspects of the concept and of the facilities, resources, and practices that have been provided accordingly.
	61% - 80%	Aware of the total concept, the strategy implemented aligns with people, process, and technology towards the implementation.
READY	81% - 100%	Proficient and knowledgeable about the concept. A very well data strategy that includes people, process, and technology capabilities towards a new vision.

Figure 4: Each percentage obtained is described in detail

Figure 5 below shows the proposed framework for this project. Big data adoption offers many positive impacts on an organization. Hence, the proposed framework below provides an overview of the positive consequences that Universiti Teknologi MARA (UiTM) Cawangan Pahang will get if they are ready with big data adoption, which is a Smart University that is also being aimed at by many other higher education institutions.

Besides that, this project also has a specific novelty in that no specific theoretical framework has been proposed for higher education based on the previous study. Other than that, this project also contributes a framework of an organization's readiness to adopt Big Data with a combination of the three main theories, which are Diffusion of Innovation (DOI), Unified Theory and Use of Technology (UTAUT) and Technology Organization Environment (TOE). The most important thing is that this project will be the guideline for addressing the issue of big data adoption in higher education. The highlighted novelties are important to achieve the objective of this project, which is to study the level of readiness for big data adoption among people in Universiti Teknologi MARA (UiTM) Cawangan Pahang and provide solutions to the problems arising related to big data adoption in higher education.

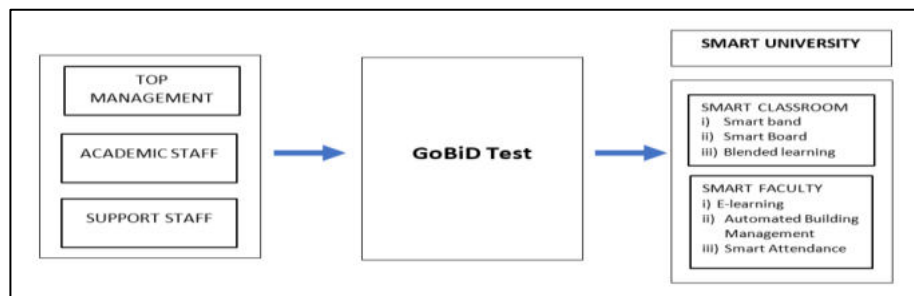


Figure 5: A Proposed Framework for Big Data Adoption

COMMERCIAL POTENTIAL

The GoBiD project covers some commercial potential that is crucial to higher education. Different industries have different requirements for big data implementation. This GoBiD will be the basic requirement or guidelines for implementing big data which focuses on people, organizations, and the environment. It is very important to analyse the level of readiness for big data adoption in an organization before that organization decides to spend some money on the implementation of this big data. Besides that, the GoBiD Testing Instrument also helps to reduce the potential failure of big data adoption in organizations. In this context, the result obtained once all the criteria have been answered will provide feedback on the level of readiness of big data adoption among the people involved, and the description is given will highlight the guidelines on the next step to be taken before the implementation of big data. The above potential closely relates to the last commercial potential that I want to highlight in this project, which is saving the organization's cost by referring to the GoBiD Testing Instrument before the actual implementation of big data in an organization. Based on the previous study, it is shown that large data adoption requires many funds. Hence, by analysing the level of readiness for big data adoption among the people involved, it will help an organization, especially higher education, to make systematic planning before the actual implementation of big data is taken. By limitation, this innovation will benefit all organization that do not yet testing on big data adoption, and which fail to adopt it.

CONCLUSION

There are numerous advantages to adopting BD in higher education, particularly for students, academia, and the university itself. Thus, it will help higher education to become one step ahead in adopting innovative technology. The GoBiD project will help an organization, including higher education institutions, to make an analysis of the level of readiness for BD adoption. Besides, this project will provide relevant feedback on the strategy to be adopted to move forward and implement the BD. In the context of improvisation planning, this project will be expanded by including additional characteristics such as environment and technology to obtain a comprehensive result for BD adoption. As a recommendation, GoBiD instrument testing should be used by another branch of UiTM to see the level of readiness for BD adoption and gain feedback on the strategy that should be taken before the implementation process.

ACKNOWLEDGEMENT

The authors would like to acknowledge the Universiti Teknologi MARA, Pahang Branch for funding this project under Dana Dalam Negeri Lestari Khas Fasa 2 (600-TNCPI 5/3/DDN 906) (010/2021) which resulted in the publication of this project.

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Benzylamine Derivatives as Corrosion Inhibitors on Carbon Steel

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ABSTRACT

Acidic solutions applied in oil and gas pipelines as well as shafts are the main source for corrosion of carbon steel. Methods aimed at preventing corrosion comprise of exposing carbon steel with corrosive media fully immersed in an aqueous acidic solution containing synthesized series of azomethine ligands derived from 2,4-dihydroxybenzaldehyde and benzylamine derivatives as corrosion inhibitors. The methods have extensive usage in numerous categories of processes includes in the manufacture or transference of oil and gas, especially for acid stimulation in a borehole or counteractive intervention in a pipeline made out of carbon steel.

Keywords: Corrosion; inhibition; acid solution

INTRODUCTION

Acidic solution exists in many levels of operations in the sector of oil and gas. As an instance, acidic solution is frequently applied in shafts penetrating subterranean foundations. This form of acidic solution possibly be employs, as in this case, in stimulation processes or clean-up operations in oil and gas borehole. Acidic stimulation procedures be allowed to ply these treatment solutions in hydraulic fracturing as well as matrix acidizing treatments. In processes using acidic shaft solution, metal exteriors of pumps, tubing, piping, blending apparatus and downhole gears potentially unprotected to the acidic solution [1, 2].

There are different types of acidic solution, as example of hydrochloric acid, hydrobromic acid, sulphuric acid, nitric acid, or any mixture of the acids. Moreover, countless solution practice in the oil and gas sector contains a water origin that might accidentally comprise particular quantities of acid, therefore could possibly be the starting point of the solution becomes less acidic [3]. Deterioration of metals may arise at any location in a well production system or pipeline system, including anywhere downhole in a well or in surface lines and equipment [4].

Toward mitigating this possible corrosion issue in processes involving acidic borehole solution, the usefulness of corrosion inhibitors is proven efficient in retarding corrosion of metals and metal alloys. The presence of inhibitor compound within the acidic solution has reduced the corrosion reaction on the metal surface [5,6]. Nevertheless, some of commonly used inhibitor such as inorganic inhibitors may not be environmentally friendly since the transition metal complexes used as inhibitor were chromate and nitrite. The expense of repairing or replacing corrosion damaged equipment is extremely high, thus corrosion inhibitor is one of the alternatives against corrosion issues [7,8].

General Measurement Terms

Practise of corrosion inhibitors is rather ordinary in production and processing stage. Based on the acids utilized, dissimilar corrosion inhibitors have been established and included to borehole solution or pipeline solution to lessen the dissolution of metal and henceforth shield and improve the lifetime of metal cylindrical. Current corrosion inhibitors are divided to be use in strong mineral acid (i.e: HCl , H_2SO_4 and HNO_3) corrosion inhibitors or organic acid inhibitors (i.e., formic acid, citric acid and oxalic acid). The reason is due to the variance in mechanism of corrosion inhibition. Mostly thought-provoking is the progress of fresh chemistries, which preserve decent protection of materials underneath a diversity of circumstances even though kept to be environmentally satisfactory.

It has been revealed that 2,4-dihydroxybenzaldehyde and benzylamine derivatives has outstanding corrosion inhibition properties in strong mineral acid solution (as example hydrochloric acid) on carbon steel and at high concentration of HCl acid (1 M HCl).

Corrosion and Inhibition

Normally, "corrosion" is the damage of metal owed to chemical or electrochemical series of chemical reactions, which might ultimately abolish a construction. The corrosion kinetics rate will differ along time dependent on the specific circumstances to which a metal is unprotected, as example the quantity of water, pH, additional chemicals, temperature, and pressure. A few examples of general forms of corrosion contains, but are not restricted to, the dissolution of metal, the corrosion of a metal in an acidic media, deterioration of a metal, chemical exposure of a metal, electrochemical invasion of a metal, and discolouration progress on the exterior of a metal [9].

Iron and Steel Corrosion

Iron is a metal element with the symbol Fe (from Latin: ferrum) having atomic number (A.N.) of 26. Iron is categorized as the first transition series. Major form of iron naturally exists (by mass), establishing the planet Earth as a full, founding much of Earth's external and inner core. Iron is the fourth greatest naturally existed element in the Earth's shell. Iron occurs in a extensive series of oxidation states, -2 to +8, although +2 and +3 are the furthestmost universal. Elemental iron is oversensitive to oxygen and water. New iron exteriors appear shiny silvery-grey, but tarnish in normal air to produce iron oxides, also recognised as rust. Contrasting several supplementary metals which form passivating oxide layers, iron oxides inhabit additional capacity than iron metal, followed by iron oxides shaved off and depicts fresh tops for corrosion [10].

INNOVATION DEVELOPMENT

In realization, a method of retarding or slowing down process of carbon steel corrosion is exposed to a corrosive solution encompasses an aqueous acidic media is explained, by which the method (Fig. 1) comprising the steps of: (1) synthesizing azomethine ligand also known as Schiff bases that are identified by conjugated carbon which bonded to nitrogen ($\text{C}=\text{N}$) from 2,4-dihydroxybenzaldehyde and benzylamine derivatives, (2) characterizing the azomethine ligands, (3) establishing the solution including an aqueous acidic solution (1 M HCl), in which the solution are added with synthesized organic compound of azomethine and (4) examining the surface morphology of carbon steel in acidic solution.

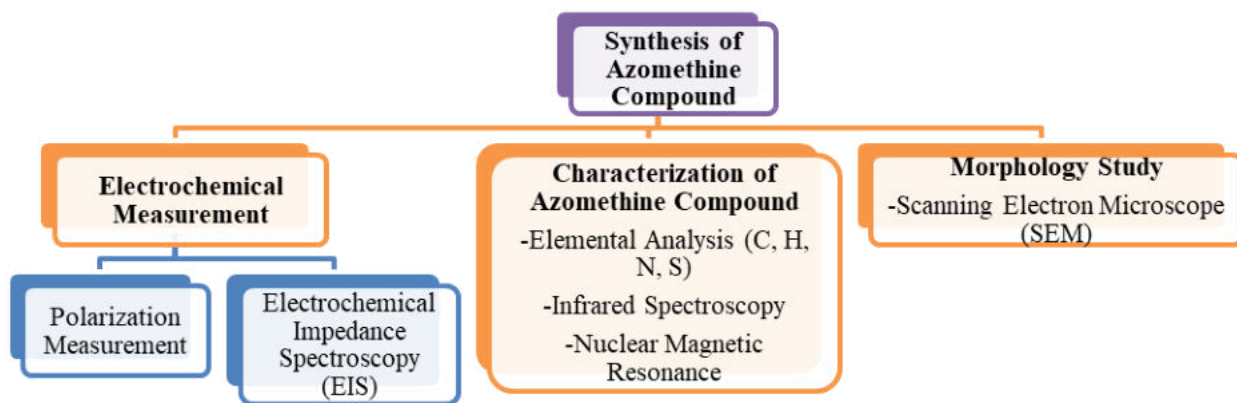
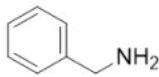
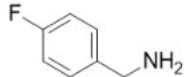
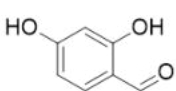
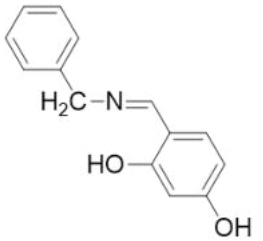
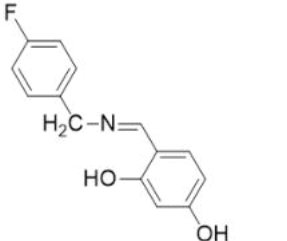


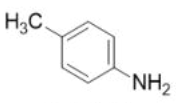
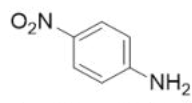
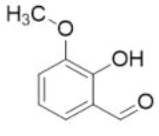
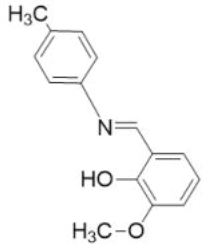
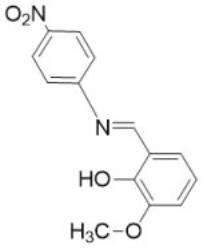
Figure 1: Research methodology flow chart

The inhibitive effect of azomethine compounds derived from 2,4-dihydroxybenzaldehyde and 2-hydroxy-3-methoxybenzaldehyde were deliberate on carbon steel in 1 M HCl solution at room temperature. By discussing the Fig. 1, electrochemical measurements were the key constituent to highlight the inhibition efficiency of the respective azomethine inhibitors.

The synthesized azomethines (Table 1) were prepared by refluxing for three hours a similar ratio of ethanolic 2,4-dihydroxybenzaldehyde with benzylamine derivatives. The precipitate formed was gathered, filtered, and lightly rinsed using cold absolute ethanol.

Table 1: Structure of Azomethine Series

Aldehyde \ Amine	Amine	
	 benzylamine	 4-fluorobenzylamine
 2,4-dihydroxy benzaldehyde	 4-((benzylimino)methyl)benzene-1,3-diol (A1-H)	 4-(((4-fluorobenzyl)imino)methyl)benzene-1,3-diol (A2-F)

Amine \ Aldehyde	Amine	
	Aldehyde	
	 <p>p-toluidine</p>	 <p>4-nitroaniline</p>
 <p>2-hydroxy-3-methoxy benzaldehyde</p>	 <p>(Z)-2-methoxy-6-((p-tolyl)imino)methylphenol (A3-CH₃)</p>	 <p>(Z)-2-methoxy-6-((4-nitrophenyl)imino)methylphenol (A4-NO₂)</p>

The conformation of synthesized azomethine ligands as shown in Table 1 were clarified via elemental analysis (CHNS), ¹H and ¹³C nuclear magnetic resonance (NMR), Fourier transform infrared spectroscopy (FTIR), and single-crystal X-ray diffraction.

1 M HCl were used as the test solutions for the corrosion inhibition test which prepared from 37% concentrated HCl in ultra-pure water. The test was implemented at room temperature varies from different concentration of inhibitor (0.01, 0.02, 0.03 and 0.04 mM) for each azomethine inhibitors.

In polarization measurements, the inhibition efficiency (IE (%)) was calculated using the following (1):

$$IE (\%) = \frac{i_{corr} - i_{corr(inh)}}{i_{corr}} \times 100 \quad (1)$$

where *i*_{corr} and *i*(inh) are the corrosion current densities in the absence and presence of the inhibitor, respectively

As shown in (1), by adding 0.04 mM A2-F in the mineral acid solution (1 M HCl) resulted in *i*_{corr} of at 26.74 μA/cm² and IE (%) at 95.3%, which proves the effectiveness of azomethine ligands to protect carbon steel against blank mineral acid solution of 1 M HCl.

The Electrochemical impedance spectroscopy (EIS) measurements has discovered the corrosion retardation effectiveness is calculated using charge transfer resistance (*R*_{ct}) as according to (2):

$$IE (\%) = \frac{R_{ct(inh)} - R_{ct}}{R_{ct(inh)}} \times 100 \quad (2)$$

By referring to (2), the IE (%) obtained for A2-F was up to 95.5% at optimum concentration of 0.04 mM. The low carbon steel is adequately protected under the exposure of 1 M HCl acidic solution.

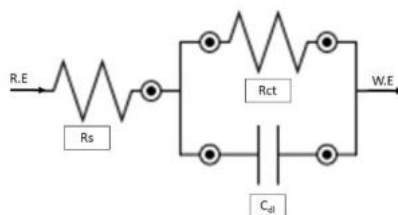


Figure 2: Equivalent circuit used to fit impedance spectra

The measured EIS spectra (Fig. 3) were fitted to the equivalent circuit as in Fig. 2. The fitted circuit for the EIS method includes elements of solution resistance or ohmic resistance (R_s), charge transfer resistance (R_{ct}), which is a quantification of transferred electrons on the metal surface, as well as a double layer capacitance (C_{dl}).

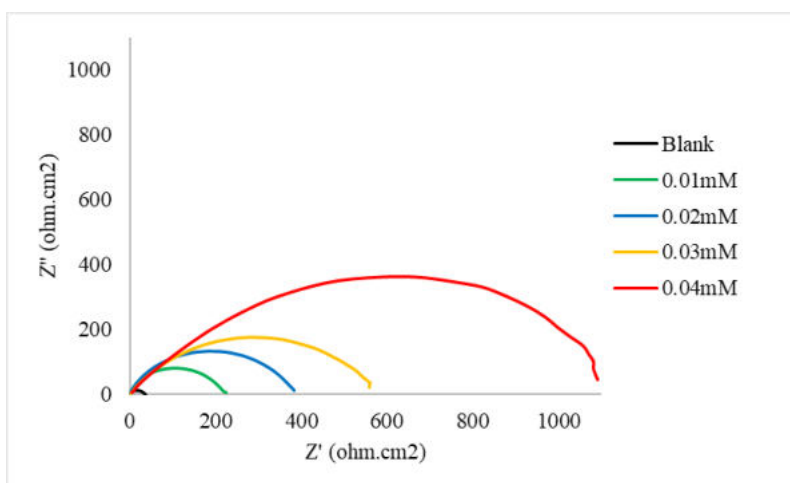


Figure 3: Nyquist plot for carbon steel in 1M HCl in absence and presence various concentration of A2-F inhibitor

The above information proves the corrosion inhibition properties of 2,4-dihydroxybenzaldehyde and benzylamine derivatives in mineral acids of 1 M HCl.

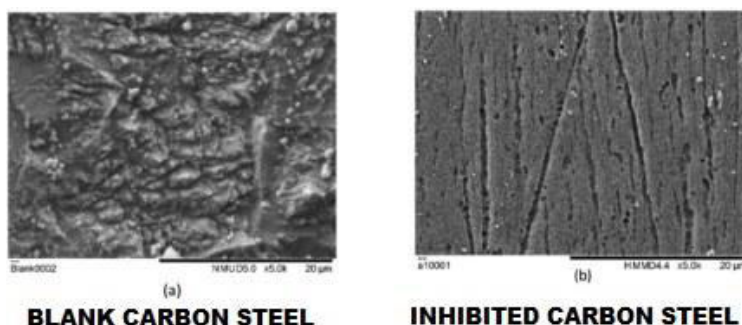


Figure 4: SEM images of (a) blank carbon steel immersed in 1 M HCl and (b) carbon steel with addition of 0.04 mM A2-F

Generally, from SEM images, it was clearly proved that by addition of corrosion inhibitors in 1 M HCl (Fig. 4b) greatly improves the surface of carbon steel even exposed to the acidic solution for 24 hours. The texture of the carbon steel was highly uniform and shows lesser cracks as compared to the uninhibited solution (Fig. 4a).

COMMERCIAL POTENTIAL

The synthesized azomethine as corrosion inhibitor is environmentally friendly compounds. This will cover the performance gap between the current industry-standard and use of a safer, chromate-free inhibitors for the protection of metals from aggressive solutions. Practically all environments are corrosive to some degree and are major contributing causes of material failure and also are a large economic cost to the society. Corrosion inhibitors are one of the most widely used and economically viable methods protecting metals against corrosion. The current invention has been published [11] and awarded Intellectual Property Recognition (IPR).

CONCLUSION

Hence, the present-day discovery is improved to attain the ends and advantages stated so thus those that are inherent therein. The particular embodiments disclosed above are illustrative only, as the present invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. It is, therefore, evident that the particular illustrative embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the present invention. The various elements or steps according to the disclosed elements or steps can be combined advantageously or practiced together in various combinations or sub combinations of elements or sequences of steps to increase the efficiency and benefits that can be obtained from the invention. The invention illustratively disclosed herein suitably may be practiced in the absence of any element or step that is not specifically disclosed or claimed. Furthermore, no limitations are intended to the details of construction, composition, design, or steps herein shown, other than as described.

ACKNOWLEDGEMENT

The inventors wish to acknowledge Faculty of Applied Science, Universiti Teknologi MARA for providing instruments, facilities for research purposes and grant 600-RMC/MyRA 5/3/LESTARI (011/2020). We are also thankful for the Ministry of Higher Education Malaysia for the research grants (600-IRMI/FRGS 5/3(030/2017) and 600-IRMI/FRGS-RACER 5/3 (098/2019).

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Yippie Organo Tiles– An Interactive Game for Pre-University Organic Chemistry

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ABSTRACT

The amount and complexity of information learned in organic chemistry frequently overwhelms STEM students. Having said that, Yippie Organo Tiles was invented as a unique teaching and learning tool that will aid students learn better and understand organic chemistry in a fun and engaging way. This domino-like tile-based game is a simple and attractive board game, requires students to identify and build the sets of organic chemistry reaction involving reactants and products. The game is played with magnetic tiles that are small, flat, rectangular in shape. Each tile contains an organic chemical reaction as well as the result of that reaction. Then, the product will act as a reactant in the organic reaction that follows. The tiles are shuffled face down on a flat playing board before each game, thoroughly mixing them with hands. It is ideally played by 3-6 players. From the middle deck, each player must select three to four tiles. The game begins with a random tile from the deck being flipped. The first player places his or her tiles in order to complete the reaction started by the opened tile. The next player then places his or her tile on one of the open ends, and the game continues around the table with each player placing a tile. Depending on the free end to which the tile was attached, the faced-up tiles can be either a product or a reactant in an organic reaction. If the player is unable to attach a tile to either end of the opening tiles, he or she must choose a tile at random from the deck. If the player is still unable to add a tile to the board, his or her turn is forfeited. The winner is the first person to finish all of his or her tiles and shout "YIPPIE!". The ability to assesses students' cognitive and psychomotor abilities, this game has the potential to be commercialized and utilised in pre-university teaching and learning. Yippie Organo Tiles is an ingenious tile-based game designed to boost the attention of STEM students in organic chemistry and to promote STEM to others.

Keywords: Organic reaction; tiles-based game; STEM

INTRODUCTION

Foundation and matriculations students frequently struggle with the amount and complexity of information they learned in organic chemistry. The difficulties to understand this course resulted in high failure rate in exams. Learning is made even more difficult by a negative perception of chemistry course and underdeveloped study skills [1].

Traditional chemistry education focuses on conveying chemistry knowledge via lectures and recitations [2]. For learning to be most effective, active learning has recently been considered as a promising strategy to increase the learning outcomes of classes, in particular in the context of organic chemistry. By active learning methods we mean any instructional method

that actively engages the students in their learning process as opposed to the passiveness of listening to a lecture [3].

Game-based learning provided an interesting approach to active learning, as they merge the building of knowledge with playful activities intensified by cheerful competition [5,6]. Game-based learning is defined as the utilization of games or simulations in any forms to fulfil specific learning objectives. The use of games in education plays an important role in engaging students by encouraging a hands-on approach. Gamification of chemistry especially across chapter of organic reactions will help students improve their understanding. The success of this strategy is readily confirmed by the increasing number of games that have been effectively used to teach organic chemistry subject such as functional groups [6], organic chemistry [7] and synthetic strategy [8]. In general, these games involve minimal adaptations of traditional or mass-market games.

Our aim is to develop a new domino-like tile-based game for organic reactions, alkane, alkene, alcohol, haloalkane, carbonyl and carboxylic acid compounds. This game is different from all other chemistry games in that the game process can be used to solve synthetic problems with variable starting and target compounds. The goal of Yippie Organo Tiles is to provide students with a study aid to predict the product of the reaction. Through this game, it also can develop an enthusiastic learner, motivate, and help students with focus and memorise organics reactions in a stress-free, interactive way. This game is not only beneficial to students but also lecturers and educators which can reduce monotonous learning methods during class.

INNOVATION DEVELOPMENT

This domino-like tile-based game is a simple and attractive board game, requires students to identify and build the sets of organic chemistry reaction involving reactants and products. The game is played with magnetic tiles that are small, flat, rectangular in shape. Each tile contains an organic chemical reaction as well as the result of that reaction. Then, the product will act as a reactant in the organic reaction that follows. The tiles are shuffled face down on a flat playing board before each game, thoroughly mixing them with hands. It is ideally played by 3-6 players. From the middle deck, each player must select three to four tiles. The game begins with a random tile from the deck being flipped. The first player places his or her tiles in order to complete the reaction started by the opened tile. The next player then places his or her tile on one of the open ends, and the game continues around the table with each player placing a tile. Depending on the free end to which the tile was attached, the faced-up tiles can be either a product or a reactant in an organic reaction. If the player is unable to attach a tile to either end of the opening tiles, he or she must choose a tile at random from the deck. If the player is still unable to add a tile to the board, his or her turn is forfeited. The winner is the first person to finish all of his or her tiles and shout "YIPPIE!". A sample 'Yippie Organo Tile' scenario is shown in Figure 1 and example of a complete organic chemical reaction is shown in Figure 2.

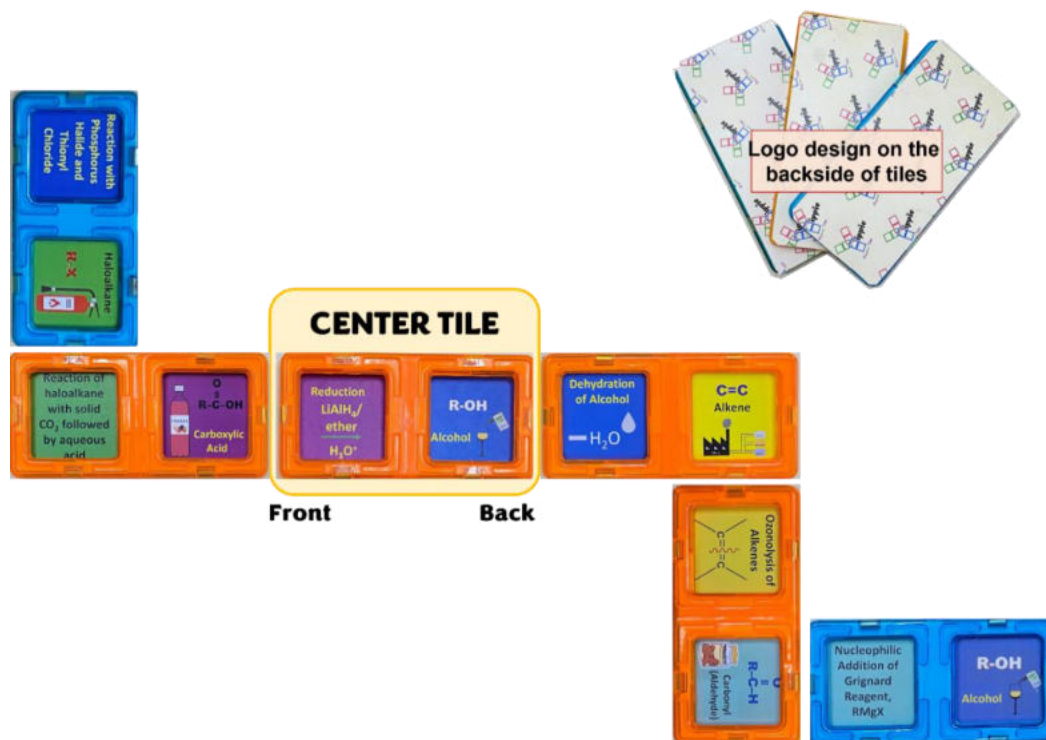


Figure 1: An example of gameplay for Yippie Organo Tile

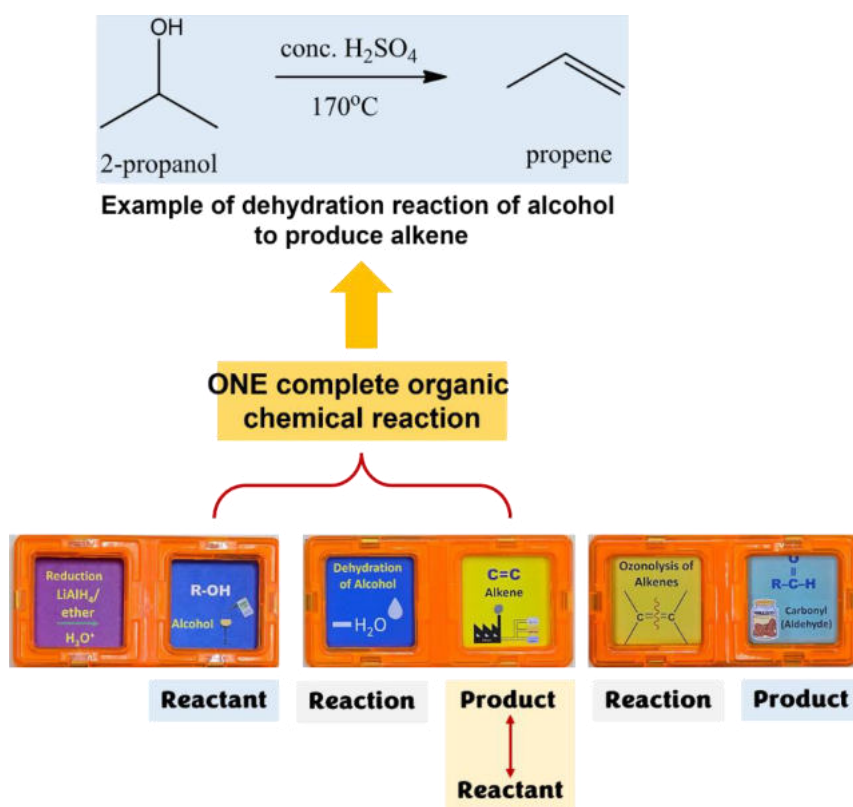


Figure 2: An example to complete organic reaction

COMMERCIAL POTENTIAL

Innovativeness

Yippie Organo Tiles was invented as a unique teaching and learning tool that will aid foundation and matriculation students learn better and understand organic chemistry in a fun and engaging way. This domino-like tile-based game is a simple and attractive board game that incorporates all three cognitive, psychomotor and affective domains in its design, requires students to identify and build the sets of organic chemistry reaction involving reactants and products. This game is used as a support tool to complement traditional teaching methods to improve the learning experience of the learners while also teaching other skills such as following rules, collaboration, inquiry, problem solving, critical thinking and creativity.

Another innovativeness of Yippie Organo Tiles is that it uses colour code as part of the learning process. Five colors are used to design the tiles, with two different colors in each tile to represent the reaction and the product it can form. The color-coded based game is used as the learning principle where the same color from both end of two connected tiles, used to indicate the reactant and reaction involved (Figure 3). By this color-coding game, it helps student to memorize and understand organic chemistry in fun and engaging way.

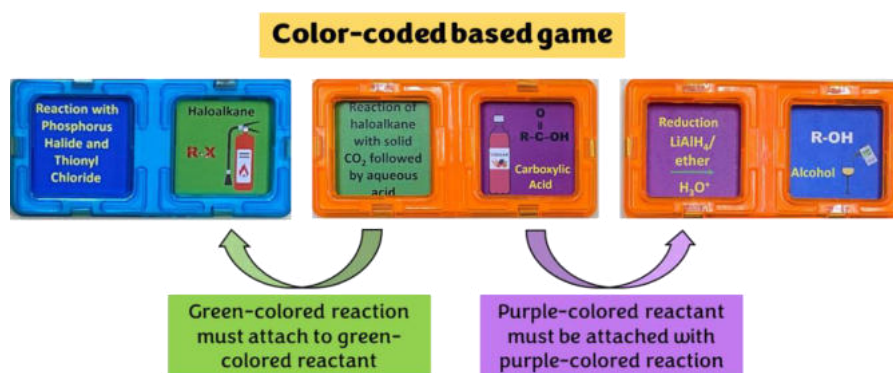


Figure 3: The unique design of Yippie Organo Tiles, a color-coded based game for organic chemistry teaching and learning tool.

Commercial values

Generally, organic chemistry-based games provide students with opportunities to apply concept they have learned in a fun way. Therefore, Yippie Organo Tiles is developed and have a commercial potential locally and globally. In Malaysia, there are 30 matriculations and foundation institutions [9,10] that show the high number of potential customers or buyers. This game is suitable to apply in teaching and learning at pre-university and foundation level as well as science stream students in secondary level.

Yippie Organo Tiles mainly consists of 40 magnetic flat and rectangular-shaped tiles that comes with the packaging box. The size of each magnetic tiles for the game was 65 mm x 130 mm. Therefore, the cost of investment to develop this product is RM35.00 and the proposed selling price is RM70.00. The calculation of the return of investment (ROI) shows that the approximation of profit margin is 100%. The basis of the calculation of ROI is when 20,735 units of product sold in Malaysia, expecting 10% of total students from 30 matriculation and foundation centers, and 2440 secondary schools purchase the product.

Feedback Evaluation

Yippie Organo Tiles game was introduced to foundation students at Centre for Defence Foundation Studies of UPNM to obtain their response towards the effectiveness of the game. Besides from helping us in improving students' knowledge of organic chemistry, the response obtained will also assist us in surveying the market for the potential commercialization of the game. In this study, 18 students completed the feedback evaluation form after playing Yippie Organo Tiles game. Fifteen questions were asked regarding the benefits of the game in helping students to improve communication, knowledge sharing, focus, method of revision, stimulate the interest, the easiness to understand organic chemistry, active participation from students in teaching and learning process, and user friendly. The results from Table 1 shows that more than 60% of respondents completely agreed with all the questions indicating that the domino-like tile-based game can be one of the learning tools to improve their understanding in organic chemistry. Respondents also agreed that they have so much fun while learning organic chemistry using this color-coded tiles-game.

Table 1: Data analysis from students respond towards Yippie Organo Tiles

No.	Survey questions	Percentage (%)					TOTAL
		Completely disagree	Disagree	Not sure	Agree	Completely agree	
1	Able to use Yippie Organo Tiles (YOT) with clear instructions.	0	0	0	27.8	72.2	100
2	Can improve communication between students and lecturers.	0	0	11.1	22.2	66.7	100
3	Able to help with effective communication among students.	0	0	0	27.8	72.2	100
4	This innovation product is suitable to be used during teaching and learning session.	0	0	5.6	22.2	72.2	100
5	Developing and exchanging ideas while using YOT.	0	0	0	38.9	61.1	100
6	Able to provide attention to more focused lesson with the use of YOT.	0	0	0	38.9	61.1	100
7	Freedom in doing revision.	0	0	5.6	27.8	66.7	100
8	Able to help educators and students in teaching and learning process.	0	0	0	33.3	66.7	100
9	Increase students' interest in organic chemistry.	0	0	5.6	27.8	66.7	100

10	Assist in student-centered teaching and learning.	0	0	5.6	27.8	66.7	100
11	Able to understand organic chemistry easily.	0	0	0	27.8	72.2	100
12	Increase students involvement during teaching and learning activities in classroom.	0	0	0	33.3	66.7	100
13	The content in this T&L tool covers the topics included in syllabus.	0	0	0	33.3	66.7	100
14	This innovation product is user-friendly and easy to understand.	0	0	0	16.7	83.3	100
15	Contains aspects of knowledge to be mastered.	0	0	0	27.8	72.2	100

Intellectual Property (IP)

Yippie is an alternative teaching and learning tool that will help students specifically at foundations and matriculation level with organic chemistry reaction across chapter in a fascinating and fun way. There are several products for to help for organic chemistry subject such as ChemPOV, Virtual Labs (computational type game), Chem complete, Retrosynthetic Rummy (card game) and Compounded, Escape E.V.I.L (Board game) but none of it like Yippie. Therefore, the copyright of the game has been submitted and waiting for the approval to protect the uniqueness of the game. Logo of Yippie Organo Tiles game consists of three flat and rectangular-shaped tiles (Purple (FF3399), Green (33CC33) and Blue (0066FF)) as a build up of character Y. Each rectangular-shaped tiles is colored as Figure 4 below. Yippie character is black and lowercase using Matura MT Script Capital size 18. Organo Tiles using Brush Script MT size 50 using color purple, FF3399, 00FF00, FF3399 and purple. For Yippie magnetic tiles, its color coded was based on organic compound and its reactant (Table 2).



Figure 4: Yippie Organo Tiles Logo

Table 2: Color coding, font type, size and color and background color

Compounds	Font, Font size	Font color	Background color
Alkene	Calibri, 22	Black	Yellow
Haloalkane	Calibri, 22	Black	33CC33
Alcohol	Calibri, 22	White (compound) Yellow (reactant)	0066FF
Carbonyl aldehyde	Calibri, 22	Yellow (compound) Green (reactant)	53F9CE
Carbonyl ketone	Calibri, 22	Yellow (compound) Black (reactant)	Pink
Carboxylic Acid	Calibri, 22	Black (compound) Yellow (reactant)	CC00FF

CONCLUSION

A big challenge for students all over the world to understand organic chemistry via traditional method such as lecture and recitations. Therefore, educators need to be creative and use different approach to make organic chemistry interesting for the students. Using games can help capture student's attention as this is considered to be a fun way of learning. Yippie Organo Tile is an alternative teaching and learning tool that will help students at foundations and matriculations level with organic chemistry reaction across chapter in a fascinating, fun and interactive way. This is a simple and attractive domino-like tile-based game that requires students to identify and complete the sets of organic reaction involving reactants, name of reactions and products. The Yippie Organo Tile is not only engaging and fun to play but also uniquely competitive and collaborative at the same time. Our findings indicate that although game-based learning may improve student confidence in the subject matter, they may not necessarily make students more interested in the subject itself.

ACKNOWLEDGEMENT

The authors would like to acknowledge Department of Chemistry and Biology and Centre for Defence Foundation Studies, National Defence University of Malaysia, for providing the fund that has resulted in this project. We are also extremely grateful to all of the students for their invaluable help with testing the game.

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Ohsem Organoboard: Interactive game for Pre-University Organic Chemistry

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ABSTRACT

Majority of STEM students consider the reaction of organic chemistry to be difficult and boring because it requires memorization. In order to address this issue, an Ohsem OrganoBoard game is designed to help STEM students learn and understand organic chemistry in a fun and interesting way. This board game is suitable to be played by 2-4 players. It consists of a board, 2 dice, and 4 types of cards named as Wild Card, Starting Material (green), Reactant (blue), and Condition (red). The board consists of boxes designated with Starting Material (organic compound), Reactant, Condition and Wild Card slot. Players may choose to buy the cards of the respective slots when they land on them based on the respective values. Players are required to collect a set consisting of 1 Starting Material card, 1 Reactant card and Condition card to complete a chemical reaction and receive a token (product). Players will receive credit when another player landed on their slot. The Wild Cards may contain reward or punishment. The winner is the person who gets the most token and credit within the time allocated. The student's cognitive and psychomotor skills will be tested while playing this game. This game can be commercialized to be used by educators and students at pre-university level. Ohsem OrganoBoard is an innovative teaching and learning tool to raise student interest in organic chemistry.

Keywords: Organic chemistry; board game; STEM

INTRODUCTION

Research in alternative teaching method is growing in recent years to motivate people to stay interested and spark the fun in learning. High motivation may encourage students to participate fully in the learning process, and thus resulting in improved learning outcomes because complicated concepts may reduce students' enthusiasm to learn. In this aspect, gamification appears to be an appropriate method for driving learning motivation.

Thus, a great amount of work has also been devoted to develop new teaching strategies that enhance students' motivation and commitment and maximize their knowledge acquisition. Among different strategies, gamification has attracted the interest of educators, who in the last times have been exploring its potential to improve student learning [1-3]. Studies about the effectiveness of gamification are promising, with variable to positive results [2-5].

Game-based learning is one of the latest approaches to education being studied around the world. It is interesting to design a better learning environment to attract students especially in chemistry subject. Chemistry subject involves basic and important concepts such as elements and compounds, upon which complicated concepts are built. They are composed of a heavy

load of facts for students to memorise. In this early stage of chemistry learning, an innovative teaching approach is crucial to engage students and arouse interest.

Organic Chemistry is considered a difficult subject for secondary school and undergraduate students. Organic reactions are one of the most difficult topics in Organic Chemistry [6]. Previous studies show that when learning activities of chemistry concepts are combined with games in the classroom, students' motivation increases [7], improving their performance [8,9] and making them more engaged compared with traditional methodologies [10,11].

In pre-university and foundation chemistry subject, organic chemistry covers around 50% of the syllabus. Therefore, failure to grasp the concepts in organic chemistry will affect their performance. This especially for the case of pre-medical students, where organic chemistry is a very crucial part of the knowledge requirement in order for them to qualify for Medical Programme. Furthermore, low and middle achiever students often face difficulty in understanding and comprehension of organic chemistry when it is thought via conventional teaching and learning method.

To overcome this challenge, Ohsem Organoboard is developed with the objectives of (i) to provide an alternative teaching and learning method for organic chemistry that is fun, attractive and engaging. (ii) to assist lecturers in providing students with hands-on and minds-on skills and knowledge development in organic chemistry and (iii) to produce students with excellent teamwork, enhanced creativity, improved communication skills, negotiation capabilities and basic entrepreneurship skills by using cooperative learning strategies.

INNOVATION DEVELOPMENT

The board game-based teaching aid for organic chemistry is an innovative, fun and interactive teaching and learning tool to raise students' interest in Organic Chemistry. It provides new paradigms in education for an alternative methodology in the higher education classroom and has potential to be commercialized to be used by educators and students in STEM at pre-university level worldwide.

The prototype of board game innovation is shown in Figure 1. The design of the board is hexagonal inspired from the benzene hexagonal ring structure. With this hexagonal board design, the maximum players can be up to 6 persons. The more players would make the game more competitive and interesting for them to compete. This game is suitable to be played by 3 to 6 players.

The purpose of the game is to collect a set of cards consists of starting material, reagent and reactant to get a trophy (product), so that players can earn more money when other players landed on their starting material lot as shown in Figure 1 and 2. This game consists of 12 starting material lots, 12 reagent cards, 12 reactant cards, and 30 wild cards. A standard set of Ohsem Organoboard pieces includes a dice, bank notes, tokens and 12 trophies (product) (Figure 2).



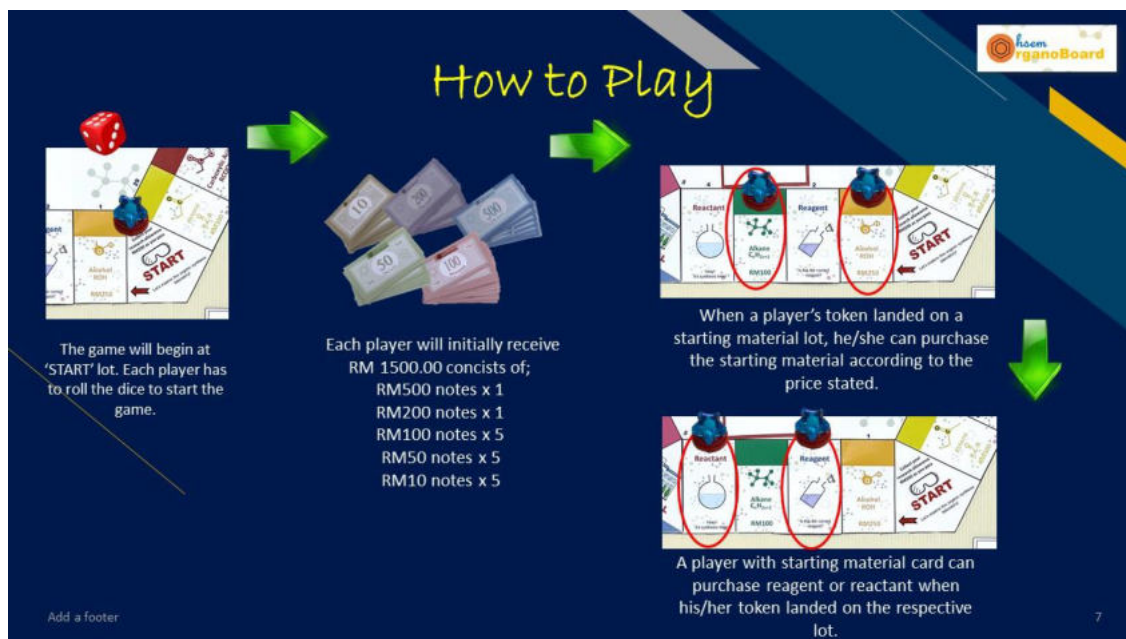
Figure 1: Ohsem Organoboard innovation prototype.



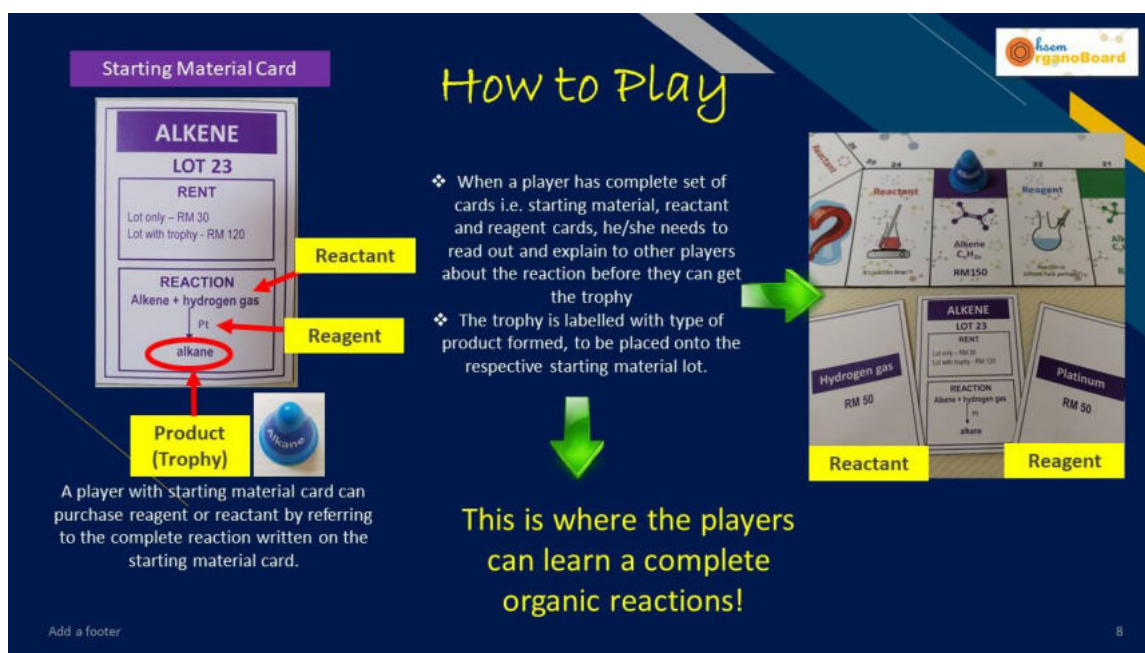
Figure 2: Ohsem Organoboard layout and its components.

The game will begin at 'START' lot in which each player has to roll the dice to start the game. Each player will initially receive RM1500 to start the game (Figure 3(a)). When a player's token landed on a starting material lot, he/she can purchase the starting material according to the price stated (Figure 3(a)). A player with starting materials card can purchase reagent or reactant when his/her token landed on the respective lot. A player with starting material card can purchase reagent or reactant by referring to the complete reaction written on the starting material card. When a player has complete set of cards i.e. starting material, reactant and reagent cards, he/she needs to read out and explain to other players about the reaction before they can get the trophy (Figure 3(b)). The trophy is labelled with type of product formed, to be

placed onto the respective starting material lot. This is where the players can learn a complete organic reaction.



(a)



(b)

Figure 3 (a) and (b): How to play.


The other instructions are depicted in Figure 4 (a) and (b). For 'Paying Rent', if a player's token landed on another player's starting material lot, he/she is required to pay rent. Starting material lot with trophy will cost more than a lot without trophy. The charges are stated on the respective starting material card. For 'Wild Card', if a player's token landed on wild card lot, he/she must pick a card from the 'wild card' deck and follow the stated instruction. The wild card may contain organic chemistry questions/trivia or in-game reward-punishment instructions. If a player's token landed on the 'Poison' lot, go straight to 'Hospital' lot. Players

can learn from some of organic chemistry related questions in the Wild Card here. If a player's token landed on the 'Break time' lot, the player just stays on the lot, until next turn. On the first round, no purchasing is allowed (Figure 4(b)). Upon passing the 'Start' lot, player will receive RM200 and able to start purchasing from the second round onwards. Player also can sell their cards to the bank or another player when he/she needs more cash. A bankrupted player must exit the game. The WINNER is the player that has the highest monetary value based on cash and assets after a pre-determined time.

Instructions

Paying Rent

- ❖ If a player's token landed on another player's starting material lot, he/she is required to pay rent.
- ❖ Starting material lot with trophy will be costs more than a lot without trophy.
- ❖ The charges are stated on the respective starting material card.



WILD CARD

- ❖ If a player's token landed on wild card lot, he/she must pick a card from the 'wild card' deck and follow the stated instruction.
- ❖ The wild card may contains organic chemistry questions/trivia or in-game reward-punishment instructions.

Players can learn from some of organic chemistry related questions in the Wild Card here!

Go Straight

If a player's token landed on the 'Poison' lot, go straight to 'Hospital' lot.

Break Time!

If a player's token landed on the 'Break time' lot, just stay on the lot, until next turn.


9

(a)

Instructions

- On the first round, no purchasing is allowed.
- Upon passing the 'Start' lot, player will receive RM200 and able to start purchasing from the second round onwards.
- Player can sell their cards to the bank or another player when he/she needs more cash.
- A bankrupted player must exit the game.

The **WINNER** is the player that has the highest monetary value based on cash and assets after a pre-determined time.



10

(b)

Figure 3 (a) and (b): Instructions.

COMMERCIAL POTENTIAL

Innovativeness

Ohsem Organoboard is an innovative pedagogical tool for foundation and matriculation students because it incorporates all three cognitive, psychomotor and affective domains in its design. Students use their cognitive skills to complete sets of organic chemical reactions made up for starting material, reactant, products and reaction conditions. Psychomotor skills are required to move tokens on the board and affective skills developed are such as teamwork, entrepreneurship skills and responsive movement.

Another innovativeness of Ohsem Organoboard is that it uses colour as part of the learning process. Different colours are used to highlight and identify different groups, such as reactant, conditions and respective organic material starting materials. Study has shown that colour draws on both symbolic and cognitive powers to affect learning, facilitating memorization and identification of concept. Colour also influences the way we see and process information.

Finally, this game incorporates entrepreneurship elements in its gameplay in order to inculcate students' interest in finance, trade, capital management and business rivalry. This provides vital exposure to real life challenge which emphasizes the importance of these skills and knowledge.

Commercial values

This board game has a huge potential to be commercialized locally and globally. This game is suitable not only for science students of matriculation/foundation level, and Form 6, but it can also be introduced to secondary school science students of Form 4 and 5 for early exposure which could spark interest of learning organic chemistry among students. The schools, matriculation and foundation centres could use this board game as an additional educational tool in the teaching.

Market needs and potential

This game can be well-accepted locally and globally due to its fun learning approach. In Malaysia alone, there are 17 KPM Matriculation Centres [12] and 9 Public University Foundation Centres [13] that show high number of potential customers or buyers. This number will be multiplied when we include the secondary schools, which are 2440 [14] in Malaysia alone. Globally, this product is marketable as there is no boundary as we have same syllabus in organic chemistry for science foundation level.

Return of Investment (ROI)

In Malaysia, there are 17 KPM Matriculation Centres, 13 Public University Foundation Centers, and 2440 secondary schools. If each institution buys 5 units of the product as their additional teaching tools, 12,350 units will be sold. The estimation cost of the product is RM25 each and the proposed selling price is RM69.90. Therefore, based on this price, the expected ROI will be 179.6% with expected revenues is RM863265. The total expense will be RM308750, and thus the net profit will be RM554515. This estimated ROI is achievable as we only calculate for potential buyers from these institutions in Malaysia, not included personal buyers, private institutions and from other countries. We also plan to do a tour to these institutions in Malaysia in order to promote the products.

Survey and Feedbacks

This Ohsem Organoboard game was introduced to a number of students at Centre for Defence Foundation Studies of UPM, and survey questions have been distributed among them. The result of the survey is shown in Table 1. Nineteen questions were asked regarding the benefits of the game in helping students to increase understanding, communication, knowledge sharing, focus, method of revision, comfortableness in learning, stimulate the interest, the easiness to understand, active participation from students in teaching and learning process, and friendly user. The result showed that most of the respondents agreed and very agreed on most of the questions, which indicate that they have fun and enjoy the game while learning organic chemistry.

Table 1: Result of Survey Conducted on Students of Centre for Defence Foundation Studies of UPM

Bil.	Soal Selidik	PERCENTAGE(%)					TOTAL
		Amat tidak setuju	Tidak setuju	Tidak pasti	Setuju	Amat setuju	
1	Telah menanamkan sifat sendiri yang dapat membantu meningkatkan kefahaman saya.	0.0	0.0	0.0	42.9	57.1	100
2	Dapat menggunakan OOB dengan panduan yang jelas	0.0	0.0	0.0	14.3	85.7	100
3	Dapat memperbaiki komunikasi dengan pensyarah secara berkesan	0.0	0.0	0.0	0.0	100.0	100
4	Dapat memperbaiki komunikasi dengan rakan secara berkesan	0.0	0.0	0.0	28.6	71.4	100
5	Bahan ini sesuai digunakan semasa sesi pengajaran dan pembelajaran	0.0	0.0	0.0	28.6	71.4	100
6	Mencambahkan dan bertukar idea di antara saya dan rakan semasa menggunakan OOB	0.0	0.0	0.0	57.1	42.9	100
7	Memberikan tumpuan kepada pelajaran lebih terfokus dengan penggunaan OOB.	0.0	0.0	0.0	42.9	57.1	100
8	Kebebasan mengulangkaji	0.0	0.0	14.3	28.6	57.1	100
9	Menggantikan penggunaan buku rujukan.	0.0	0.0	0.0	57.1	42.9	100
10	Memberi keselesaan untuk mempelajari kimia organik	0.0	0.0	14.3	14.3	71.4	100
11	Dapat membantu proses pengajaran dan pembelajaran	0.0	0.0	0.0	57.1	42.9	100
12	Merangsang minat terhadap kimia organik	0.0	0.0	0.0	28.6	71.4	100
13	Membantu pengajaran dan pembelajaran yang berpusatkan pelajar	0.0	0.0	0.0	57.1	42.9	100
14	Dapat memahami kimia organik dengan lebih mudah	0.0	0.0	0.0	28.6	71.4	100
15	Mendapat gambaran secara mendalam sewaktu pembelajaran	0.0	0.0	0.0	28.6	71.4	100
16	Meningkatkan penglibatan dalam aktiviti PdP di dalam kelas	0.0	0.0	0.0	57.1	42.9	100
17	Kandungan bahan bantu pembelajaran meliputi topik yang terdapat di dalam silibus.	0.0	0.0	14.3	28.6	57.1	100
18	OOB mudah difahami dan mesra pengguna	0.0	0.0	0.0	57.1	42.9	100
19	Mengandungi aspek pengetahuan yang hendak dikuasai	0.0	0.0	0.0	42.9	57.1	100

CONCLUSION

Ohsem Organoboard is an invention for hybrid learning method of game and knowledge. Ohsem Organoboard could provide a fun, attractive and engaging alternative teaching and learning method for organic chemistry. It can be used to assist lecturers or teachers in providing students with hands-on and minds-on skills and knowledge development in organic chemistry. It also can encourage students with excellent teamwork, enhanced creativity, improved communication skills, negotiation capabilities and basic entrepreneurship skills by using cooperative learning strategies. It also helps students to memorize through their subconscious mind as they observe, speak, and listen the content of organic chemistry repeatedly during the game. For future development, this game can be improvised by adding more organic compounds and might include integration with other subjects by applying the organic chemistry to other relevance subjects. Copyright application of the product has been submitted and waiting for the approval. For commercial purposes, we will do collaboration with company to produce the product in bulk and market

it. We also plan to do a tour to matriculation/foundation centres and secondary schools in Malaysia to promote the product and getting their feedback on the product.

ACKNOWLEDGEMENT

The authors would like to acknowledge Department of Chemistry and Biology and Centre for Defence Foundation Studies, National Defence University of Malaysia, for providing the fund that has resulted in this project.

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TRAPP: An Interactive Dashboard for Tracking Students Academic Performance and Personality Traits

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ABSTRACT

Monitoring and tracking each student's academic progress during open and distance learning (ODL) can be challenging for courses with different types of continuous assessments. This study will therefore propose a dashboard model for monitoring and tracking students' academic performance. A pilot study, data collection and preparation, analysis, development, and implementation of data stories in the dashboard are the phases involved in this study. The evaluation comprises data stories of a student including academic performance and their personality traits - behavior, cognitive skills, and discipline. It helps facilitate lecturers to identify students who need guidance and support, considering their background and traits. Its digital traces, enable viewing and detecting students' ongoing assignments. Students can also see their progress for self-evaluation. The novelty of this model is that it uses visual analytics to monitor and benchmark each student against their group and personalise milestones as academic progress. The main outcome is the learning analytics progressive responsive dashboard with a compelling narrative of data stories with features for personalization and generic representation. Potentially, it can be marketed throughout the education sector at a minimum cost of RM30K.

Keywords: Visual analytics; learning analytics; personality traits; academic performance; progressive dashboard

INTRODUCTION

ODL is an alternative to the traditional classroom during the COVID-19 pandemic. It has been a huge endeavor for most lecturers to implement successful ODL. For courses with various continuous assessments i.e., quizzes, assignments, and tests, monitoring and tracking students' academic progress can be quite difficult. Similarly for project-based coursework, it requires a great deal of independent study. Students may also wonder if they are making as much progress as the rest of the group. Teaching and learning through ODL is critical, especially for lecturers to identify students who need more guidance, support, and early intervention using big data analytics [1]. Thus, an early intervention which means in-time intervention indicated by several prediction indicators can be executed.

Each student is different in character traits, including behavior, cognitive skills, and personality. Research has shown a strong correlation between behavior, and academic performance [2]. However, few studies sought to explore and apply analytics to these

parameters, which led to the present study. Although many learning analytics have been deployed in recent years, there is still a lack of knowledge of the impact on student behaviour [3]. Many learning management systems lack visual analytical modules such as to cluster and categorise students or to make personalised recommendations [4]. The manual approach focuses on psychology and behaviour view, partly due to the intervening on the student's mentation and conduct, also acts taken without the figurative assistance and consistent monitoring. Digital tool is useful to visually analyse student activities, record data in a progressive mode that suits the local context and environment [5,6,7].

The objectives of this study are (i) to analyse and provide visual insight of behavior, cognitive skills, personality traits, demographic background, and academic performance and; (ii) to provide visual analytics for tracking and monitoring students' academic performance in progressive mode for early intervention.

Comprehensive tools for monitoring such as to keep record and determine whether students are progressing along with a predefined learning path is highly needed. Effectively, interactive visuals give users a clearer view of a certain pattern of data than textual form. A dashboard with progressive updates is the most efficient way to track multiple data sources and dynamic information. Lecturers can monitor students' performance as it saves time in analysing and reduce a long line of communication [8].

INNOVATION DEVELOPMENT

This product is developed based on a data science life cycle as shown in Figure 1. The first stage is construction of questionnaire, collecting data from the respondents and generating synthetic data for academic performances. Next is data scrubbing or cleansing raw data. The data is processed, transformed, and aggregated, leaving only important data. The third stage involved EDA, analysis and applying statistical tools to find notable patterns and trends for effective data storytelling. The fourth stage is data model or implementation, which involves refining the data to significantly identify patterns and relationships. Lastly is data stories implementation. The data is displayed and delivered to users in a dashboard and its usability has been tested.

This research started off with the user requirement process. Academics have been interviewed to get their insights about this study. A compilation of literature review covers selecting suitable constructs as described in Table 1. A set of questions has been validated by an expert before distributing it to the respondents as shown in Figure 2.

A dashboard prototype is created as a result of the visual analytic process. As seen in Figure 3, it comprises three main sections presented in three separate pages. Its usability is supported by integrated and interactive features that allow users to interact with data in real time to better understand potential performance concerns. Users may access data from multiple sources on a single screen, swiftly communicate results, and increase productivity. A click-to-filter option is an excellent way to increase interactivity by simply selecting any data set in the charts or using the slicer. Inventive features in this dashboard are the creative visuals that tell a story about the student's personality traits patterns against their academic performance. Creating data stories is difficult because micro data does not reveal any patterns directly. Furthermore, choosing the right charts to display the relationship is crucial, since it might clarify or confuse users if the visual depiction is incorrect [9,10].

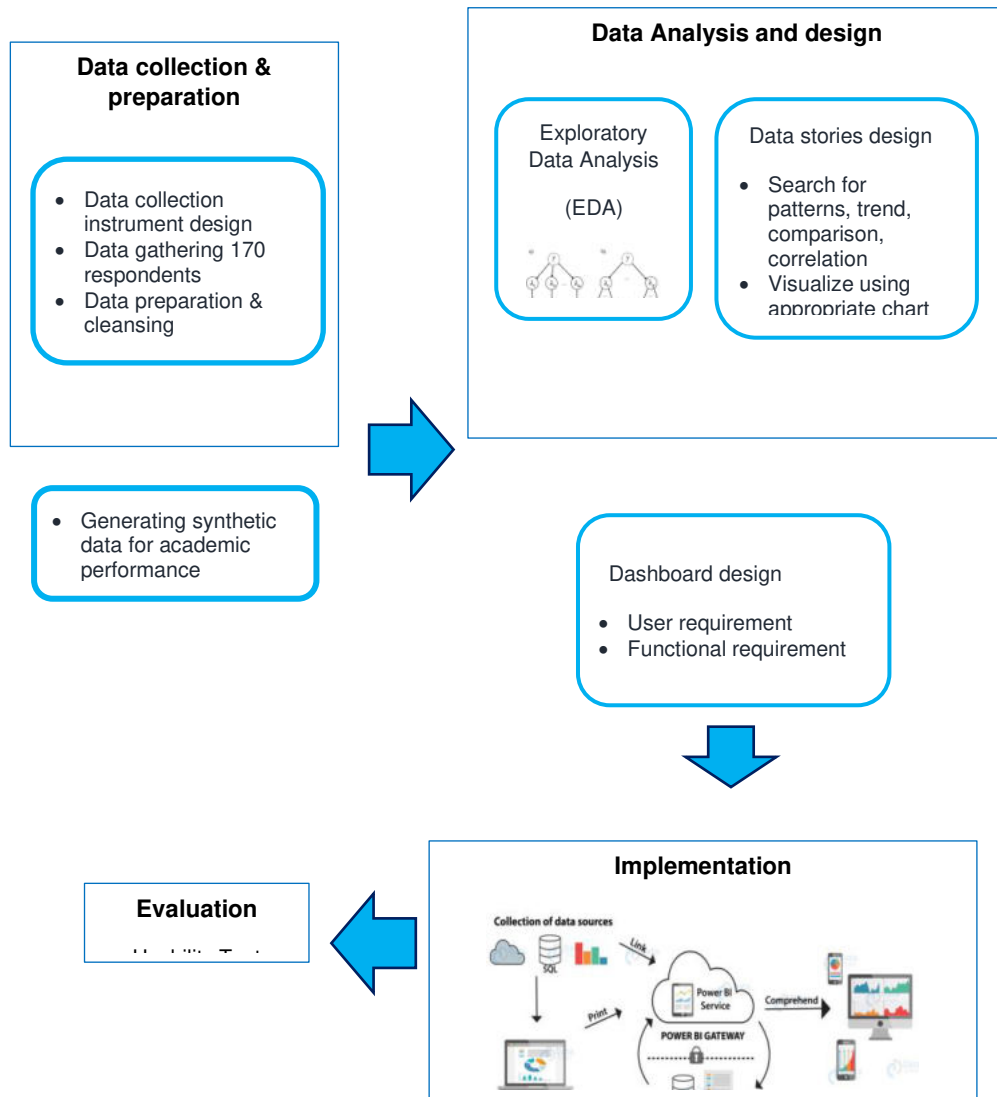


Figure 1: Generic flow of tasks in data science process

Table 1: Description of the Dataset Attributes

Attribute	Meaning
1 - 10	Demography data
MQ1 – Q5	Motivation: reward toward their accomplishment, value each task given to them, intrinsic motivation. self-efficacy. anxiety.
CSQ6 – Q10	Cognitive Strategy Used: studying strategy. memory recalling ability. prioritising strategy. learning experience. holistic thinking.
PQ11 – PQ15	Personality: Mindfulness, ability to change, resilience, ability to change with high desire, diligence and linking ability.
Academic Performance	Quiz, Assignment, Project, Test 1, Test 2 (Synthetic data)

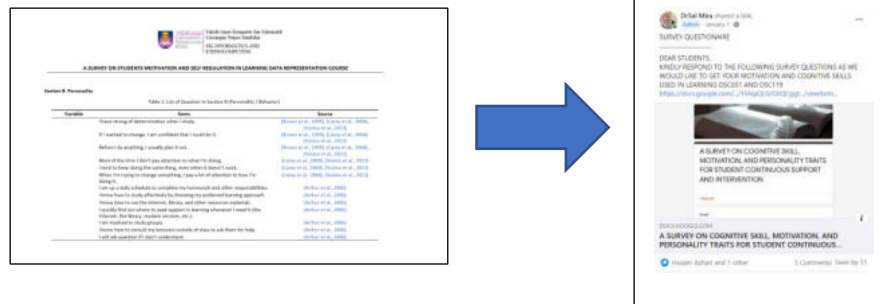
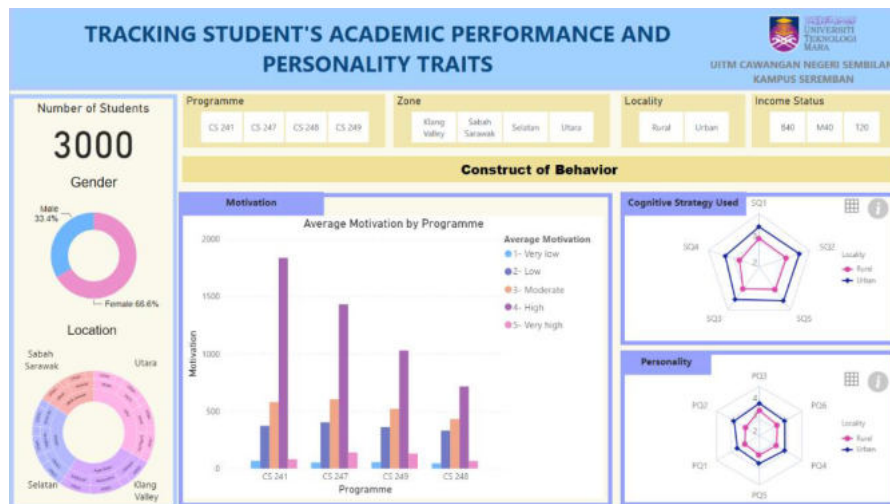
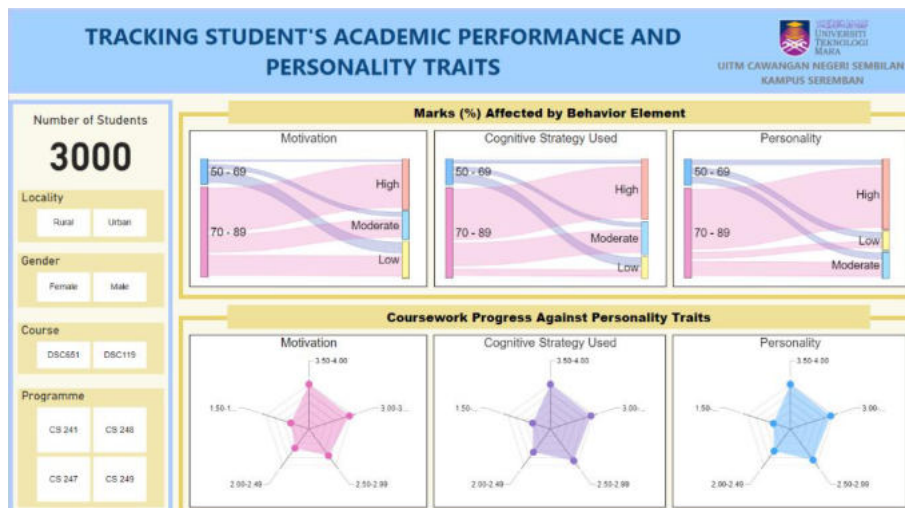


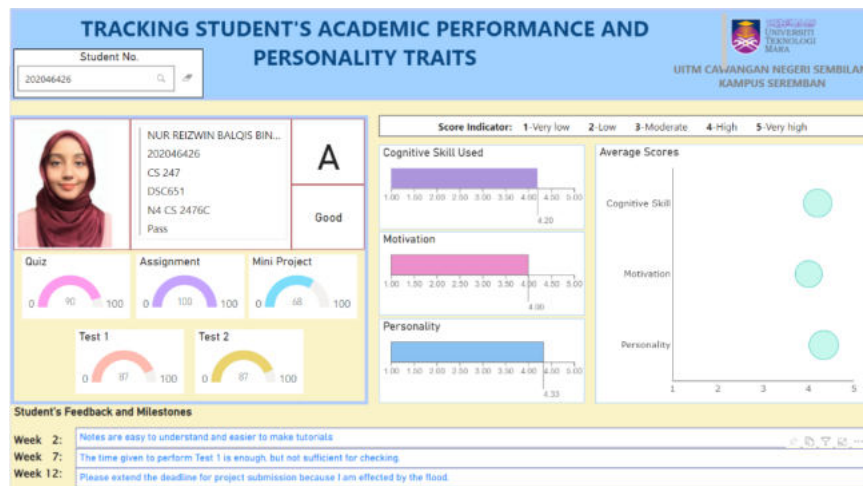
Figure 2: List of questions and request for respondents to fill in the Questionnaire - screenshot



Page 1: Pattern of all students' traits (motivation, cognitive skill used and discipline scores)



Page 2: Pattern of all students' academic performance against student's traits



Page 3: Information of individual student's characteristics

Figure 3: (a, b and c) Dashboard Prototype Design

COMMERCIAL POTENTIAL

The main contribution of this innovation is knowledge and applying recent analytics technology in obtaining patterns and trends to help academics in identifying and executing early intervention. The progressive and dynamic dashboard provides personalized visual data stories which has the potential to be marketed to higher education institutions as it helps academics to improve efficiency in tracking and monitoring students' academic performance. The proposed selling price is between RM30K to RM50K [11].

CONCLUSION

In view of all information presented in the preceding section, monitoring and tracking students' performance against personality traits helps identify students who need intervention. Besides, personalised data stories are an excellent comprehensive implementation to monitoring students' progress. The current findings contribute to an expanding body of knowledge on analytics in general. Ultimately, further research might be expanded with the use of dashboard to predict final grade using machine learning algorithm.

ACKNOWLEDGEMENT

This innovation has been developed using the UiTM Professorial Research Grant. No Fail/Geran: 600-RMC/GPPP 5/3 (001/2021)-2

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Ohsem Biodiversity Board Game

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ABSTRACT

Biodiversity and creature taxonomy are typically seen as broad topic in biology and often challenging to study. Recently, an emerging teaching technique using scientific board games and gamification of scientific concepts for teaching and learning is making headway. Ohsem Biodiversity Board Game is intended to do just that; to assist students learn biodiversity in a fun and engaging way. This game encourages students to nurture their memorization and critical thinking skills that will improve their understanding towards the concepts of biodiversity. This board game is suitable to be played by 3-6 players. The board consist of designated slots, namely Kingdom (Archaea, Bacteria, Protist, Fungi, Plantae and Animalia), Phylum, Characteristics and Wild Card slot. When players land on the relevant slots, they can opt to buy them depending on the respective values listed on the board. Players must gather a set of cards consisting of Kingdom, Phylum, and Characteristic cards in order to acquire a trophy (species of the kingdom). The player will be credited when another player lands on their slot and the values vary depending on whether the player has a complete or incomplete set. After the time limit has expired, the player with the most credits and assets will be declared as winner. This game aims to explore new educational paradigms to provide an alternative methodology for teaching and has the potential to be a beneficial pedagogical tool for accelerating learning in a fun and engaging way. This board game has the potential to be used by secondary school students and educators as well as foundation level institutions as an innovative teaching and learning aid.

Keywords: Biodiversity; board game; teaching; learning

INTRODUCTION

Biodiversity is defined by the Convention on Biological Diversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species (genetic diversity), between species (species diversity) and of ecosystems (ecosystem diversity)” [1].

There are millions of different species on the planet. In order to easily identify them, scientists have group similar organisms together. The groups start big and the organisms within have only a few similarities. As you move down the groups, they get smaller, and the organisms have more features in common. Domain is the largest category into which organisms are classified, and there are three domains: Archaea, Eubacteria and Eukarya. Organisms are separated into these three domains based on the specific structural and biochemical features of their cells. Then, these organisms are subcategorised into six kingdoms (Archaea, Eubacteria, Protista, Fungi, Plantae, and Animalia), followed by a phylum which is a subdivision of a

kingdom. Organisms are placed in phyla based on careful investigation of the specific nature of their structure, metabolism and biochemistry. There can be more than one phylum in a kingdom [2].

The word biodiversity is a contraction of 'biological diversity'. According to Katie, the concept of biodiversity is abstract, broad, and complex [3]. Different educational professionals have also referred to biodiversity as an ill-defined concept, implying that the topic has multiple interpretations, difficult to define, value-laden or normative, and multi-dimensional [4-6]. Due to its complexity, the concept of biodiversity or sustainability do not simply translate into people's brain [7], hence make it is difficult for students to understand and learn such concepts easily [8]. Moreover, lack of varieties in teaching methodologies may have contributed to students' dwindling motivation towards rich-content subjects.

Traditionally, the learning on science topic has centered on memory, cognition, and reasoning [9]. A more interactive approach is needed to initiate and maintain the students' motivation in learning this subject. Recently, a great deal of alternative methods have been developed and put in place to improve teaching and learning. Integrating the use of games into educational practices is one of the methods and proven to be an effective approach. Research also supports this belief as shown by a growing body of literature analysed the effectiveness of the use of games in teaching and learning [10-13].

Both video games and board games have the potential to function as learning and entertainment tools for students. In fact, board games have been used as teaching tools since ancient times, primarily because players improve their critical thinking, problem-solving, analysis, reasoning, planning, and communication skills while playing the games [13]. According to Mostowfi, Mamaghani, and Khorramar [14], board games can instil collaboration and communication skills through effective teamwork to solve problem during the play. Findings from Bahar et al., [15] also revealed that both the students and the teacher concurred that the board game has a positive impact on learning motivation and enjoyment with regards to content-rich subjects.

These attributes, alongside motivational and self-directed learning concept could be one of the potential options in addressing demotivating factors in the classroom such as boredom, learning environment and conventional teaching methodology. In this paper, Ohsem Biodiversity Board Game has been developed and used as an interactive learning tool for complex and abstract scientific concepts of biodiversity helping students comprehend and learn biodiversity facts in a fun and appealing way as well as enhancing skills related to their cognitive, affective and psychomotor domains.

INNOVATION DEVELOPMENT

As board game has been recognised as one of the teaching aids that can function as learning and entertainment tools, here we developed an innovative, fun and interactive Ohsem Biodiversity Board Game (OBBG). This game not only can be used for the students but also for educators to enhance students' motivation in learning Biodiversity in a fun and engaging way. Therefore, this board game will provide new paradigms in education for an alternative methodology in the higher education classroom.

Ohsem Biodiversity Board Game is an innovative pedagogical tool for upper secondary education, foundation and matriculation students as well as educators because it incorporates all three cognitive, psychomotor and affective domains in its design. Students use their

cognitive skills to play this game by remembering what domain, kingdom and phylum is. Psychomotor skills are required to move tokens on the board and affective skills developed are such as teamwork, entrepreneurship skills and responsive movement.

Another innovativeness of Ohsem Biodiversity Board Game is that it uses colour as part of the learning process. Different colours are used to highlight and identify different card groups, such as kingdom, phylum and characteristic. Study has shown that colour draws on both symbolic and cognitive powers to affect learning, facilitating memorization and identification of concept. Colour also influences the way we see and process information.

The prototype of board game innovation is shown in Figure 1. The board game was innovatively designed in round-shaped board to represent our Earth and the diversity of its biosphere. The board is inclusive of designated lots for all the biological kingdoms, namely Archaeobacteria, Eubacteria, Protist, Fungi, Plantae and Animalia. They are also lots designated for Phylum, Characteristics and Wild Card, each with its own distinctive colour and design. This game is suitable to be played by 3 to 6 players. The more players would make the game more competitive and interesting for them to compete.

The purpose of the game is to collect a set of cards consists of kingdom, phylum and characteristic of the kingdom to get a trophy (an organism of the respective Kingdom), so that players can earn more money when other players landed on their kingdom lot. The back of the card is colour coded; black for all 6 biological kingdoms, blue for the phyla of each kingdom, green for the unique characteristics for each kingdom, and white for wild cards. Other accessories required and given with the set are two dices, bank notes, tokens and three-dimensional trophies inserted with images of an organism belonging to each kingdom.



Figure 1: Ohsem Biodiversity Board Game Set

PLAYING INSTRUCTIONS

Before starting the game, all players will receive an equal amount of currency notes (\$1,500) to be used for purchasing during the game. The game begins at 'START' and the first player rolls the dice and move his/her selected token on the board. When a player's token landed on the any of the Kingdom lots on the board, they can opt to buy them. The values are stated on the board. A player that already have kingdom card can purchase phylum or characteristic

card when he/she lands on Phylum's or Characteristics' lot. The aim of this game is for players to gather as many complete sets as possible each consisting of Kingdom, Phylum and Characteristic cards. For each completed set, the player will receive a Trophy, in the form of an example of an organism found in the Kingdom, to complete the collected set. Here, players will easily learn how to recognize and match the characteristics of organisms found within each Domain, Kingdom or Phylum.

If a player's token landed on another player's Kingdom lot, he/she is required to pay rent. The values are stated on the Kingdom card. Depending on whether the player has a complete or incomplete set, the values vary. Landing on a Kingdom lot with a trophy is will incur significantly higher rent than landing on one without a trophy. For 'Wild Card', if a player's token landed on Wild Card lot, he/she must pick a card from the 'Wild Card' deck and follow the stated instruction. The Wild Card may contain biodiversity questions/trivia or in-game reward/punishment instructions. Players can learn from some of biodiversity related questions in the Wild Card here. Upon passing the 'START' lot, player will receive RM200 from the bank. If a player loses all his/her money and assets, he/she will be declared bankrupt and must exit the game. The WINNER of this game is the player that has the highest monetary value based on cash and assets after a pre-determined time. The playing instructions are shown in Figure 2.

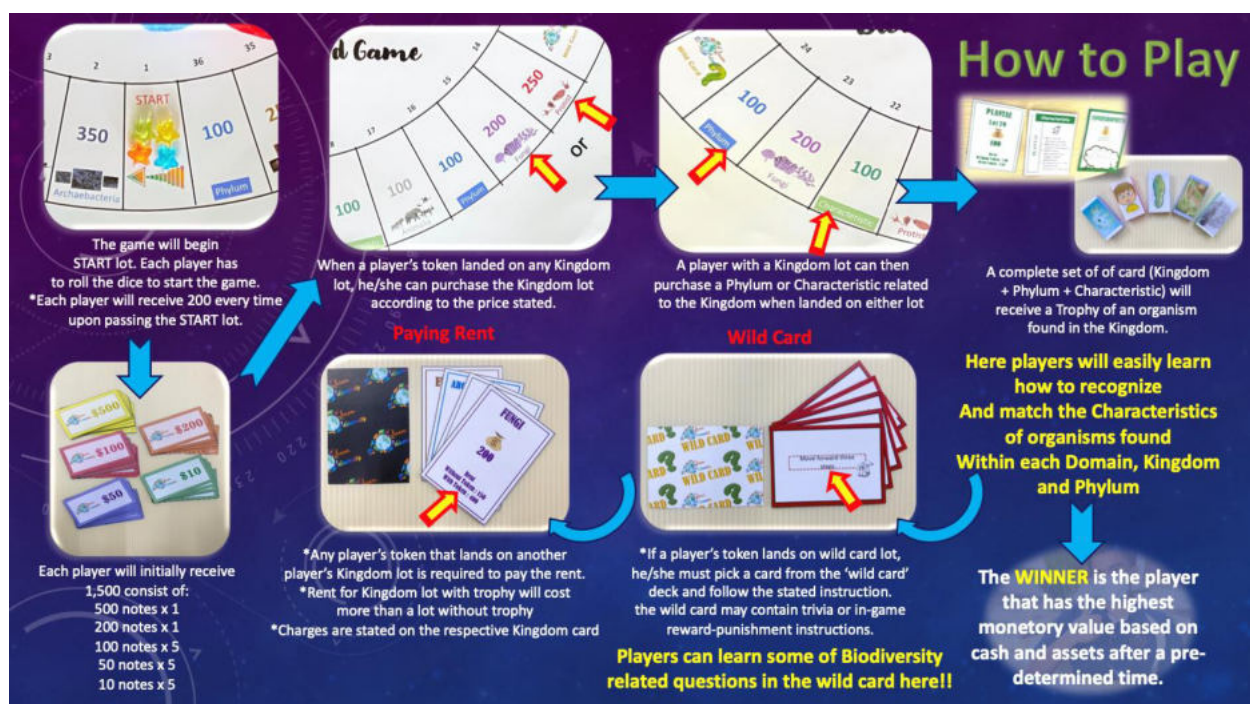


Figure 2: Instructions on How to Play the OBBG

The Ohsem Biodiversity Board Game is recommended for use at the upper secondary education, foundation and matriculation levels as a fun learning aid to students and interactive teaching tool for educators to describe the general characteristics of organisms in each domain, kingdom, and phylum. Students are also encouraged to purchase it to further strengthen their basic understanding of this broad topic.

This game can be played with friends and create a learning environment where there will be discussion, exchange of ideas and sharing of knowledge. It is possible that in the future this game can be made virtually where many students from different areas can play together. Finally,

this game incorporates entrepreneurship elements in its gameplay in order to inculcate students' interest in finance, trade, capital management and business rivalry. This provides vital exposure to real life challenge which emphasizes the importance of these skills and knowledge.

COMMERCIAL POTENTIAL

This board game has a huge potential to be used as educational kit as well as entertainment tool. This innovation will provide new alternative on the conventional pen and paper method, thus enhance student's interest in learning biodiversity. Copyright application of the product has been submitted and pending approval.

In terms of market potential in Malaysia, this game has a great potential to be commercialized since it is suitable to be used by a range of students from upper level of secondary school, matriculation and foundation level. According to the statistics from Ministry of Education and Ministry of Higher Education 2019, the total of these students are 270,3579. If only 10% of them are science stream, that means 207,358 students taking biology subject. This shows high number of potential prospects. Among these students, if 10% of them using OBBG as educational kit, it means approximately 20,736 sets are highly sellable.

Based on this figure, we have calculated the return of investment (ROI). The cost of the product is RM 20.00, and the proposed selling price is RM 45.00, which is similar with conventional board game such as Saidina (RM 45.90). The calculated expected revenues is RM 933,120 and the total expenses are RM 414,720, thus the net profit will be RM 518,400 with percentage ROI of 125%. This shows our developed OBBG game board is a profitable invention. The ROI calculation is shown as below.

Expected revenues	= Selling price of OBBG X number of estimated customer
	= RM 45.00 X 20,736
	= RM 933,120
Total expenses	= Cost price of OBBG X number of estimated customer
	= RM 20 X 20,736
	= RM 414,720
Net Profit	= Expected revenue – Total Expenses
	= RM 933,120 - RM 414,720
	= RM 518,400
Return of Investment (ROI)	= (Net Profit / Total expenses) X 100%
	= (RM 518,400 / RM 414,720) X 100%
	= 125 %

This Ohsem Biodiversity Board Game (OBBG) was introduced to a group of medical foundation students based at the Centre for Defence Foundation Studies of UPNM, and feedback evaluation survey regarding the OBBG were gathered. The survey covers the benefits of the game in helping students to improve comprehension, communication, knowledge sharing, focus, learning comfort, interest stimulation, interactiveness and engaging participation from students in teaching and learning process. The result showed that most of the respondents

agreed and very agreed on most of the questions, as shown in Figure 3, which indicate that they have so much fun and enjoy the game while learning Biodiversity.

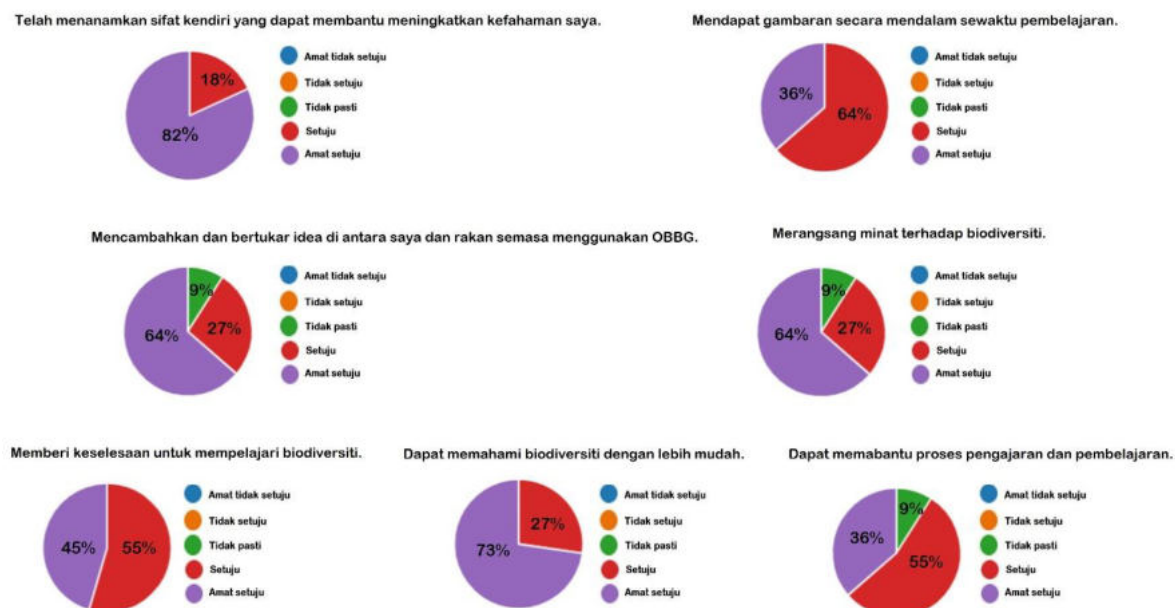


Figure 3: Pie chart results of the feedback evaluation survey

CONCLUSION

Biodiversity-related subjects have long been embedded in the syllabus, beginning from the foundation-level content during primary education, up until tertiary level in university. However, lack of varieties in teaching methodologies may have contributed to students' dwindling motivation towards rich-content subjects. Hence, a more interactive approach is needed to initiate and maintain the students' motivation in learning this subject. Ohsem Biodiversity Board Game is an innovative pedagogical tool for foundation and matriculation students as well as educators because it incorporates all three cognitive, psychomotor and affective domains in its design. This invention is a hybrid learning method of game and knowledge. OBBG is designed to provide a teaching aid for biodiversity that is fun, attractive and engaging. Based on the survey, most of the respondents agree that OBBG could help them understand and learn biodiversity easily in fun and engaging way. This shows OBBG can improve student's intrinsic motivation in learning biodiversity. Ultimately, intrinsic motivation is a crucial part in improving academic performance. Survey among educators will be done later to observe educator's opinion on OBBG. In near future, we are looking to engage with local app development company to convert this game into an online game, available both on Google Play (Android) and App Store (iOS). This would perhaps increase the visibility of OBBG as one of the interactive tools in learning Biodiversity.

ACKNOWLEDGEMENT

The authors would like to acknowledge Department of Chemistry and Biology and Centre for Defence Foundation Studies, National Defence University of Malaysia, for providing the fund that has resulted in this project and the students that involved in providing valuable feedbacks on the game.

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Development of Emergency Response Plan Recorded Video to Enhance Laboratory Safety Awareness Among Pre-University Students

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ABSTRACT

Science and technology are known as important mediums that lead Malaysia in becoming a developed country. In this field, hands-on skills are much required in addition to the theory given in the class. However, one of the concerns commonly addressed related to the laboratory activities among university students is the safety issues during learning activities in the laboratory. The emergency response plan (ERP) is among the vital components in case of an emergency. Although this concern has been emphasized by the Ministry of Health Malaysia in Guidelines 2015, Malaysia Laboratory Biosafety and Biosecurity Policy, the level of awareness on laboratory safety among the pre-university students is not clearly known due to lack of reports on the matter. Thus, the objective of this innovation is to enhance awareness of the emergency response plan (ERP) for Biology laboratory safety during teaching and learning for Pre-University students. ERP QR Code is a video-recorded laboratory safety guide that was developed to enhance safety awareness among Pre-University students. This is aligned with the Sustainable Development Goal (SDG) 4 on Quality Education which is to build education facilities that are safe and inclusive with effective learning environments through the cultivation of sustainable well-being programs.

Keywords: Laboratory safety; awareness, emergency response plan (ERP); pre-university student; sustainable education

INTRODUCTION

Science and technology are recognised as an important channel that lead Malaysia in becoming a developed country. Science education could encourage scientific literacy and increase science related knowledge among students in Malaysia. In this field, hands-on skills are much needed in addition to the theory given in the class. Due to this, most of the teaching and learning activities in this field of education are carried out in science laboratories. Laboratory activities can create many opportunities such as to reflect on findings and student interactions during their lab work [3]. Nonetheless, the students need to be aware of safety measures when they conduct laboratory activities. The approaches regarding science laboratory safety are (1) work procedure, (2) safety equipment, (3) handling experiments, (4) waste management, (5) emergency response plan [4].

One of the main concerns that is commonly addressed related to the laboratory activity among university students is the safety issues. These safety concerns are particularly highlighted for high hazardous labs, such as the labs involved with microbial, chemical, and explosive-type of experiments. According to [2], the accident rate in academic laboratories is about 10 to 50 times higher than the industrial laboratories. Even though this issue has been highlighted by the Ministry of Health Malaysia in Malaysia Laboratory Biosafety and Biosecurity Policy and Guideline 2015, the level of awareness on laboratory safety among the university students is not clearly known due to shortage of reports on the matter. Since the safety measures were introduced to reduce the number of accidents in the laboratory, it is important to learn whether the university students are aware of these measures. In addition, conventional techniques on the ERP sharing through manual reading prior to laboratory sessions might not capture the interest among students. Following the findings from the survey study on the awareness of laboratory safety, this innovation was developed with the aim to enhance awareness among pre-university students on laboratory safety through the easy access of visual lab demonstration. The emergency response plan (ERP) module is vital in case of laboratory emergency. The main point of having an emergency response plan (ERP) is to keep laboratory users away from fatalities and decrease injuries during an emergency [2].

Understanding the safety features in science laboratories must be a requirement for every student before entering a science laboratory [2]. Laboratory in university is a place where students first build their laboratory practices and scientific practices. This shows the significance of laboratory practice throughout their professions [5]. Due to this importance, Sustainable Development Goals (henceforth SDG) is incorporated into this study. SDG is a blueprint to achieve a better and more sustainable future for all that encompasses economic, social, and environmental dimensions. Quality education in SDG (SDG 4) could be achieved through life learning opportunities. Aligned with the goal in SDG4, there is a necessity to educate students to be aware of safety in the laboratory.

INNOVATION DEVELOPMENT

The emergency response plan (ERP) was prepared in a video recorded version, compiled as a single source guide which can be accessed by students through QR code. This ERP QR Code was created to ease students' access to the source through their mobile phone or any other gadget available. This will allow students to get the information on the laboratory safety easily and immediately. This innovation may enhance and can create higher awareness of laboratory safety among the students as well as decrease the time for laboratory demonstration before the laboratory session starts. Generally, it is important for the instructors to briefly explain "Introduction to Laboratory Safety" to the students at a very early stage of their time in the university [5]. Therefore, university staff must be an exemplary model in safety by showing good practices to their students [1].

This innovation was developed based on the preliminary survey study which indicates a high level of awareness [2] among students toward the ERP. From the findings, it can be deduced that the awareness level among Biological Science students on Biology Laboratory (Biolab) safety for ERP is at a high level with an average mean score of 4.20. This is supported by [2] who agreed that the mean score of 4.0 and above indicates a high level of awareness. The study further suggests that an improvement is needed in terms of lab demonstration and access to the source of information. Thus, visual lab demonstration and easy access to the source was developed. Innovation was developed based on preliminary study that is tabulated in Table 1.

Table 1: Student's awareness of the Emergency Response Plan

No	Item	Mean
1	Fire extinguisher is prepared in the Biology laboratory	4.66
2	Instructor explains Biology laboratory safety rules at the beginning of the semester	4.54
3	Emergency aid kit is prepared in the Biology laboratory	4.53
4	An eye wash is prepared in the Biology laboratory.	4.46
5	Poster to operate fire extinguisher is displayed in the Biology laboratory	4.43
6	Procedure for emergency aid is prepared in the Biology laboratory (poster, pamphlet, books, etc).	4.26
7	Biology Laboratory has clear and easily understandable safety guidelines	4.24
8	Names of officers that should be called in the case of emergency is prepared in the Biology laboratory	4.12
9	Location of alarm, telephone and exit point in the case of emergency are clearly marked in the Biology laboratory.	4.12
10	Biology laboratory in my Univesity is a risky place	2.13
		4.20

Table 2: Mean interpretation scale [2]

Mean Score	Level of Awareness
$5.0 \leq y < 4.0$	High
$4.0 \leq y < 3.0$	Medium-high
$3.0 \leq y < 2.0$	Medium-low
$2.0 \leq y < 1.0$	Low

This is the first recorded video of ERP in the Centre for Foundation Studies (CFS) International Islamic University Malaysia (IIUM) study which was previously delivered to students through manual readings and powerpoint presentation (Figure 1). In previous practice, the ERP were shared with students through manual readings before the practical session which caused lack of virtual experience among students in facing emergency cases, other than it is also time consuming (Figure. 1). Whereas, in current innovation, the innovation focuses on the development ERP video (Figure. 2) which consists of the usage of fire extinguisher, first aid kit, eyewash, safety shower, safety poster and exit point (Figure. 3-7). The advantages in current innovation are students will have higher level of understanding and it can reduce time of briefing for ERP before laboratory practical sessions.



Figure 1: Conventional practice: Lecturer brief on ERP through powerpoint slides in laboratory



Figure 2: ERP QR Code video demonstration on ERP in Biolab



Figure 3.

Fire extinguisher



Figure 4

Emergency First Aid Kit



Figure 5.

Eyewash and safety shower



Figure 6.

Safety poster



Figure 7.

Exit point

A survey among pre-university students was conducted to measure students' perspective on ERP Recorded Video which consist of five questions scaled through Likert scale, namely 1- Strongly disagree; 2- Disagree; 3- Neither; 4- Agree; 5- Strongly agree. In general, the result shows that students found the ERP recorded video can enhance their awareness on Emergency Response Plan (ERP) for laboratory safety, with an average mean value of 4.71. Based on Table 1, it is noted that one of the main reasons why students' access was made easy through the innovation of ERP video recording is because it can enhance students' awareness of laboratory safety.

Table 2: Student Perspective: of ERP Recorded Video

No	Student Perspective on ERP Recorded Video	Mean value
1	ERP recorded video help students in self-preparation before conducting laboratory experiment	4.71
2	ERP recorded video enhance students awareness on the laboratory safety	4.80
3	ERP recorded video allow students to easily get the information on the laboratory safety	4.73
4	Students can view the ERP recorded video anywhere at anytime	4.73
5	Students feel ERP recorded video is interesting	4.59
	Average Mean	4.71

The findings of this study suggest that the students have benefited from accessing the ERP video recording [6] [7] [8]. Feedback from students indicated that this ERP video recording enables them to access parts of the demonstration which they do not understand. Some students also indicated that these recordings help them in self-preparation before conducting laboratory experiments. Students also find the ERP video recording has provided them with the flexibility of accessing it anywhere at any time.

COMMERCIAL POTENTIAL

The ERP Video QR Code will be included in the Laboratory Manual Book for Practical Biology (Figure 8) where it can be sold to pre university students. The expected profit from this

sale is around RM3 per book with the target number of students purchasing this book is around 400 students from each semester. As the ERP video follows standard ERP format, this Laboratory Manual Book for Practical Biology can also be purchased and used by pre university students from other institutions. This ERP recorded video also has been aired in YouTube channel, where the possibility for money generation could be achieved through a high number of viewers from the YouTube channel.



Figure 8: Laboratory Manual Book for Practical Biology

CONCLUSION

As a conclusion, this innovation in developing the Emergency Response Plan (ERP) for laboratory safety in recorded video through QR code is able to enhanced awareness among pre-university students on the Emergency Response Plan (ERP) for laboratory safety. From the findings, it can be deduced that students agree that this ERP video recording is able to enhance awareness among pre-university students on the Emergency Response Plan (ERP) for laboratory safety, at a high level with an average mean score of 4.71. This is because students agree that they are more aware and appreciate safety issues in the laboratory. Teaching and learning also becomes more effective. This innovation can be brought up for further discussion, be included in policy at the centre level and be shared with other institutions. Briefly, satisfactory and quality facilities in the laboratory can improve the teaching and learning process, as well as maintain the safety in laboratories. This is aligned with one of the objectives highlighted in the Sustainable Development Goal (SDG) 4 on “quality education”, which is specifically to build up a university practice that can strengthen students’ learning experience through the cultivation of a sustainable well-being environment.

ACKNOWLEDGEMENT

We would like to thank Sr. Shafiyah Soleheh, Sr. Nurul Azrina, Nurul Syazwani, all staff Department Biology CFS IIUM, Biological students and Centre for Foundation Studies IIUM.

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In-situ Water Quality Device using Cloud Information Floating Water Quality Device (i-FLOWD)

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ABSTRACT

Contamination of water is a major issue across the world and one of the major contaminants in stormwater runoff comes from urban areas, highways, and roads. Water is an important necessity for survival and should be monitored regularly. As a result, water monitoring is a crucial procedure for monitoring water quality. Numerous old water quality measurement techniques are still in use today which are laboratory-based, requiring the delivery and evaluation of the sample which is time-consuming and expensive. The monitoring device's high cost has limited the authority owner's (properties developer's) ability to own it. This project was initiated with the integration and enhancement of individual sensors into a floating system powered by solar energy and transmitting live GSM data to a cloud processing base that can monitor and analyse water quality parameters such as temperature, total dissolved solid (TDS), and turbidity in real-time. The development of a low-cost in-situ measurement instrument for authority owners (property developers) or a new development area favours the market. Therefore, this device demonstrates its ability to produce more efficient and reliable results, allowing authorities to conduct environmental assessments more quickly and efficiently.

Keywords: Floating; prototype; real-time; water quality

INTRODUCTION

In this era of modernization and industrialization, contamination of water is a major issue in stormwater runoff. In urban stormwater, metals, polyaromatic hydrocarbons, and nutrients are typically found. When contaminated stormwater is discharged into receiving waters without treatment, it may produce short- and long-term harmful consequences for biological life. For example, phosphorus causes direct harm to water bodies such as lakes and estuaries and hence needs to be removed to avoid their eutrophication [1-3]. Detention ponds have grown increasingly popular as a way to remove some of the sediment from rainwater before it is discharged [4]. Sedimentation is an important mechanism for pollutant reduction in stormwater ponds since the majority of pollutants are associated with solids. However, fine particles can be flocculated, but the majority of it will be transported through the pond until it is discharged [5]. As a result, water monitoring is a crucial procedure [6] and usually the detection of water quality was done at the site where the samples were collected and transported to laboratories, which was time-consuming and expensive [7].

Therefore, this project was initiated with the integration and enhancement of individual sensors into a floating system powered by solar energy and transmitting live GSM data to a cloud processing base that can monitor and analyse water quality parameters such as temperature, and turbidity in real-time. This innovation aligns with UN Sustainable development goals under Pillars 9 (SDG9) (Industry, Innovation and Infrastructure).

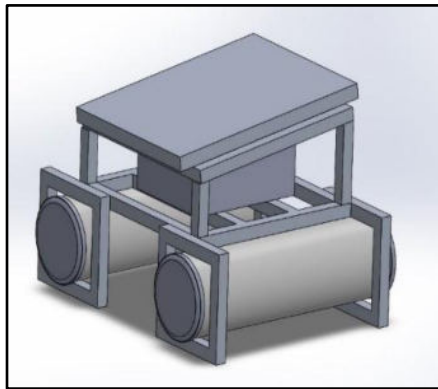
INNOVATION DEVELOPMENT

The floating platform device was built up using readily available materials where it can be operated on the water's surface without crew. The floating platform was built up using materials such as PVC pipes, solar panels, aluminium square frames, an electronic box, pipe holders, short and long stands, and pipe caps.

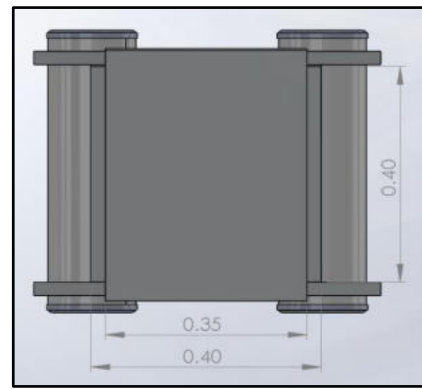
Floating device modelling

The conceptual design of the floating platform is shown in Figure 1. The descriptions of components used for the prototype in Figure 1(a) are listed in Table 1 below. The dimensions of the floating device are shown in Figure 1(b), 1(c) and 1(d). The full dimensions of the device as a whole are 0.6m(length) x 0.5m (width) x 0.4m(height). The weight of the floating device model was approximately 7.0kg which can be handled by only one person at one time.

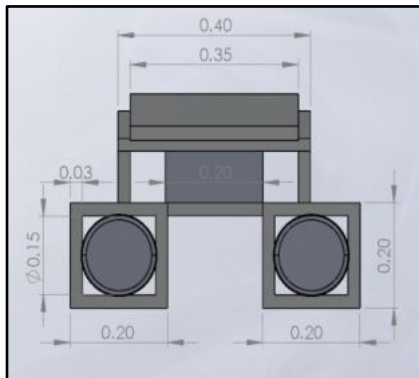
An electrical box with a length of 0.2m and width of 0.25m was installed in the middle of the floating device and the material high-density polyethylene was used. It was selected for its high durability, resistant towards water and affordable [8]. This box accommodates the electrical components and also rechargeable battery. The floater body was made up of cylindrical PVC pipes with a length of 0.5m and diameter of 0.15m as well as pipe caps. Both PVC pipes and pipe caps were built using PVC plasticized and PVC rigid which is lightweight, has a good mechanical strength and good resistance to weathering. The floater body was connected to the electrical box and solar panel using aluminum (1060 alloys) frames. Aluminum (1060 alloys) offers a high amount of corrosion resistance and workability. The solar panel with 0.35m (length) and 0.47m (width) was placed on the top of the device. This solar-powered floating device that can provide live GSM data to a cloud processing base for real-time monitoring and evaluation of water quality parameters such as temperature, total dissolved solids (TDS), and turbidity.



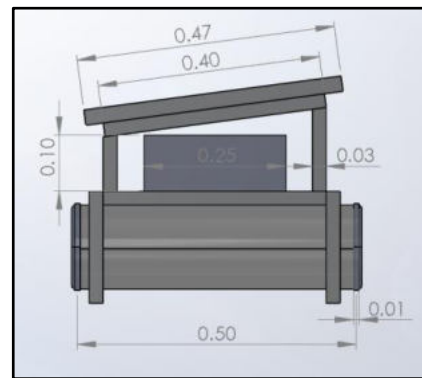
Isometric View



Top View



(c) Front View



(d) Side View

Figure 1: Floating device model view and dimensions

Table 1: Component Properties

Descriptions	Weight (kg)	Materials
Solar Panel	2.00	Aluminum (1060 alloys)
Frames	1.50	Aluminum (1060 alloys)
Electrical Box	2.50	High-density polyethylene
Floater Body	1.00	PVC Plasticized

Sensor and Main Board Selection and Specification

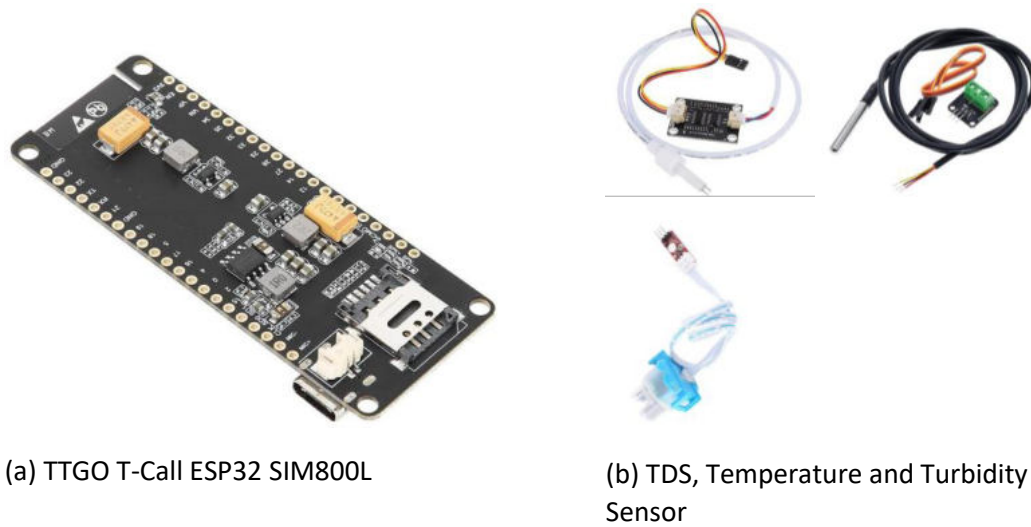


Figure 2: Electronic components of sensor main board

TTGO T-Call as shown in Figure 2 (a) has Wi-Fi, Bluetooth and an onboard GSM/GPRS to send environmental data to cloud servers either via Wi-Fi, Bluetooth or cellular network using GSM/GPRS module (enabled with an active SIM). It is very useful for IoT projects that don't have access to a nearby router via Wi-Fi. TDS sensor in Figure 2 (b) able to measure inorganic salts and dissolved organic matter, temperature sensors monitor temperature of water and surrounding, meanwhile turbidity sensor measures the water clarity and suspended solid such as clay, silt and sediment.

The programming flowchart diagram and hardware flowchart diagram are shown in Figure 3 and Figure 4. The flowchart diagram in Figure 3 shows the programming process for the floating device. It begins with initializing the variables and reading the input sensors such as temperature, TDS and turbidity. Next, the data will be pushed to the internet and the device will be in a sleep mode for 20 minutes before the next cycle begins. Meanwhile, the flowchart diagram in Figure 4 shows the component diagram for the electrical part of the floating device where the main controller, TTGO Module, will receive the input temperature and turbidity. TTGO Module is operated using a sealed lead acid battery which is generated from a solar panel. The module consists of a microcontroller unit (MCU) and GSM module which controls all the input sensors and then will display the output on the Website.

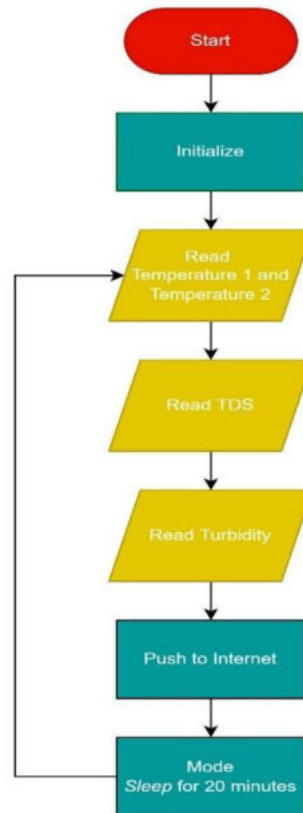


Figure 3: Programming flowchart diagram

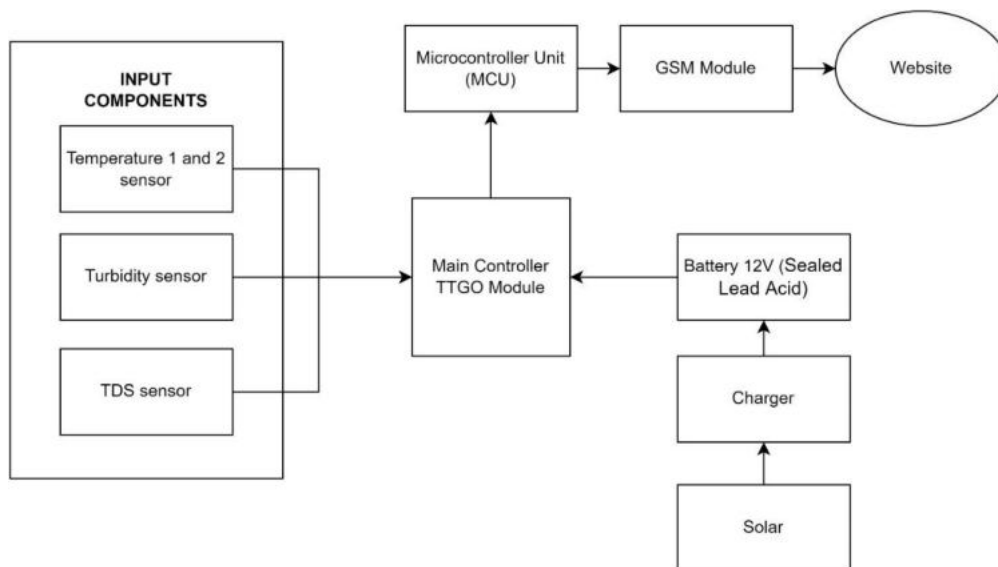


Figure 4: Hardware flowchart diagram

Assembling the Electrical Components and Mounted on the Bracket of Floating Platform Device

The electrical components are assembled inside an electrical box as shown in Figure 5. The electrical components consist of TDS, temperature and turbidity sensor, main controller and converter. The box also includes a rechargeable battery. Then, the box is mounted on the

bracket of the floating platform in the middle of the device's body device as shown in Figure 6 and Figure 7.

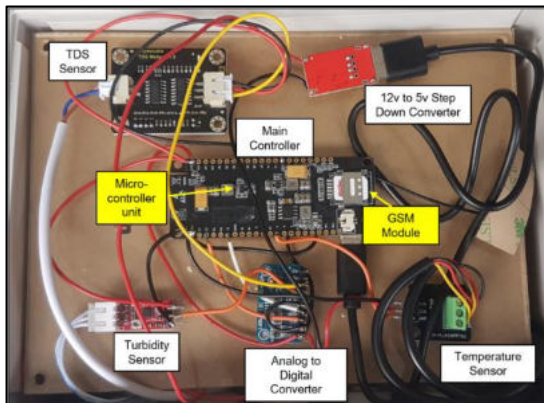


Figure 5: Assembling the electrical components inside the electrical box

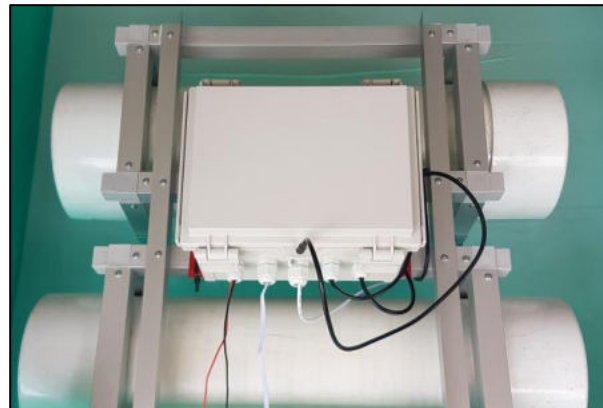


Figure 6: Hardware components mounted on the bracket of floating platform device



Figure 7: The electrical box in the middle of the device's body

COMMERCIAL POTENTIAL

Rapid development in an urban area has led to an increase in river water pollution. The demand for water quality monitoring devices has increased to monitor water quality at urban wet detention ponds before discharge to the river. However, the high costs of the device have restricted the authority owner (properties developer) to own. The market is favoured by developing a low-cost in-situ measurement device for authority owners (properties developers) or a new development area.

This device is simple and lightweight in which one person can handle this product and Easy to deploy anywhere compared to stationery products. Moreover, the overall system is low cost compared to conventional products, therefore it is easy to be marketable. Figure 8 and 9 show the related work that has been accepted and published in Scopus indexed conference proceedings. In addition, an application has been submitted to MyIPO for copyright application.



Figure 8: Scopus Indexed Conference Proceeding (Accepted)

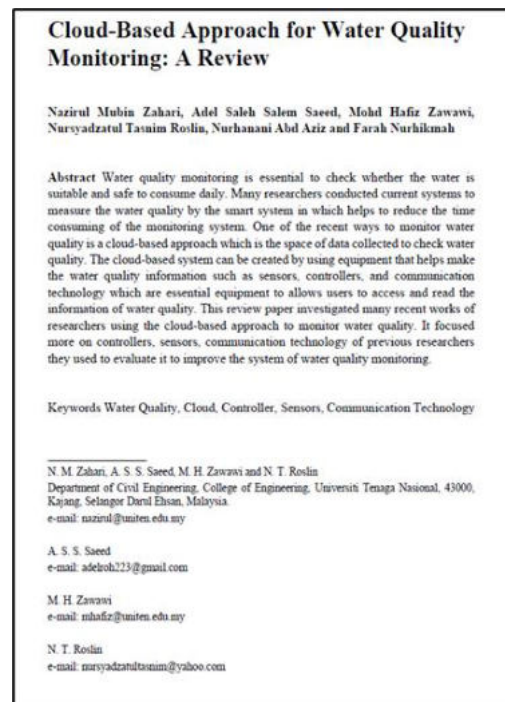


Figure 9: Scopus Indexed Conference Proceeding (Published)

INTELLECTUAL PROPERTY CORPORATION OF MALAYSIA
 An agency under the Ministry of Domestic Trade, Co-Operatives and Consumerism
COPYRIGHT ACT 1987
NOTIFICATION OF WORKS
 [Subregulation 5(2) and 5(3)]

Application No.: []

Applicant:
☒ Owner ☐ Author ☐ Licensee

Title of work (Original language): [INNOVATIVE CLOUD INFORMATION FLOATING DEVICE FOR WATER Q]

Translation: []

Transliteration: []

Name of the Language (Language that best used in the work): [ENGLISH]

If published in a periodical or serial (Literary Works): [] [] []

Section A: Category of Works
☒ Literary ☐ Musical ☐ Artistic ☐ Film ☐ Sound Recording

Date of Fixation / First Published / Elected / Incorporated: [01] / [01] / [2022]

Section B: Publication
 The Work is: ☐ Published ☒ Unpublished

If published: [] [] [] [] [MALAYSIA]

Section C: Author (If author is "same as owner" go to Part D - If more than one author, please attach a list of names and addresses of all the author)
Name: [NAZIRUL MUBIN BIN ZAHARI]

National Identification No. / Passport No.: []

Address 1: [DEPARTMENT OF CIVIL ENGINEERING]

Address 2: [UNIVERSITI TENAGA NASIONAL, PUTRAJAYA CAMPUS]

Figure 10: MyIPO Application (Submission Process)

CONCLUSION

As a conclusion, the design and development of a water quality monitoring device demonstrate its ability to produce more efficient and dependable results. The device is primarily designed to analyse the water quality in real-time. The floating platform can measure some parameters including temperature, total dissolved solid (TDS) and turbidity. Several phases that were planned were completed successfully and were able to operate according to the plan. The device is dependable and simple to operate, and it may also be

used to monitor water contamination. Furthermore, with the help of this device, the authorities will be able to undertake environmental evaluations more swiftly and efficiently. Apart from that, the platform was built to meet Malaysia's environmental monitoring requirements.

ACKNOWLEDGEMENT

The authors would like to acknowledge Universiti Tenaga Nasional for providing the facilities and financial assistance under BOLD Research Grant 2021.

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Tadabbur-Storytelling Approach in Dealing with Mental Health Issues at the Centre for Foundation Studies, IIUM

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ABSTRACT

The National Health and Morbidity Survey (NHMS) conducted by the Ministry of Health (MoH) in 2015 revealed that the prevalence of mental health problems among those 16 years and above was 29.2%. 1 in 3 Malaysians have mental health issues, with highest prevalence among those aged 16-19 years as well as those from low-income families. Hence, the study suggests an integrated and supplementary approach in dealing with mental health issues at the Centre for Foundation Studies, IIUM. The proposed approach integrates the practice of tadabbur (in-depth reflection) on selected exemplary figures and stories from the Al-Quran with the conventional methods in dealing with the mental health issues. The selected figures and stories are analysed in the context of mental health intervention and supports. As an alternative approach, the methods of implementation of the approach rely on the tadabbur (in-depth reflection) of Quranic verses and effective storytelling. The novelty of using the tadabbur-storytelling method in tackling the mental health issues is the core foundation of this approach. The responses collected from the participants i.e. students and staff, have been very encouraging towards the new approach and can be seen from the results of the survey conducted.

Keywords: Mental health; tadabbur; storytelling

INTRODUCTION

The World Health Organization (WHO) conceptualizes mental health as a “state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community”. Physical health, quality of life, and productivity can all be affected by mental health. Nearly half a million people in Malaysia are found to be suffering from moderate stress or depression, according to the National Health and Morbidity Survey (NHMS, 2019). Kuala Lumpur Befrienders patron, Tan Sri Lee Lam Thye, said the NHSM 2019 study also found that 424,000 children had mental health problems (Berita Harian, 2020). Statistics show that 2.3% of Malaysians aged 16 and above suffer from mental health problems. Minister of Health, Datuk

Seri Dr. Adham Baba said the NHMS study in 2017 also found that suicidal behavior among adolescents between the ages of 13 and 17 showed an increasing trend for the prevalence of suicidal ideation which was 10 percent compared to 7.9 percent in 2012 (Harian Metro, 2020). This undoubtedly should be getting an alarming move to cater to the issue. Despite the awareness movement to address the issue, it should be noted that this mental health issue is neglected due to the stigma attached to it. The stigma regarding mental health issues is not only happening in our country but also across the globe. The appreciation towards the importance of addressing the issue related to mental health might have been underestimated because of the failure to see the connection between mental illness and other physical illnesses. Many have the tendency to separate between the mental disorder and physical disorder, whereby the mental disorder which can be seen as something intangible is mostly left unattended. This explains the stigma that is happening in our society and all other societies in the world. We perceive mental health issues as an unimportant issue and most of the time, when we are faced with this issue, we try not to pay much attention to it. In reality, mental health disorder increases the risk for communicable and non-communicable disease and it can also contribute to unintentional and intentional injury.

The COVID-19 pandemic has presented us with unprecedented challenges which require measures beyond ordinary in facing them. It is undeniably true that with what already happened across the globe, the challenges that we face are currently becoming more crucial and worrying. We have to accept the fact that with this COVID-19 pandemic, everybody is struggling to cope, including the students in primary, secondary and tertiary education institutions. The learning environment is forced to change from face to face session shifted to online learning platforms in order to minimize the physical session between students. We are not actually ready to shift the platform but the situation forced us to do so. Here comes those challenges to deal with the mental and emotional side of the students during this challenging situation. Some students admitted that they are struggling with their mental health issues to cope with this new method of study and all the already existing challenges even before the coming of COVID-19.

Hereby, taking all the above-mentioned concerns into consideration, we conducted this study to suggest an integrated and supplementary approach in dealing with mental health issues at the Centre for Foundation Studies, IIUM. By looking at the increasing number of mental health issues among teenagers in Malaysia, especially our very own foundation students, the initiative is taken to help address the issues of mental health and present relevant proposed solutions to cater the issues.

INNOVATION DEVELOPMENT

The proposed approach integrates the practice of tadabbur (in-depth reflection) on selected exemplary figures and stories from the Al-Quran with the conventional methods in dealing with the mental health issues. The novelty of using the tadabbur-storytelling method in tackling mental health issues is the core foundation of this approach.

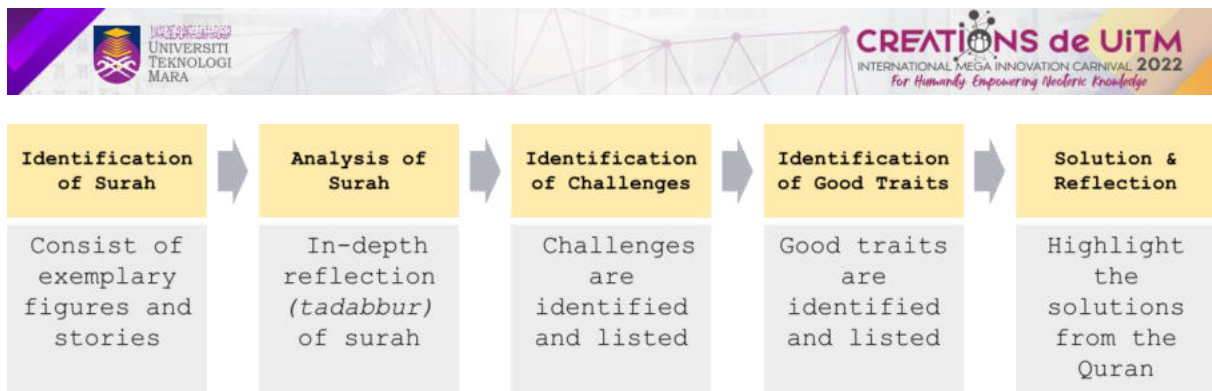


Figure 1: The systematic tadabbur-storytelling model

For a start, two programmes have been conducted to address the mental health issues among the students at Centre for Foundation Studies, IIUM. The programmes were Maintaining Healthy Mentality from Quranic Perspective and Exemplary Figures in the Holy Quran. Both programmes were using tadabbur-storytelling model as the approach in tackling the issues.

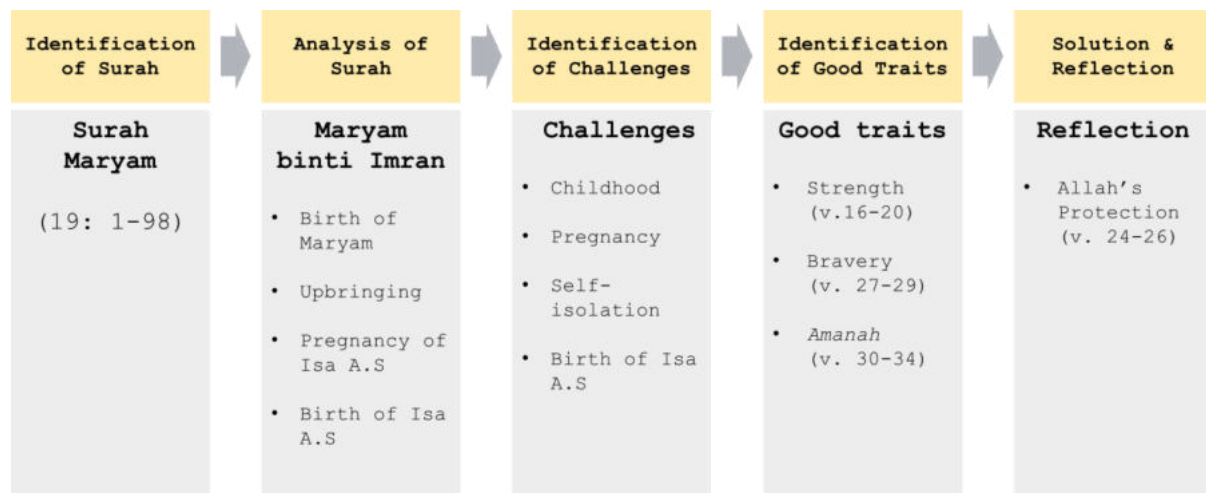
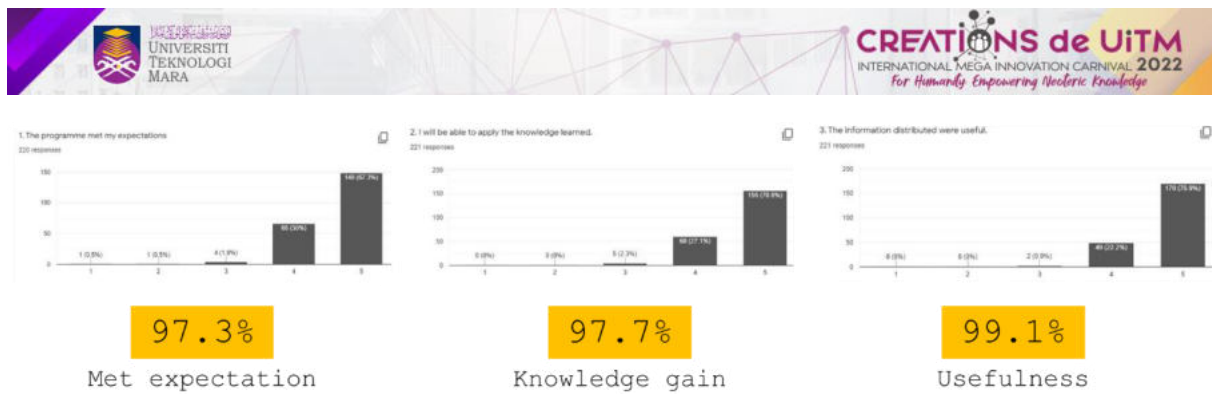


Figure 2: One of the models of tadabbur-storytelling, Maryam

The responses collected from the participants i.e. students and staff, have been very encouraging towards the new approach and can be seen from the results of the survey conducted. The positive responses from the participants have proven the effectiveness of the model in addressing the issue of mental health.



- I really like the speaker. The information was crystal clear compared to previous mental health talk that I was attending before. I hope there will be more mental health talk like this with a good speaker just like this one or just maintain the speaker 😊 I love how madam talked to us ❤️
- Please do more program like in the future because it really help us as a student
- More programs like this in the future for the students
- Please make lot of programs like this that talk about mental health and so on , i know this program held today because of the world suicide prevention day. But still , it's a good program, and inshaallah i will take a look back the yt live when i have any free time. Very good speech from the speakers especially br akif 👍👍 keep the good work 🌟🌟

Figure 3: The results of the survey

COMMERCIAL POTENTIAL

The commercial potential of the tadabbur-storytelling approach can be based on the combination of tadabbur and storytelling approaches. Storytelling has long been an effective educational approach in education. It promotes construction on knowledge among students and collaborative learning.

Alternatively, any figures and stories can be promoted as medium of addressing mental health issues, as long as the structure of storytelling itself is maintained. A structured storytelling model will ensure the effectiveness of the method.



Figure 4: A typical storytelling structure

CONCLUSION

In conclusion, the tadabbur-storytelling model is one of the new methods formulated to address the mental health issues among the teenagers. The method proved to be delicate enough to be used on sensitive groups such as teenagers and kids, reducing the stigma of mental health problems. Further improvements can be made to improve the model and its

effectiveness, such as collaboration with experts in psychology, counselling and Quranic scholars.

ACKNOWLEDGEMENT

Management, International Islamic University Malaysia.

Management, Centre for Foundation Studies, IIUM.

Mimar Sinan's Academic Departments, CFSIIUM.

Lecturers and students, Centre for Foundation Studies, IIUM.

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FABRICATION OF PROTON CONDUCTING POLYMER ELECTROLYTES BASED ON PVC-NH₄CF₃SO₃-BU₃MENTf₂N FOR PROTON BATTERY

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ABSTRACT

Searching a new material for the development of proton conducting polymer electrolytes that can be used in protonic electrochemical cells is the focus of this research study. In this study, the proton conducting polymer electrolytes were prepared by solution cast technique. Poly (vinyl chloride) PVC is used as the polymer host, ammonium triflate (NH₄CF₃SO₃) as the doping salt and ionic liquid-butyltrimethyl ammonium bis trifluoromethyl sulfonyl imide (Bu₃MeNTf₂N) is used as the plasticizers. Characterization techniques of Electrochemical Impedance Spectroscopy (EIS) was used to study the electrical properties of the PVC based proton conducting polymer electrolytes. The highest ionic conductivity achieved was $1.56 \times 10^{-4} \text{ S cm}^{-1}$ for 15 wt. % Bu₃MeNTf₂N polymer electrolyte. Electrochemical cells were fabricated using PVC-NH₄CF₃SO₃ - 15 wt.% Bu₃MeNTf₂N electrolytes. The cells were discharged at different loads of 1.5 k Ω , 62 k Ω and 95 k Ω . The open circuit voltage (OCV) of a cell based on the highest conducting electrolyte with configuration: Zn+ ZnSO₄.7H₂O+PTFE | 85 wt. % (PVC-NH₄CF₃SO₃) +15 wt. % Bu₃MeNTf₂N | MnO₂+PTFE is ~ 1.52 V while its discharge capacity is 0.55 mA h with maximum power density of $5.048 \times 10^{-3} \text{ W/kg}$ and maximum energy density of 0.560 Wh kg⁻¹. The discharge performance of the cells showed that the protonic polymer electrolyte film proposed in this work has potential for application in protonic electrochemical cells for proton battery.

Keywords: Electrochemical cells; ammonium triflate; ionic liquid; proton battery

INTRODUCTION

Recently, the synthesis of anhydrous proton conducting polymer electrolytes for higher temperature operation (100 – 200°C) has been the focus of polymer research for their applications in various electrochemical devices. In this context, more temperature tolerant polymer electrolyte membranes were obtained by doping of polymers bearing basic units such as amide, imine, ether with strong acids i.e. H₃PO₄ or H₂SO₄ [1-3]. Although these types of polymer blends have already been illustrated to have high protonic conductivity in the anhydrous state, self-condensation of acidic units may be problem at higher operation temperatures [4-5]. Recently, neutral (or basic) proton conducting polymer electrolytes have already been announced as they are likely to be more stable in the presence of electrode materials. In such membranes the basic dopant enhanced proton vacancy type conduction [6-7]. Protonic electrochemical cells, which emerged as a new generation trend, offer good prospects for use in low-current-device applications. This is as a result of the low electrochemical window for protonic electrochemical cell which is generally ~1 V. Only a few groups of researchers have reported protonic electrochemical cells using proton conducting polymer electrolytes. Agrawal and co-workers [8] studied the performance of electrochemical

cells using PEO-NH₄HSO₄-SiO₂ electrolyte. They obtained open circuit voltages (OCV) of 1.5-1.8 V for cells with configurations ZnSO₄.7H₂O | PEO-NH₄HSO₄-SiO₂ | MnO₂ + C and ZnSO₄.7H₂O | PEO-NH₄HSO₄-SiO₂ | PbO₂ + V₂O₅ + C. Other group of researchers reported an OCV for Zn + ZnSO₄.7H₂O | PEO-NH₄ClO₄-PC | V₂O₅ + PbO₂ + C + E cell of 1.55 V [9]. These researchers observed that the discharge performance of the cell increased when discharged with a high load resistance of 1.1 MΩ. Agrawal and coworkers [8] found that the voltage of ZnSO₄.7H₂O | PEO-NH₄HSO₄-SiO₂ | MnO₂ + C and ZnSO₄.7H₂O | PEO-NH₄HSO₄-SiO₂ | PbO₂ + V₂O₅ + C cells discharged with a load of 1 MΩ remained stable for a long time making them suitable for high load or low current density applications [9]. To the best of the author's knowledge, no work has been done on protonic electrochemical cell using PVC based proton conducting polymer electrolytes. In the present study, protonic electrochemical cells are fabricated using the highest conducting PVC based proton conducting polymer electrolyte. However, PVC based proton conducting polymer electrolyte is first prepared and characterized in order to optimize their characteristics. In this paper, a study is carried out on PVC-NH₄CF₃SO₃ - 15 wt. % Bu₃MeNTf₂N systems, and then applied to Zn + ZnSO₄.7H₂O+PTFE / MnO₂+PTFE proton batteries.

INNOVATION DEVELOPMENT

In order to study the electrochemical performance of the PVC based proton conducting polymer electrolytes studied in this work, one proton electrochemical cells were fabricated. The cells were assembled by sandwiching the selected PVC based proton conducting polymer electrolytes between anode and cathode materials. The highest proton conducting polymer electrolyte film is used as the electrolyte. To make cathode pellet for the first type of primary proton battery, a mixture of 0.3237 g of manganese dioxide (MnO₂) (TOSOH Corporation) and 0.0806 g binding agent polytetrafluoroethylene (PTFE) (Aldrich, USA) followed by pressing of the mixture under a pressure 1.4 x 10³ kg m⁻² to form pellet of thickness 0.451 mm and 0.4355 g weight. The same procedure is taken to prepare the anode pellet composed of 0.3250 g of zinc powder (Zn) (SHOWA Chemical co.ltd, Japan), 0.0429 g of zinc sulphate (ZnSO₄.7H₂O) (R & M chemical, U.K) and 0.0413 g PTFE to form pellet of thickness 0.282 mm and 0.3916 g weight. In this work, primary proton battery has been fabricated using a stainless-steel battery holder. The electrolyte of the primary proton battery is sandwiched between the cathode and anode and is loaded in the battery casing. Good mechanical contact may be obtained by screwing the casing tight. The open circuit voltage (OCV) of the electrochemical cells is monitored for 24 hours. A sample of the OCV of a primary proton battery based on solid polymer electrolyte during 24 hours of storage. Discharge characteristic is one of the crucial characteristics for proton batteries. The electrochemical cells were discharged using three different resistances, which are 1.5 K Ω, 62 K Ω and 95 K Ω respectively. The discharge characteristics is carried out using the experimental set up which the voltage and current is measured by a True RMS Multimeter.

The main advantages of polymeric electrolytes are their good mechanical properties, ease of fabrication into thin film of desirable sizes and the ability to form good electrode/electrolyte contact. The originality of this product is ionic liquid (Bu₃MeNTf₂N) as a good plasticizer and batteries based on PVC proton conducting polymer electrolytes. In this work, PVC as polymer host of proton conducting polymer electrolytes and ionic liquid (Bu₃MeNTf₂N) is a novelty.

COMMERCIAL POTENTIAL

This product has good performance of PVC based proton conducting polymer electrolytes in electrochemical cells. It suitable for potential application as electrolytes in

solid-state electrochemical devices like batteries. Applicability of this polymer electrolytes especially in proton electrochemical cells, primary battery for proton battery and energy storage. Application of Intellectual Property/Copyright was submitted to Intellectual Property Corporation of Malaysia (MyIPO) with the application number LY2022W00007. Figure 1 shows flowchart for preparation of anode and cathode for proton battery, Figure 2 shows prototype of product for primary proton battery and Figure 3 depicts voluntary notification for copyright application.

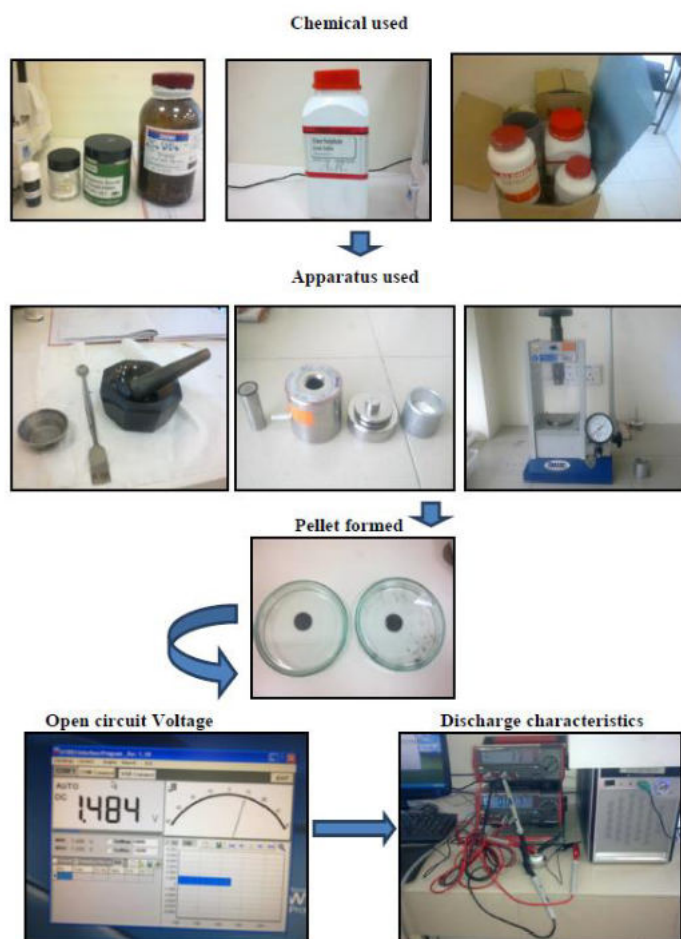


Figure 1: Flowchart for preparation of anode and cathode for proton battery.



Figure 2: Picture of the battery holder for primary proton battery



<p style="text-align: center;">Pejabat Timbalan Naib Canselor (Penyelidikan dan Inovasi) <i>Office of Deputy Vice-Chancellor (Research and Innovation)</i></p>	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 60%;"> <p>Universiti Teknologi MARA Aras 3, Bangunan Wawasan 40450 Shah Alam, Selangor, MALAYSIA Tel: (+603) 5544 2004 / 2255 Faks: (+603) 5544 2070</p> </div> <div style="width: 35%; text-align: center;">  <p>UNIVERSITI TEKNOLOGI MARA</p> </div> </div> <p>Rujukan kami : 600-BITCOM (IP. 5/2/6/3/CP) Tarikh : 06 Januari 2022</p>				
<p>DR. SITI KHATIJAH BINTI DERAMAN Pusat Asasi Pusat Asasi Uitm Cawangan Selangor 43800, Kampus Dengkil, SELANGOR</p>					
<p>Y.Bhg. Prof/Tuan/Puan,</p>					
<p>PEMBERITAHUAN SECARA SUKARELA HAK CIPTA (VOLUNTARY NOTIFICATION)</p>					
<p>Dengan segala hormatnya perkara di atas adalah seperti berikut. Sekian</p>					
<p>2. Sukacita dimaklumkan bahawa pihak Business Innovation & Technology Commercialization Centre (BITCOM) telah membuat permohonan pemberitahuan secara sukarela (Voluntary Notification) di Perbadanan Harta Intelek Malaysia (MyIPO) bagi karya Y.Bhg. Profesor/tuan/puan sepertimana butiran yang berikut.</p>					
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Fabrication of Proton Conducting Polymer Electrolytes Based on PVCNH4CF3SO3-Bu3MeNTf2N for Proton Battery	LY2022W00007				
<p>3. Bersama-sama ini, disertakan salinan muka hadapan dokumen pemberitahuan tersebut. Untuk makluman, perlindungan hak cipta hanya tertakluk kepada keaslian karya Y.Bhg. Profesor/tuan/puan yang terdiri daripada samada pamflet/ brosur/ artikel/ risalah atau gambar.</p>					
<p>4. Kerjasama daripada pihak Y.Bhg. Profesor/tuan/puan dalam perkara ini adalah amat dihargai dan didahului dengan ucapan terima kasih. Sebarang maklumat lanjut, sila hubungi sekretariat Harta Intelek UiTM di talian 03-5543 7976 / 03-5544 2748 atau emel kepada bitcom@uitm.edu.my / ipribuuitm@gmail.com.</p>					
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Figure 3: Voluntary Notification for Copyright Application

CONCLUSION

Proton batteries of configurations (Zn + ZnSO₄·7H₂O + PTFE) | C3 | (MnO₂ + PTFE) have been fabricated using the highest conductivity value, C3 (PVC-NH₄CF₃SO₃ - 15 wt. % Bu₃MeNTf₂N) films as the electrolytes. This battery configuration shows high discharge capacity at high load or low current drain. This suggest that they are suitable for low current density applications. The open circuit voltage (OCV) of the proton batteries is around 1.41 V until 1.62 V. The proton battery obtained highest discharge capacity of 0.555 m Ah with maximum power density of 5.048×10^{-3} W/kg and maximum energy density of 0.560 Wh kg⁻¹.

ACKNOWLEDGEMENT

The support from the Ministry of Education, Malaysia for Fundamental Research Grant Scheme- RACER (600-IRMI/FRGS-RACER 5/3 (123/2019)) is gratefully acknowledged.

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Corrosion-Resistant Mesoporous Carbon Nanocomposite Conductive Coating

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ABSTRACT

Mesoporous carbon nanocomposite, MCN is characterized with tuneable porous structure in the range of 2 to 50 nm, high surface area ($> 1000 \text{ m}^2 \text{ g}^{-1}$), hydrophobic (contact angle $> 130^\circ$), electrically conductive and good gas permeability. The unique features of MCN may provide wide potential applications in gas sensor, electrode materials, catalysis, hydrogen storage, adsorption and other fields. The peculiar mesoporous structural system facilitates ion transport and provides energy characteristics. Therefore, MCN materials are desirable in new surface modification technology for polymer and composite-based industries. This coating technology can be extensively use for anti-fog application and it is environmentally friendly.

Keywords: Carbon; nanocomposite; corrosion resistant; conductive coating

INTRODUCTION

Mesoporous carbon nanocomposite, MCN is suitable for many applications because of its unique physical and chemical properties. In this innovation, mesoporous carbon material with surface area up to $1000 \text{ m}^2 \text{ g}^{-1}$ was synthesised using nanocasting method with SBA-15 silica as the hard template and sucrose as the carbon precursor [1]. The mesoporous silica SBA-15 template was prepared by hydrothermal synthesis using tetraethyl orthosilicate (TEOS) and Pluronic P123 copolymer under acidic conditions which was later used to synthesise mesoporous carbon material [2]. The synthesis route is simplified in Figure 1.

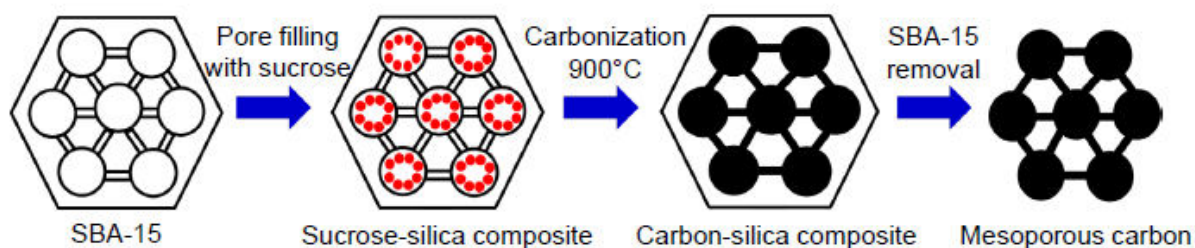


Figure 1: Nanocasting method to synthesis mesoporous carbon materials.

The synthesised mesoporous carbon material was then functionalised with Basic Red 2 dye precursor to obtained the MCN, a mesoporous carbon nanocomposite with improved electrical properties. The electrochemical performance test results demonstrated that the MCN presents enhanced capacitance (48%) compared with the original mesoporous carbon material, with maximum specific capacitance of 227 F g^{-1} at 0.5 A g^{-1} in 1 M KOH

electrolyte. This proves that the functionalised MCN has good conductivity and energy characteristics [3,4].

INNOVATION DEVELOPMENT

Besides, a hydrophobic test was conducted using water droplet and the contact angle measured was larger than 130° . This test result shows high hydrophobicity of the nanocomposite. The MCN coating material can be applied to a real environment as well. By considering these interesting findings, a corrosion-resistant conductive coating was developed. The functionalised MCN can be presented in four different forms, as shown in Figure 2 below.



Figure 2: The functionalised MCN in various forms (thin film, granules, rods and powder).

COMMERCIAL POTENTIAL

The functionalised MCN can be used as an alternative corrosion-resistant coating material with good surface properties especially in which involve solid-liquid interface. The MCN material is durable throughout dry and humid seasons in Malaysia. Other features of the MCN material are:

- Good thermal, mechanical and electric properties.
- Surface morphologies (nanopores) for mechanical and electrochemical applications.
- Ultraviolet-resistant coating for inks, plastic films.
- Waterproof-repellent and insulation coating material.
- Able to be used as configured substrate on micro-devices.

This innovation aims at several potential industries such as energy, IT, environmental and automotive or transporting industries for future development and collaboration. The examples of applications related to the MCN material are displayed in Figure 3.



Figure 3: Various application of the innovation.

CONCLUSION

The developed MCN material has high potential to be further explored in terms of physical and chemical properties. Besides, the coating process can be applied to a real substance to check for its adhesion to the surface. The related chemical bonding involves between MCN coating and the surface can be identified.

ACKNOWLEDGEMENT

The authors wish to acknowledge Universiti Teknologi Malaysia and Universiti Teknologi MARA for the research facilities.

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CATEGORY B
Postgraduate/Undergraduate

‘AReal-Vocab’: An Augmented Reality Mobile Application for English Vocabulary Learning of Children with Mild Autism Spectrum Disorder

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ABSTRACT

American Psychiatric Association defined autism spectrum disorder as a neurological disorder due to which diagnosed child may face difficulty in social communication or have a repeated or restricted set of behaviours. Learners with autism are mostly visual strategy learners and they tend to learn better through pictures and images. Due to their cognitive disabilities, most learners with autism struggle to acquire new vocabulary and with the existence of fourth industrial revolution, the use of technology is no longer a stranger to the education field. Hence, the use of augmented reality technology is considered in this study as past literature has proven that augmented reality technology could help to provide autism learners with a more meaningful learning session. In conjunction to that, this study is aimed at designing, developing and evaluating a mobile augmented reality application named ‘AReal-Vocab’ to help learners with autism in their English vocabulary learning process. It is believed that the designed and developed AReal-Vocab application can give a significant impact on autism learners’ language learning process. AReal-Vocab is believed to be able to help autism children to learn English vocabulary in a more interesting yet meaningful manner and at the same time sparks their interest in their English vocabulary language learning process.

Keywords: Autism spectrum disorder; Augmented reality; ESL learning; english vocabulary; mobile learning

INTRODUCTION

Autism spectrum disorder (ASD) causes a child to have chronic difficulty with social communication and interactions in a variety of settings, as well as to exhibit confined, repetitive patterns of behaviour, interests, and hobbies [1,2]. There are mild and severe symptoms, with the latter requiring more assistance in daily activities [3]. There is a pressing need for learning to be inclusive of all children, particularly those with autism spectrum disorders (ASD), as we work toward UNESCO's sustainable development objectives (number four of which emphasises inclusion in education through excellent education) [4]. Under the Education Act of 1996, students with learning disabilities such as sight, hearing, and speech, Down Syndrome, moderate autism, Attention Deficit Hyperactivity Disorder (ADHD), slight mental disorder retardation, and dyslexia are designated as special education students. According to Maselena et al., [5], the inclusion of children with disabilities has been increasing internationally since the proclamation of "Education for All" in Jomtien, Thailand in 1990 and a conference on Special Needs Education in Salamanca, Spain.

According to government sources, the National Autism Society of Malaysia (NASOM) [6] and many other private non-profitable organisations in Malaysia provide a spectrum of help, care, support, and education for autistic children. Fourteen Early Intervention Programs work with younger children to help them transition to regular schooling, while three Vocational Programs teach them basic life skills like baking, food preparation, laundry, housekeeping, sewing, handcrafts, data entry, and card design [6]. It is intended that people with autism spectrum disorders might learn and live a useful, productive, and fulfilling life. A typical training and intervention strategy is the behavioural method [7]. Autism Awareness Campaigns are held on a regular basis to raise public awareness about the condition [8].

Despite their challenges, children with autism have the right to participate in all parts of their lives, including learning English. As a result of technology breakthroughs and the world of the 4th Industrial Revolution [1, 9]. English has become a global language, and inclusive education will help children with autism survive in the future [10]. Learning a language is a process, and the first stage is to learn vocabulary. Word knowledge, or vocabulary, is the foundation for most aspects of language and achievement, according to Susanto [11]. According to Paradis, Rusk, Duncan, and Govindarajan [12], vocabulary development is an important part of language learning. According to the literature, several researchers have explored out possibilities and devised techniques to help autistic youngsters with their language skills. Take the use of technology as an assistive device for autistic children, for example. Each autistic child is on his or her own. Autism affects children all around the world, and they share comparable concerns and challenges as a result of their condition [13].

Each autistic child has unique learning styles and preferences, which can be both beneficial and challenging for them as students. For autistic children, however, learning a language is a difficult undertaking [14]. The four primary talents covered in language studies are listening, reading, speaking, and writing. A language cannot be mastered without first mastering its vocabulary [15]. The acquisition of vocabulary is an important part of the learning process, especially in English language learning. Beginning in kindergarten and continuing through university education, the language is taught in schools [16].

Having English language skills, whether for generally developing or autistic children, can aid them in the future with their schooling and employment. However, understanding the English language will be almost impossible if they do not understand the vocabulary component of the language [17]. Autistic children's communication skills are limited due to their cognitive impairment, which makes it difficult for them to express themselves verbally [18]. They typically struggle with communication, which is why they resort to nonverbal communication techniques like as shouting, sobbing, and throwing tantrums. Learning a new language, especially English, is difficult for children. When learning a language, the four abilities of listening, speaking, reading, and writing are studied. It's impossible to master them without first gaining a solid understanding of vocabulary. Learning vocabulary is essential for mastering English abilities, as previously said. As a result, it becomes an important part of English education. When studying a second or foreign language, various talents and components must be mastered, according to Mansourzadeh [19]. Without speech, vocabulary is one of the most significant abilities and variables in language acquisition. It can be inferred that vocabulary refers to the total number of words in a collection, and that nothing can be communicated without it.

Previous research has also showed that 4IR research is scarce in the sector, despite the fact that it might be used to help people learn English, particularly vocabulary development [12]. Technological breakthroughs in the fourth industrial revolution (4IR) are transforming our

lives and expanding possibilities that were never previously imaginable [15]. New technologies are largely geared for average citizens, leaving persons with special needs, such as people with autism, behind while technology continues to revolutionise the way we do things and improve our daily routines. According to a previous study, children with autism typically learn about social communication and interactions through tangible media such as visual cards [4]. Visual cards, for example, can be used to signal whether a youngster is hungry. While physical cards have been found to help autistic children [6], fourth industrial revolution integration of fourth industrial revolution technologies can further expand these possibilities in terms of mobility, seamlessness, and contextual learning [11]. As a result, it is thought that an augmented reality mobile application of English vocabulary learning for children with moderate autism is needed to address the challenges and gap.

INNOVATION DEVELOPMENT

This innovation employed a developmental research approach based on Richey & Klein (2014) whereby five phases are applied in this innovation based on ADDIE Model Type 1;

Needs Analysis

The researchers looked at prior research on the use of mobile augmented reality technologies in autism education for autistic students. There has been a lot of research done on the usage of augmented reality technology for children with autism in the past. However, there remains a gap in the application of augmented reality technology for English vocabulary development that is appropriate for children with autism. In addition, the needs analysis step was carried out utilising a literature review and triangulated with the use of observation and interview as instruments. The observations and interviews took place in two autistic centres in a Malaysian city, Selangor. The purpose of the observations and interviews was to understand more about the difficulties that autistic children confront when learning English language.

Design Phase

The results of the needs analysis phase are used to create a mobile augmented reality technology application for children with autism to acquire English language. The proposed augmented reality application is intended to assist youngsters with autism in acquiring English language. They can learn English language in a more exciting and relevant way with the design mobile augmented reality application. Furthermore, the mobile augmented reality technology application might pique their interest in their English vocabulary language learning process at the same time. The Malaysian English Special Education Syllabus is evaluated and amended in this phase to ensure that the content of the mobile application is aligned with their age-appropriate learning objectives.

Development Phase

The software to be utilised in constructing the augmented reality mobile application was chosen by researchers and a team of mobile application developers. In this phase, the sort of augmented reality technology is also determined. The storyboards and material will be imported into the mobile app. Later, using Unity software, researchers and a team of mobile application developers produced a storyboard and developed a mobile augmented reality application. The 3D Marker functionality, as well as Text Recognition Marker, are utilised in the mobile augmented reality application. The distinction between the two functions is that the mobile

software can read images from prepared flash cards as well as text, hence the Text Recognition Marker.

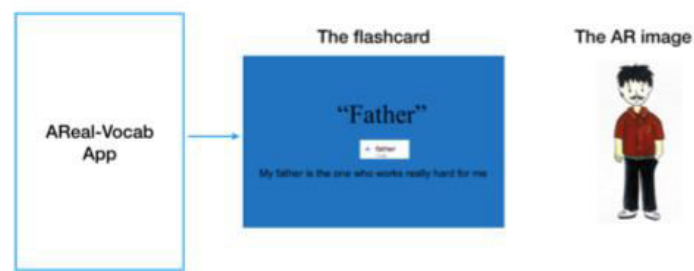


Figure 1: 3D marker feature

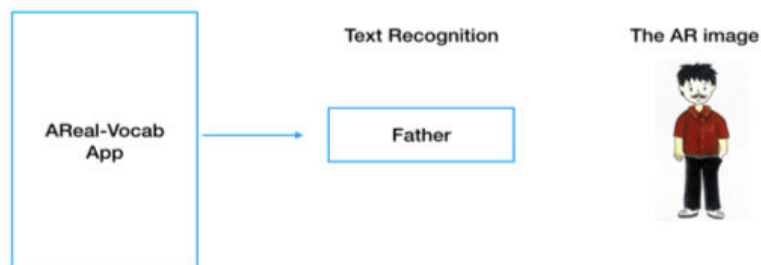


Figure 2: Text recognition marker feature

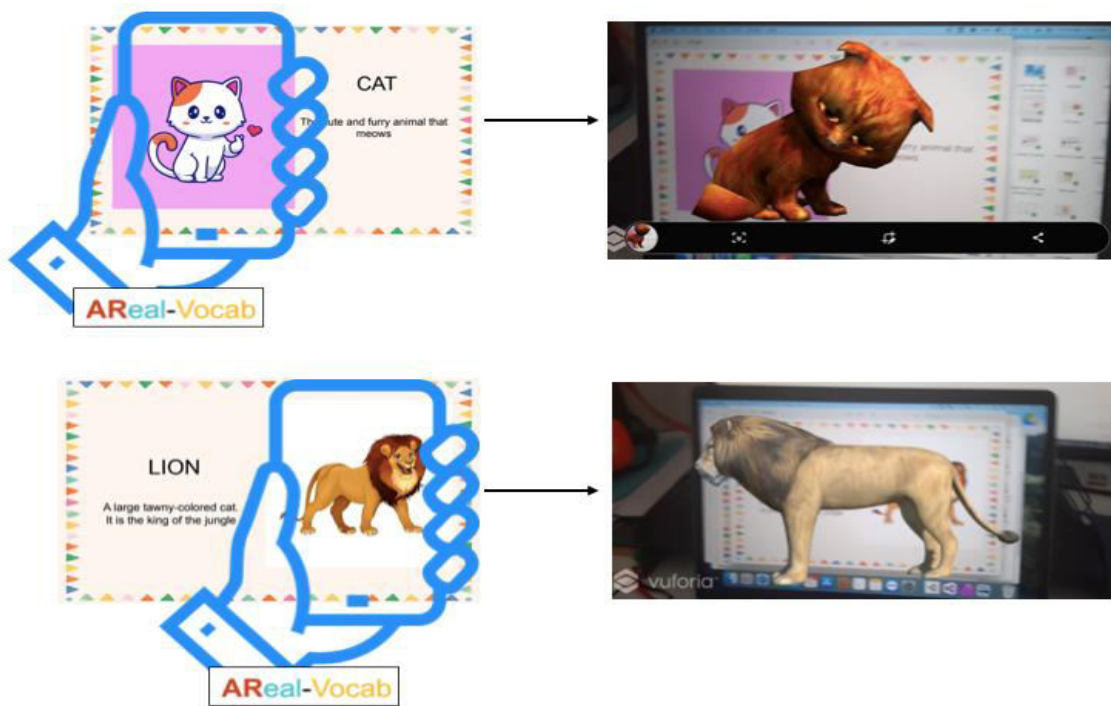


Figure 3: The output of AReal-Vocab mobile application

Both Figure 1 and Figure 2 show the features of the interface feature of the developed mobile augmented reality application. The availability of flashcards will aid children with autism in learning English vocabulary in a more engaging manner, as well as understanding the meaning of each word. Furthermore, a Text Recognition capability has been introduced as an advantage feature to make the application more convenient and accessible even without the use of flashcards, allowing youngsters to acquire English vocabulary in their spare time with the help or guidance of their parents. Figure 3 shows the final product of the produced mobile augmented reality application's prototype. Learners simply need to scan the flash cards provided and the visual of the 3D pictures feature will emerge while using the application from their or their parents' smartphone. With the help of the mobile augmented reality application, students will be able to acquire and understand new English vocabulary in a more engaging way.

Implementation and Evaluation Phase

Two autistic children, ages 7 and 10, are given the prototype of the mobile augmented reality technology application. The implementation is done qualitatively with the help of observation and field notes. The acceptance of the respondents and their responses are taken into account.

COMMERCIAL POTENTIAL

In the subject of education, augmented reality (AR) is not a new concept. As early as 2012, [4] demonstrated that Augmented Reality (AR) technology was creating waves in the field of education, notably in autism education. Unlike other technological advancements, augmented reality is thought to be capable of offering a wide range of options for connecting the actual and virtual worlds. For youngsters with autism, providing and producing actual visuals electronically can be very beneficial. Because children with autism are unfamiliar with abstract elements, having an application or tool that allows them to connect the actual and virtual worlds will aid them in learning English vocabulary.

Using augmented reality technology to learn English vocabulary can also be considered interactive, and today's millennial children are no strangers to technology. Learning with mobile phones or other technologies can make learning more interesting and enjoyable for youngsters with autism. Happy and Frith [1] believed that if children with autism were given the opportunity to use computers or technology instead of traditional learning techniques, they would be able to grasp more educational objectives. It has also been demonstrated in previous research that computer-assisted training engages and motivates not only mainstream learners, but also youngsters with autism.

Augmented reality technology can be used as an assistive tool to provide a multi-sensory experience for children with autism, allowing them to relate to basic learning concepts and making lessons more relevant. Furthermore, augmented reality technology has been shown to aid in the instillation of individualised and autonomous learning in autism education. Learning using mobile phones is exciting enough for autistic children, but adding a touch of augmented reality, where the graphics appear real, piques their interest. They are more likely to be involved in the learning process. Many previous studies have supported the use of augmented reality technology in autism teaching. AReal-Vocab has proven to be helpful in making the autistic children to capture and relate to the graphics or pictures of the surroundings, as well has managed to improve the literacy and learning skills of the autistic children. AReal-Vocab has managed to create an interesting approach to enhance the effectiveness and attractiveness of the language learning for children with autism.

Related Published Work

Hashim, H. U., Yunus, M. M., & Norman, H. Augmented Reality Mobile Application for Children with Autism: Stakeholders' Acceptance and Thoughts. English Journal, 12, 4.

Hashim, H. U., Yunus, M.M., Norman, H. (2021). English As Secondary Language Learning and Autism Spectrum Disorder: The Obstacles in Teaching and Learning the Language. Arab World English Journal, 12 (2) 22-30. DOI: <https://dx.doi.org/10.24093/awej/vol12no2.2>.

Hashim, H. U., Yunus, M. M., & Norman, H. (2021). 'AReal-Vocab': The New A La Mode of English Vocabulary Learning for Children with Autism. International Journal of Academic Research in Business and Social Sciences, 11(11), 1383 – 1393.

Awards and Recognitions

KNOVASI 2021 (Gold Award)

2nd Graduate Digital Invention, Innovation, & Design (GDIID) (Silver Award)

Teaching and Learning Poster Ideas (TALPI2021) (Gold Award)

International Innovation Competition (INNOCOM 2) 2021 (Gold Award)

Pertandingan Inovasi Kebangsaan Pendidikan dan Teknologi 2021(Silver Award)

Innovate @ International Language and Education Conference (Gold Award)

The 3rd International Shariah Compliant Idea, Invention, Innovation and Design Expo 2021 (Silver Award)

Pertandingan Amalan Inovasi Sempurna Karnival Inovasi @ UMT 2021 (Gold Award)

Final Year Project & Postgraduate: Research & Innovation Poster Competition (RIPC) Series 1/2022 (Gold Award)

CONCLUSION

This innovation is believed to aid children with autism in coping with their learning impairments as well as bridging the learning gap between autistic and typically developing children. Children with autism have abilities that are comparable to those of ordinary children, notwithstanding their differences. Children with autism will be able to learn in the same way that other children do. It is thought that one strategy to help children with autism cope with their learning problems is to approach them with things that are both appealing and useful to them. Augmented reality technology has proven to be one of the most fascinating learning tools since it allows autistic children to better integrate virtual and real-life settings. Children with autism can benefit from augmented reality technology since it allows them to have a more meaningful learning experience while also sparking their interest in acquiring English language.

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Cinemagraph; New Media Enhancement in Health Campaign

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ABSTRACT

Cinemagraph is one of the new techniques available in photography, specially made to show the interactive element available throughout the movement content. It is known as a moving image that has been replicated from the GIF file with additional aspects to make it more interesting. This study is mainly focused on the technique enhancement that will be used in public health campaigns, replacing the current poster and video medium. Current health campaign only available in poster and mainly been located in public main attractions such as clinic, hospital and library. Meanwhile, the rate of health problems in Malaysia is still high, and less awareness on the health among the patients make it even worse. With the exploration of the technique in depth, it can help in spreading the awareness with interactive content, and this time can be published on social media with the use of nowadays technology like Instagram, Facebook and Twitter through smartphones. Current development of this technique is based on the familiarity of the theory to develop effective content, to make sure every level of target audience gets used with this concept. Once the technique of cinemagraph has been developed to the final stage, with the help of data collected from the questionnaire and interview, hopefully this technique can be used widely and officially run under the watch and help from the Ministry of Health (MOH) Malaysia. As a conclusion, this study is still under development and far from perfect to be complete, because there have been some limitations that need to be considered and need other parties' attention to go even deeper.

Keywords: Cinemagraph; interactive; public service announcement; health campaign; moving image

INTRODUCTION

Public service announcement (PSA) is one of the mediums to deliver the information especially related to health and awareness topics to the public, and mostly located in easy access such as hospitals and clinics [1]. Somehow, this media is seen to be ineffective with the existence of technology through mobile phone and social media trends nowadays. In the meantime, cases related to health especially with non-communicable diseases (NCD) are getting worse and need to be solved at the national level. Five major threats for non-communicable diseases (NCD) in Malaysia and responsible for three-quarters of all deaths are cardiovascular, chronic respiratory, cancer, diabetes, and mental health conditions [2]. From this, the information of health issues delivered to the public needs to be focused and PSA is one of the important sources to deliver the content. This study is focusing on the effectiveness of cinemagraph technique to be PSA media replacement on health issues, whereby the technique is a moving image consisting of image and video combined together. The element that

represents this technique is a moving and interactive element that the public can see throughout the media, and with the high number of social media users in Malaysia, this technique hopes to be the next media of health campaign. This study aims to identify the effectiveness of this technique, as well as to see how far the acceptance and familiarity of cinemagraph technique is towards the target audience. Data collected from this research is at an early stage, to see the public's familiarities with the technique, and then will be moved to the next stage of identifying the effectiveness of the technique by developing the PSA campaign by cinemagraph according to the current health issue related. Next, the PSA campaign of cinemagraph will be tested again to see how far the media can influence and give awareness on the topic with the use of interactive elements.

INNOVATION DEVELOPMENT

This project is focusing on developing the technique of cinemagraph to replace and enhance the current poster of PSA. The technique is a variety of media file formats whereby it can be GIF, MOV, or MPEG. It is a refresh concept from the previous media format of GIF file, which is widely used in social media but with huge advantages added to make it more reliable and interesting [3]. As described, figure 1 below is the example of cinemagraph technique media which showing the movement of highlighted moving parts, but other is still image.

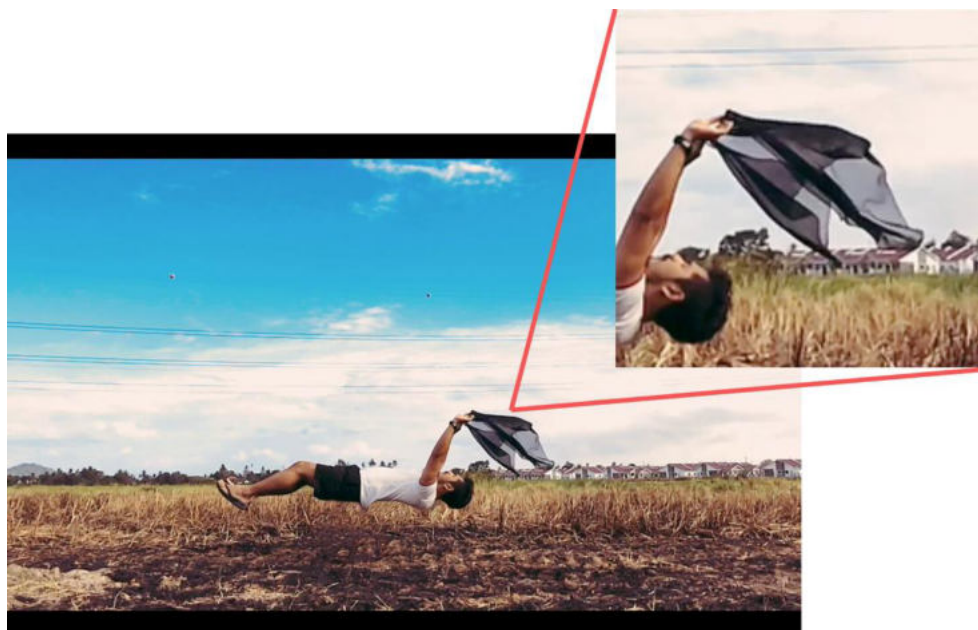


Figure 1: Innovation prototype of cinemagraph technique

Previous format of GIF is only capable of showing the loop animation in low definition of pixel, suitable to be used as emoji or emoticon in messenger or other related application [4]. With this new technique of cinemagraph, the additional enhancement has been developed from the high definition of pixel to create a more realistic image, and the interactive of moving selected parts that the creator can choose which parts to be highlighted. Plus, the size of the media file has been compressed to a smaller one even though the quality is still high, making it one of useful media files to compare with video and still image. The use of this technique with isolated looped motion could present an interesting impression to communicators conveying focused visual messages [5] What makes this technique is better option that other contender of video and still image, is that this file is consist of 2 file combining together, photo as front layer

and video as second layer at the back. The video layer act as the moving parts that will be highlighted as the photo layer act as an image that holds the media to be still.

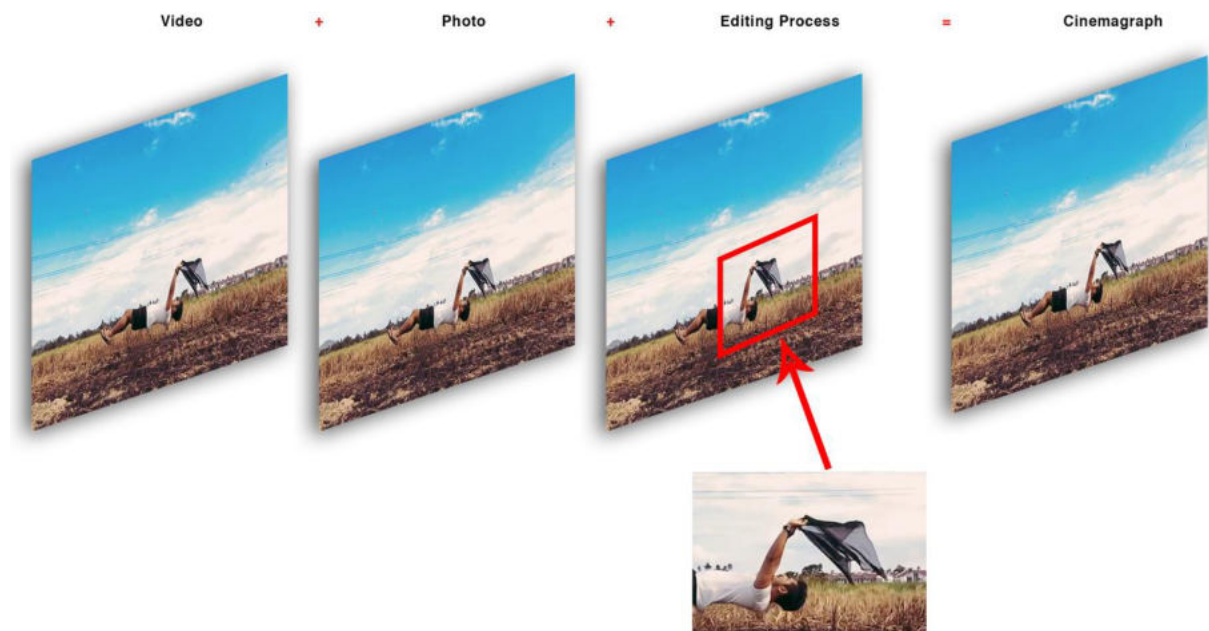


Figure 2: The process of innovation prototype of cinemagraph technique

Let's take a look at figure 2 above, showing the development process of making a cinemagraph. First stage is video shooting on the scene for about 20 to 30 seconds depending on what to highlight on the image. As for this project, the item held by the subject is moving to what to decide to highlight. Next one is photo shooting, creating images on the same scene but with different modes of photography. This is to ensure the quality and high pixel created from the image is showing throughout the last part of the process. Then comes the editing process of combining 2 media of video and image together as one layer, and the process of selecting parts to be highlighted begins. The highlighted part on the figure above is the moving black cloth, being selected with tools used in software that next will be exported as cinemagraph technique in high definition.

As new techniques are developed, cinemagraph technique needs to be undergone through several steps to identify the full capabilities of elements available. For this project, the prototype result is still considered minor to be used for the data collection. To get the best result, this development process is still ongoing until the final steps hoping to get the result expected.

COMMERCIAL POTENTIAL

In this project, the idea was to create a new technique of cinemagraph that can replace current poster advertisement as a new media approach. In 2016, it was estimated that 113 400 from the total of 154 000 deaths in Malaysia were caused by NCD-related [6] and it continues rising every year. From this, this idea of creating an interactive campaign is needed to create an awareness, and cinemagraph technique only the beginning. Since the technique is applicable on digital media, social media platforms through mobile phones is one of the great platforms in delivering these messages. Previous approaches of PSA are only available in clinics and hospitals, and some in public places like libraries and schools.

Nowadays, people are moving to digital whereas in January 2021, estimated 86% from the Malaysian population of 32.7 million were active as social media users [7]. This gives an advantage for this project to do more study on this media and how to approach each of the users closer and effectively.

This technique is not only applicable to be used as PSA, but can do in any genre in photography. It can be done with commercial, fashion, and fine art. As well as the journalism category, what makes this technique special than others is the movement elements. This study started in a PSA of health campaigns to test the effectiveness on delivering the awareness to the viewers, besides to see the acceptance of this technique rather than still image and video. Researchers are in the process of registering the Intellectual Property Recognition (IPR) under the Research Management Centre (RMC) because this research has been in the middle stage of collecting data. In terms of marketability, this study needs to be given time to complete and go through the validation of the research community before it can be marketed. Cinemagraph technique is hoping to grow and develop with other additional elements that future researcher can identify from research, and could be the next media that viewers prefer more [8].

CONCLUSION

In conclusion, this project is on the right track in answering the objective of the study. The process of developing cinemagraph technique and creating questions referring to the theory used is challenging, somehow it can be completed in given time. The case of NCD in Malaysia will continue to rise, but with this awareness approach it might help those who need it or those who really do not care about health matters care about this issue. Overall, collaboration between those in the creative art and health sector is crucial to create and develop even more effective and useful campaigns in delivering awareness to the public.

ACKNOWLEDGEMENT

I would like to express my special thanks to both my supervisors who really have huge patience in me in this journey. They also gave me the opportunities to share my study in conferences and talk, as well as supporting me in innovation competitions. Also thank you so much to my colleague that always pushed me from behind in doing the study together, and last but not least my parents who already passed away, this journey is for you.

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Semi-Auto Face Mask Disposal Bin

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ABSTRACT

There are various reasons why the increase of COVID-19 cases is continuously happening in the world. One of the many reasons might be because of the improper disposal of used face masks that has become a new norm in our daily life. This product is an invention of a waste bin that can help reduce the transmission of COVID-19 from one person to another, especially between waste collectors. The used masks that are thrown into this face mask disposal bin will be shredded and disinfected automatically. This will ensure the safety of waste collectors and the public in general as the bacteria and viruses from the used masks will break apart after it is sanitized. Therefore, there will be less risk for users to be infected by the virus. This product can be used at offices, home, and places indoors. The design of this product has been successfully created and it has also been analysed to ensure the functionality of the product. The outcome after the fabrication process has been successfully achieved according to its initial design. The shredder and the automatic disinfectant are able to work after putting a face mask into the bin.

Keywords: Face mask; disposal; mechanical

INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease and the best way to prevent and slow down transmission is to protect ourselves and others from infection by wearing a face mask. These face masks used are considered disposable after a brief use and it results to a new waste category [1].

The public does not have a special bin for used face masks in their household, which means the used masks are either thrown into their regularly used trash can at home, or a trash can at public [1]. Discarded masks may risk spreading coronavirus to waste collectors, litter pickers or members of the public who first come across the litter. The objectives of this project are to develop a special waste bin for used face masks that will automatically shred and disinfect the masks thrown by users, and to design and analyse the said face mask disposal bin.

This product is targeted towards everyone because wearing face masks has become an essential for the community. Hence, this product can be used on households and other public places. The materials will be made from PVC sheet as it is durable and suitable for light to medium use. The benefits of this product are that it is easy to use, environmentally friendly, and it can also save our time when disposing our face mask in the correct way.

There has been a lot of reports and concerns when used face masks are being thrown randomly on other types of waste bin which will mix the infectious waste, regular waste and recyclable waste [2]. Which is why a special bin for the purpose of disposing used face mask is a need for the general public.

Other than that, used face masks are not disinfected before being disposed which is an improper way of disposing an infectious waste. This can be seen through a survey and various reports that people do not apply the right way of disposing a face mask, which can result in an increase of transmission of COVID-19 [4] to the people who collects the waste and including the community in general.

Moreover, used face masks could be seen being dumped on random public places which could give an environmental impact which is a greater concern than plastic bags. When breaking down in the environment, the mask may release more micro-sized plastics, easier and faster than bulk plastics like plastic bags. Over the medium to long term, animals and plants are also affected.

The main objectives of this project are:

To design and analyse a waste bin that can be used to disinfect used face masks.

To fabricate a face mask disposal bin that works automatically.

This project requires the research of types of waste bins used by the general public and healthcare authorities on disposing used face masks, and to find an alternative to innovate or modify the existing products to ensure the public's safety while disposing a face mask. This project targets towards all society and will be placed on households, including public places like the park, office, and shopping malls to reduce the impact of used face masks on the environment. Besides, wearing a face mask has become an essential for everyone.

INNOVATION DEVELOPMENT

2.1 Concept Design Sketch

Concept 1

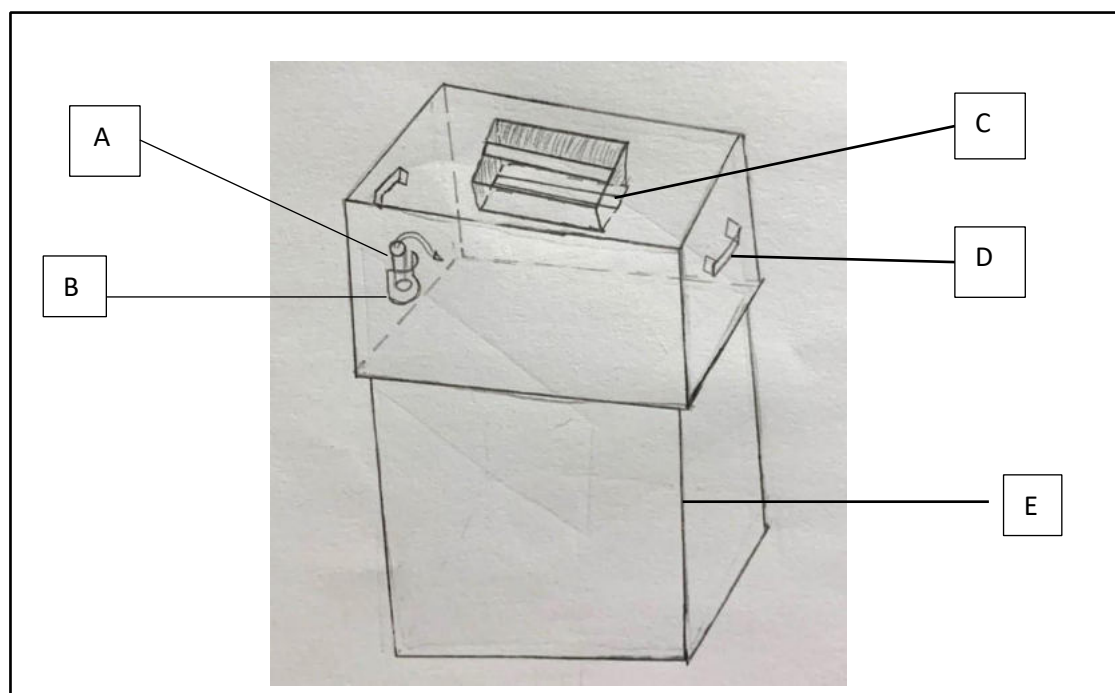


Figure 1: Design Sketch for Concept 1

Table 1: Label, function and reason

Label	Function	Reason
A	Automatic disinfectant	Low cost
B	Disinfectant holder	To support disinfectant
C	Shredder holder	To support shredder
D	Handle	Easy for users to lift
E	Body frame	Simple design

Figure 1 shows the concept that uses the simplest design to achieve the purpose of this invented bin. The material of the body frame is made of PVC Board as it is able to withstand the wear and tear of household traffic. A low-cost self-made automatic disinfectant is used to disinfect the shredded masks, and will be hold with a disinfectant holder that will be joined with the side of the inside bin. A shredder holder also made of PVC Board will be glued together with the lid of the bin so the masks will be shredded when it enters the bin. The surface of the shredder holder has a hole for the shredded masks to go into the bin. A handle on the side of the bin is for users, specifically waste collectors to use when they are going to collect the thrown masks.

2.2 Results



Figure 2: Final Drawing of Product



Figure 3: Final Product Prototype



Figure 4: Mechanism of Product



Figure 5: Mechanism of Product

Based on Figure 2 and Figure 3, the final drawing of the product's design is the same as the final product that has been fabricated. Figure 4 and 5 shows the mechanism of the product where the automatic disinfectant and the shredder has been attached to the lid of the waste bin. Therefore, when a mask is inserted it will be shredded and the disinfectant will sense the mask and it will spray out an amount of sanitizer.

2.3 Testing Product Working Capability

In order to find out the endurance of this product, it is important to do a product testing so that it could give insight into system level functions, and the product's defects can be catch early on. This is to assure the quality of the product so that it can work and satisfy the objectives and the purpose of this project.

Table 2: Product Testing

Test Description	Number of Tries	Test Result
Shredding masks	1	Mask is not shredded
	2	Mask is half shredded
Disinfecting masks	1	Pump in the disinfectant not working
	2	The sensor light did not light up
	3	Mask can be disinfected
Shredding and disinfecting mask inside the bin	1	Sensor did not sense the mask shredding
	2	Mask that is shredding can be disinfected

After doing some adjustments, the product can work efficiently when there is a mask inserted into the bin.

COMMERCIAL POTENTIAL

Health facilities have a complete process and materials to dispose used face masks that will reduce the risk of transmission, meanwhile the general public does not have the assurance on preventing respiratory droplets from reaching others when disposing used masks as they have to independently put them into a separate plastic before throwing them away. This is why the invention of this special disposal face mask is important as it will reduce the risk of the virus from spreading to others.

The outcome of this project will give a lot of benefits to the user as it is user friendly and easy to use. Firstly, this face mask disposal bin will ensure the safety and health of the user especially waste collectors because their used masks will be shredded and sanitized after usage. It is easy to use because it does not require to use hands to open the bin. Users will only have to insert their used face mask into the bin and turn the shredder on. Other than that, it also does not require electricity to operate, which means it can be used at public places indoors such as

offices, and at each household. It is also portable in which it can be placed at any desired spot, and it is easy for waste collectors to collect the waste.

CONCLUSION

The project has been successfully conducted. A new waste bin specifically for used face masks has been designed and analysed to ensure the safety of the public. The waste bin has been fabricated according to its initial design and could perform its functions to satisfy the problem statements of the project. With this, both of the objectives of this project, which are to design and analyse a waste bin that can be used to disinfect used face masks, and to fabricate a face mask disposal bin that works automatically has been achieved. The significance of this project is that the product can be used by everyone who wears disposable face mask, and as it is portable, it can be placed in various places. With this, the correct way of disposing used face masks can be applied by many hence decrease the risk of being infected by the virus.

To improve the face mask disposal bin, these are the recommendations:

1. Use a motor with higher power so that the shredder can withstand shredding metals and ear ropes. This will help users to save time before disposing their masks.
2. Put a sensor inside the shredder so users do not have to manually push the on button to activate the shredder. This will limit the physical contact from users with the surface of the waste bin.

By applying these recommendations, the functionality of this face mask disposal bin can be improved as it will be easier for users to use, and it could bring a better result by disposing face masks the correct way. Hence, it could reduce the risk of transmission of the virus and ensure the safety and health of others.

ACKNOWLEDGEMENT

The author would like to thank the College of Mechanical Engineering for their support to conduct this prototype.

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THE APPLICATION OF BRAILLE CODE FOR VISUAL IMPAIRMENT PEOPLE TOWARDS CLOTHING DESIGN

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ABSTRACT

Visual impairment people have challenges in their lives that can cause them to feel less independent compared to people who can see. Those who are visually impaired cannot see details on the clothes such as the color and size of the clothing they want to buy. It causes visual impairment people to ask for help from others or have to choose to use the same color for all their clothes. Moreover, the surface of the Braille dots that appear on the garment will allow visually impaired people to read important data on the garment. This study included samples for visual impairment facilities of people from Jalan Masjid India, Kuala Lumpur, and the Development Organization for Blind Malaysia. Visual Impairment people face challenges when shopping for clothes, especially in identifying the size and color of clothing. This study complements the sustainable development goals (SDG) 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. Surveys found that people with visual impairments have problems while shopping. Sellers say they have trouble identifying the type of clothing to choose. Ideas developed through Braille code towards clothing design that has functionality for visual impairment can use the Braille to identify size and color on clothing. All of the designs were created based on a Braille code system that easy visual impairment people to identify size on clothing. Furthermore, it can attract retailers to increase the success of the fashion industry. The availability of a Braille code system on clothing can be a more efficient alternative for the fashion industry to accommodate the visual impairment of people in shopping and clothing selection.

Keywords: Visual impairment people; braille; fashion

INTRODUCTION

Facing the problem of vision loss or myopia is just one of the challenges faced by the visually impaired while living life. As one of the founders of Envision said in his TEDxGoud talk, it has built a world around us that serves the majority. That means that any individual different from the average, such as the visually impaired faces difficulties because they are not considered as a normal person. Aims to explain the challenges faced by the visually impaired simply by living life and being odd (Challenges blind people face when living life, 2021). Seeing others face visual impairment problems, will remind them of one's weaknesses and wonder how to continue to manage life independently. Some of how someone with a visual impairment can stay on top of the clutter of the closet and know which clothes they choose. Everyone has a certain style of clothing and not only do people with visual impairments continue to choose clothes that fit their fashion preferences and budget, but their friends can also help. The process begins at the purchasing phase, and often a shop assistant or friend can see by describing the color or style of clothing. People with low vision can also buy their own

and will be attracted to the texture, style, and comfort of the item. Once at home, storing clothing requires an organized storage system (Ms.approby.com, 2021).

The researcher has conducted a preliminary study on this issue on 3 visually impaired respondents and also the seller has experience serving customers who have visual impairment problems. This study was conducted through a survey form in a one-on-one interview. Surveys found that people with visual impairments have problems while shopping. Meanwhile, sellers say that visually impaired people also have problems while shopping. Sellers say they have trouble identifying the type of clothing to choose. The survey also found that those with visual impairments had difficulty identifying material. In addition, respondents also emphasized the main criteria when buying clothes. Among them, the price, brand, quality, and comfort of the clothes. Respondents agreed to suggest improvements to Braille in clothing to make it easier for the visually impaired to shop.

Objective 1: To experiment technique of fashion embellishment towards the braille code. Experiments are conducted to identify the most appropriate experimental technique to be used in clothing. Different embellishment techniques have been performed to identify the effectiveness of practical techniques to apply to clothing.

Objective 2: To identify the usability of braille code by the visual impairment people for apply on clothes. The usability of the Braille code system on clothing can help visually impaired people to identify the size and color of clothing. Moreover, the Braille system used on clothes is the Braille dots used by them to read.

Objective 3: To outcome, the usability of braille code into clothing for visual impairment people while going shopping. This research produces five different styles. In the first style, the researcher focused on creating a polo shirt by combining cotton plaid using Braille dots size 'S' and color 'BLACK' and formal trouser describing size 'M' and Color 'BROWN' on clothing items. The second style focuses on shirts that combine cotton plaid using Braille dots size 'M' and color 'BLACK' and a formal trouser that describes size 'M' and color 'BROWN' on clothing items. The third style focuses on polo shirts that combine cotton stripes using Braille dots size 'M' and color 'WHITE' and plaid trousers that describe size 'XL' and color 'GREEN' on clothing items. The fourth style focuses on polo shirts that incorporate cotton stripes using Braille dots that describe size 'L' and color 'PINK' and a plaid trouser that describes size 'XL' and color 'GREEN' on clothing items. Finally, the fifth style focuses on polo shirts by combining cotton plaid using Braille dots size 'XL' and color 'NAVY' and formal trouser that describes size 'M' and color 'BROWN' on clothing items. All these collections use the customer trend 2023 of visual impairment people as a trend forecast to follow the current fashion trend.

INNOVATION DEVELOPMENT

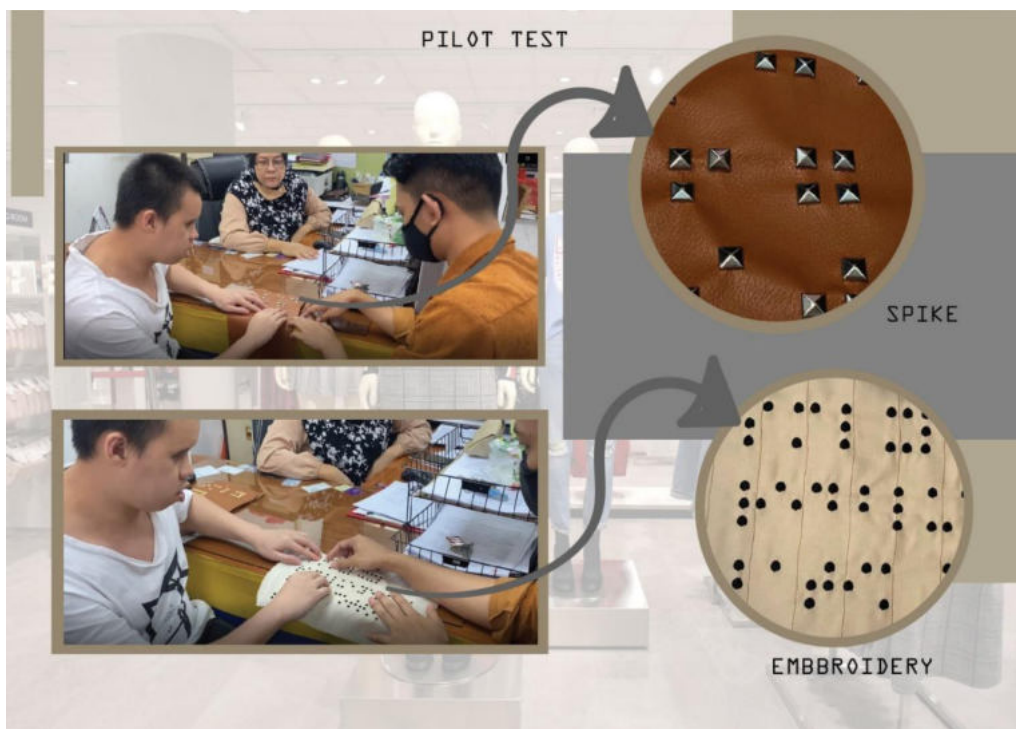


Figure 4.3: Experiment technique of fashion embellishment towards the braille code (Source: Personal collection)

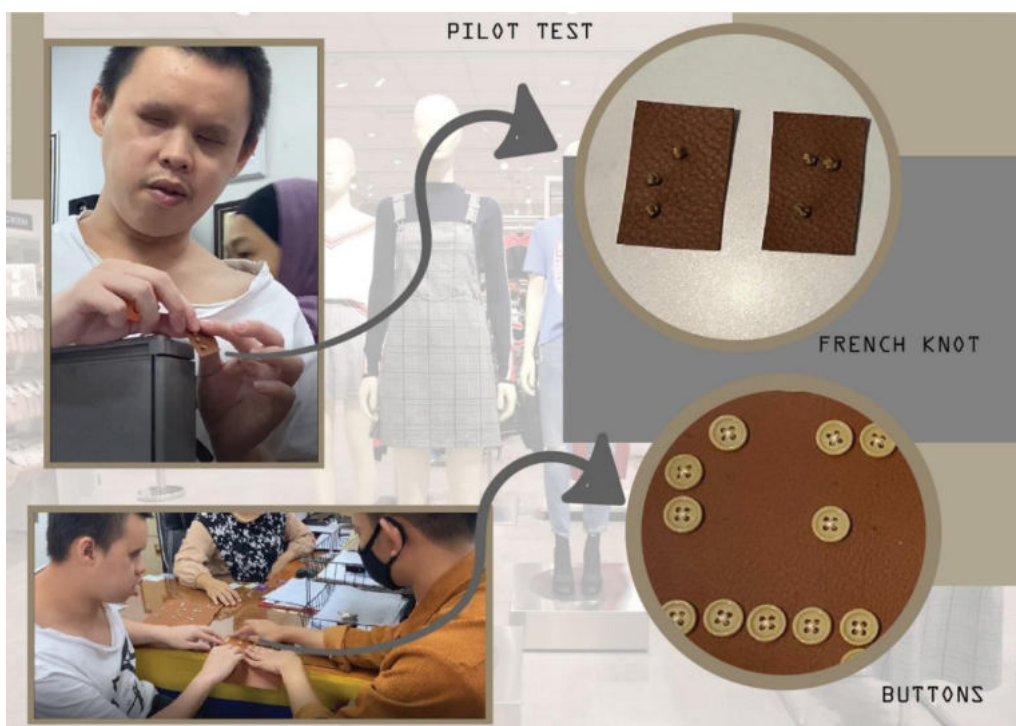


Figure 4.3: experiment technique of fashion embellishment towards the braille code (Source: Personal collection)

Based on this study, the visually impaired experience various difficulties in living life as usual in doing shopping activities at the mall. Researchers have made a pilot test on visually impaired people by using two types of techniques and two materials that have been produced based on Braille code. Moreover, through a pilot test researcher can identify the shortcomings of the Braille code technique and materials that has been produced. According to the respondent, the use of buttons is not suitable to be used as Braille code because it is too large to be applied to clothing. Respondents said the button technique was readable but it was quite large and close to identifying, the braille letters displayed. Furthermore, the researcher suggested embroidery as a technique for respondents to identify the letters found on clothes. The use of embroidery technique the respondent was able to identify but was somewhat confused because the Braille code produced was quite close between the other Braille dots. Besides that, researchers also use the spike as a material to be used on clothing. Respondents gave the opinion that the spike material is not very practical because it is quite large and confusing for visual impairment to identify the point next to it. After all, it is too close between other points. Finally, researchers use the French knot technique as a technique that uses the original size of the Braille code and is not too large. According to the respondent, the French knot technique is a size that is quite suitable to be applied to clothing as a Braille code that will help visual impairment identify the size of clothing.

As a result, of the one-on-one interview record, the respondent has explained how to write Braille correctly. Among them, the use of uppercase letters, lowercase letters, and even numbers. Respondents provide a summary of all techniques produced by the researcher. Respondents said that researchers need to control the distance between braille dots to other Braille dots because it will be confusing when visually impaired people read it. Furthermore, the respondent said that if he wants to use a number, he needs to put a number sign (#) so that it is not confused with the letters of the alphabet. Respondents said that the main problem often faced by visual impairment in choosing clothes is the difficulty in identifying the size of clothes. Researchers will focus on the size of clothing. Respondents also said that the use of the Braille code is very practical if researchers want to use it as a tool to facilitate visual impairment people to identify the size of clothing.

COMMERCIAL POTENTIAL

The strategic product design process of idea generation is very important to solve the major problems faced by visual impairment people. In an approach to creating a systematic product, the researcher needs to first evaluate an idea before turning it into a tangible invention and product. The role of the researcher is to create a product to combine art and technology to create a new product. For example, researchers have incorporated the art of Braille code into clothing to make it easier for visually impaired people to identify the size and color of clothing.



Figure 1: Innovation 1



Figure 2: Innovation 2



Figure 3: Innovation 3



Figure 4: Innovation 4



Figure 5: Innovation 5

CONCLUSION

The current study focuses on visual impairment people in Kuala Lumpur, Malaysia. Further studies can help to determine if there are differences compared to other areas. Understand the unique challenges of visually impaired people and their experiences while shopping in the mall. Maybe it can attract retailers to increase the success of the fashion industry. Moreover, can make positive quotes based on Braille dots to create positive vibes for visually impaired people when they wear the design. Availability of QR code scans for visually impaired people in stores can lead to increased success in the fashion industry by providing opportunities for visually impaired people to go to the mall and be able to buy clothes easily and more freely. The availability of a Braille code system on clothing can be a more efficient alternative for the fashion industry to accommodate the visual impairment of people in shopping and clothing selection.

ACKNOWLEDGEMENT

Firstly, I would like to express my deepest thanks to Assoc. Prof. Ts. Dr. Rohana Zul my supervisor has given me guidance and advice in completing the design project and thesis. Also, her help and support in giving suggestions, and guidance during this ODL (Online Distance Learning) had taught me to be confident and firm in my decision-making process.

This thesis is also forwarded to my parent Azizah Abdullah and Rabudin Ahmad because without their efforts and enthusiasm; I do not think, I can make it until today. Not to forget my only sister Riza Raihanna and also my friend Fatin Liyana who have given their moral support, advice, and help in preparing this Master Thesis. Without prayer and help from them, this master will not able to complete on time and be blessed. Also, thank you to all that had helped me through this meaningful Master's journey.

My greater appreciation also goes to Universiti Teknologi Mara (UiTM) in giving me the opportunity for me to continue my Master's degree and had supported their students with the ODL session during this COVID-19 pandemic.

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DIRECT SEW GARMENT PIECES D.I.Y PROJECT INITIATIVE FOR B40 EMPOWERING SKILLS AT ONCE GENERATE EXTRA INCOME

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ABSTRACT

The B40 population, most of them were already struggle before the pandemic, The B40 group is who have been the hardest effected by the COVID-19 pandemic, especially for women, many of them doesn't get the opportunity to earn a living because lack of skills. with help by the government to B40 groups such as helping them in increasing their household's income by giving them an opportunity to learn skills by providing them free classes can decrease their burden. The researchers recommend to the b40 population in mastering and empowering their skills that can be used as a source of their income in order to continue surviving in this current COVID-19 crisis. Also, learn an extra skill that helps them gain new experiences, train their brains for a variety of challenges, and keep their neural pathways active. Nowadays, due to all communities are required to be indoors or stay at home in order to prevent the COVID-19 infection and prohibited from holding a seminars or classes with the face-to-face method, it's hard for them to attends any skills classes. The researchers recommend new learning methods of sewing skills using DIY product that can be practiced at home to facilitate the b40 group to be more active and productive to strengthen their skills and at the same time, they can generate extra income. To understand the problem faced by B40 population and to identify improvement that can be made in the design that can adapt to their behaviour and style, the survey questionnaire and observation captured in photographs were done. The preliminary data, pilot test has been done before proceeded to be implicated into design development and final products. Through post-test and interview, the research found that the new feature added in the design are very suitable with customer behaviour and lifestyle, with minimalist design, suitable material and creative instruction method enables them to easily and enjoy the process of making their own product, learning and practice skills.

Keywords: B40 group; COVID-19 pandemic; empowering skills; generate extra income; new learning method

INTRODUCTION

The B40 income group, many of whom were already living hand to mouth before the pandemic, has been badly affected and become worse after the implementation of the movement control order (MCO). The B40 group is who have been the hardest hit by the COVID-19 pandemic, especially for women, many of them could not earn a living because lack of skills and became even more complicated when some of their husbands lost their jobs during the pandemic. And have been proved from the survey that conducted by researcher. Many efforts and initiative by the government to help the B40 groups to have a comfortable life especially helping them in increasing their household's income by giving them an opportunity to have a skill training, by providing them free classes or free training courses, especially for women of

the household like housewife, single women, and single mom. (Faizah Mokhtar, 2020). But in this situation nowadays, all the people are required to stay at home and prohibited from holding a seminars or classes with the face-to-face method, it's hard for them to attends any skills classes or training seminar outside.

This research is very important and there are needs for the researcher to do this studied as initiative to help an unemployed Malaysian and B40 population especially housewives in mastering and empowering skills at once can generate extra income for their family, especially in this pandemic era and also for the long-term source income, with the new innovation idea of the direct sew garment pieces DIY project.

This study and innovations were concluded by the research findings through readings, reviews, observation, surveys, and development of ideas in design process. Outcomes of final products were designed the Quick sew- direct sew garment pieces DIY project initiative for B40 empowering skill and generated extra income, based on the needs and criteria agreed by the respondents as the target users, to resolve or lessen the problems that they face. Designs implicated were made to enable these users enjoying learning skills as well as can help them become more creative and productive.

This product expected to supporting SDG 8 - Decent work and economic growth. Promote sustained, comprehensive, and manageable financial development, good and decent work. Drive economic growth and productivity by upgrading skills, and supporting growing businesses. Also, this innovation is anticipated to support sustainable development goals 1: end poverty. Poverty in Malaysia is one of the controversial economic issues. To reduce Malaysians from all ages living in poverty and help the B40 population who have lost their jobs, been placed on unpaid leave, or experienced pay cuts since the implementation of the movement control order (MCO) especially the female-headed households like housewives, single women or single moms to make their life better and out from their low-for-long-income trap.

INNOVATION DEVELOPMENT



Figure 1: Idea Development Framework

In order to explore many design possibilities and outcomes, design developments were made out of the first design ideas and sketches based on the concept and guidelines chosen.



Figure 2: Ideation/ Story Board



Figure 3: Garment Pieces Design



Figure 4: Printed Instruction Design



Figure 5: Creative box Design

Final Product



COMMERCIAL POTENTIAL

The study began when problems were identified among B40 population who are more likely lost their job due to MCO and become more complicated when they become unemployment with lack of skills and at the same time all the face-to-face classes are prohibited it give more difficulties for them learn and practice skills. In order to contribute to this community, the study proposed an innovation on new learning method specially for B40 population and beginners to learn and practice sewing skills at home. So that they can feel more safer and learning skill according to their own time.

Market needs

Due to the situation nowadays, that required people to stay at home and prohibited from holding a seminars or classes with the face-to-face method, it's hard for them to attends any skills classes or training seminar outside. (Hamdan Hamidi, 2020) Apart from stay at home without doing nothing because they cannot go to classes or skills training canters, many people who are very creative and courageous take the challenge to learn and explore by themselves at home and practice skills by using DIY product, in this way beginners can learn without relying on the time and date set by the training centre or classes to attend the classes outside and the most importantly save from involve in crowd, they are more comfortable and enjoy doing their project at home according to their own time and whenever they want.

Do-It-Yourself can be viewed as a cultural response in modern technological society to expanding economic specialization and academic specialization which brings individuals into contact with just a little focus area within the larger context. Often, this method is done by someone who busy working, and doing a craft as a hobby and their interest in art and craft or to fill their free time with useful activities. Do-It-Yourself products have various advantages and benefits to today's modern society, particularly in the today's diseased and virus environment. DIY is one of appropriate and suitable method of learning or practicing at home for the people who seek for knowledge and strengthen skills. in addition, DIY products are also believed can help a beginners start their own project that can generate extra income especially for B40 population.

Nowadays, Companies that sell DIY kits have seen an increase in sales as customers search for new activities to do at home in order to fill their free time, practicing skills, or making a project to start the small business (Emily Canal, 2020).

Due to meet the market needs, this product and innovations is using DIY concept to be adapted to the current situation and needs of customers. This product is a Direct sew garment pieces DIY project for beginners that targets the b40 population as consumer of this product.

This product is also suitable to practice in this COVID-19 era, because the method of learning new skills through this product does not require the user to leave the house or have a gathering event like the face-to-face learning method. this product is also very easy to practice and can help beginners to work faster and easier as well as be able to produce their own products in a big quantity, either for their own uses or for sale of finished products to other buyers.

Target market

This Quick sew- Direct sew garment pieces DIY project is a DIY concept product. The Direct sew garment pieces DIY project for beginners that targets the b40 population as consumer of this product. this Direct sew garment pieces DIY project is created according to the suitability of the consumer in terms of the design and methods of producing it or in terms of affordability, it is because this product is expected to helps the b40 population in learning new skills and empowering their skills. In this product provide a ladies leisure wear clothing garment piece (ready to sew), instruction booklet (card style) and basic sewing tool.



Market Area

The market area of this product will be marketed in the online shopping apps such as Shopee and Lazada or at the craft store or sewing shop as the demographic, geographic and psychographic factors are related. There are stimuli such as lifestyle, interest, beliefs, occupations, academic backgrounds, income, living area and reachability to buy a product that affect their buying behaviours.

Prices

Table 1: Costing Sheet

DATE: February 2022	STYLE NO.: 1
DESCRIPTION: QUICK SEW- DIY SEWING	CATEGORY: LEISURE WEAR
SIZE: FREE SIZE FIT TO XL	SELLING PRICE: RM52.00

1.MATERIAL/ ITEMS	QUANTITY	PRICE/METR /pcs	AMOUNT	PRODUCT
1. cotton (batik)	4	RM 2.00	RM 8.00	
2. Packaging box	1	RM 1.00	RM 1.00	
3. sewing Tools case	1	RM 1.00	RM 1.00	
TOTAL:			RM 10.00	
2. TRIMMING	QUANTITY	PRICE	AMOUNT	
1. Sewing tools set	1	RM 2.00	RM 2.00	
2. Packaging & Booklet design printed	1	RM2.00	RM 2.00	
TOTAL:			RM 4.00	

3. PRODUCTION COST	HOUR	RM/HOUR	AMOUNT	 
PATTERN	1	RM 8.00	RM 8.00	
CUTTING	1/2	RM 4.00	RM 2.00	
DETAILING	1/2	RM 4.00	RM 2.00	
TOTAL:			RM12.00	
4. TOTAL AMOUNT (1+2+3) (RM10 + RM 4+ RM 20)			RM 26.00	
5. TOTAL AMOUNT + MARK UP (MIN 50%) (MAX 100%)			RM 39.00	
6. DESIGN FEES (MIN 50% OF 4)			RM 13.00	
7. TOTAL (5+6)			RM 52.00	

CONCLUSION

In objective one where to identify the activities of the B40 population in generating income for their life surviving. This study discovered that are most of the b40 population work as subordinates or are self-employed, such as open stalls, construction workers, ranchers, farmers, fishermen or factory operators to earn their living income, and many of them also work in private companies but most of them have a high potential to lose their jobs due to lack of skills. However, the basic skills of the B40 group used to be highly valued by them, such as cooking, sewing, handicrafts, etc., but because the young people of the B40 group now have fewer opportunities to learn skills, they don't know much about the advantages of having additional skills on life.

In objective two where to introduce the new design and learning method of sewing that is suitable for beginners to learn and practice at home. This study identified that B40 population face problems when all people are required to stay at home and prohibited from holding seminars or classes with the face-to-face method due to COVID-19 pandemic, it's hard for them to attend any skills classes or training seminars outside. By introducing a new method of learning using sewing DIY kits project to B40 populations and unemployed Malaysians especially home-makers, can giving them the opportunity to learning skills while being fully committed to the house-hold responsibilities. Especially, most housewives, single women or single moms are situated at home because of family commitments. therefore, they are unable to commit to a full-time job or hold a part-time job because of its fixed working hours. Hence, earning any form of income becomes difficult for them. Based on the research findings suggest that DIY project as new method of learning skills for today's Malaysian consumer. The majority of respondents agree that using DIY project as learning method gives them a new option for them to gain more knowledge, empower skill at once can generated extra income.

In objective three where to create a new direct sew garment pieces DIY project initiative for B40 empowering skills at once generate extra income. This research produced a Quick sew-Direct sew garment pieces DIY project. The early ideas and design

development were triggered by the responses from the targeted community, B40 population who are the most struggles group in pandemic era such as losing job, get pay cut, etc. And some of the B40 population doesn't get the opportunity in learning skill that can help them in their daily life or their financial. This problem statement is supported by preliminary study survey that most of respondents are from B40 population. By means of the survey and observation done, it is concluded that there are six new criteria and feature that were emphasized and implemented in the design which are easy, quick, trendy, functional, affordable and resalable in order to improvise the design of DIY sewing kit project initiative for B40 empowering skill and generate extra income. This feature also plays important role in providing useful experiences and Knowledge when using the product as a new learning method. the method of learning new skills through this product does not require the user to leave the house or have a gathering event like the face-to-face learning method. this product is also very easy to practice and can help beginners to work faster and easier as well as be able to produce their own products in a big quantity, either for their own uses or for sale of finished products to other buyers. The material picked for garment pieces include in the final product is Cotton material with Batik and Pelikat patterns is found to be a better material to them according to their feedback given in post-test survey and interview because cotton material is easy handle material suitable for beginner. Meanwhile design attributes like a simple and easy design can make it easier for new users or beginners to practice sewing skill at home without helps from the expert and complete their own product faster also can produce it in large quantities for their small business. Addition of these features received positive feedbacks from the B40 population who participated in the post-test. The choice of theme used on the final product were Quick Sew DIY project.

However, based on the additional feedbacks done by the focus group respondents in post-test, some of them suggested that the design need more style and clothing categories options that can be done according to the tailor's level of expertise such as the more skilled the tailor, the more design details are added. Furthermore, the researcher suggests to the next researcher explore more on the instruction method such as latest method using digital as times become more modern and sophisticated. There is a need to design this Quick sew-Direct sew garment pieces DIY project because this way can give the opportunity to B40 population or beginners who are willing to learn and empowering their skills that can give them many benefits for their life and also can use to generate extra income.

ACKNOWLEDGEMENT

"In the name of God Allah SWT, the Most Gracious, the Most Merciful"

Alhamdulillah, First and foremost, thanks to Allah S.W.T the Almighty god for blessing me with health and strength, guiding me in improving my knowledge that enable me to complete the thesis writing successfully.

Secondly, I would like to express my deepest thanks to my team member Ts. Dr. Rohana Zur and Khairul Muzamir for offering their advice and guidance in completing the design project. Also, their help and supports in giving suggestion, and guidance during this ODL (Online Distance Learning). the encouragement, and endless support in making this research possible. The helpful guidance from my supervisor right from the beginning until the final of this study encouraged me to improve myself as a researcher. I would also like to thank all the lecturers from the Faculty of Art and Design, who has been helping me to learn and understand the process of researching, whether directly or indirectly, in many ways.

Finally, my greater appreciation and thanks also goes to our honourable Universiti Teknologi Mara (UiTM) in giving me the opportunity to continue my Master's degree and further my knowledge even in this hard situation with pandemic COVID-19, the ODL session is very helpful for student. Last but not least, thank you to those who involve directly or indirectly during this research.

Thank you and Alhamdulillah.

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Orcycle

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ABSTRACT

Such problems must be resolved as soon as possible because allowing such problems to occur will have a negative impact on our country's economy. This motivates to develop products that will benefit farmers in our country as well as encourage people to start farming at home. Orcycle is a product developed to address this issue. Orcycle was invented because there still no organic medium for hydroponics and aquaponic use. Orcycle is a new medium for seed germination that contains 90% recycle materials and known as compost product because it is contains its own nutrients that plant needed. This orcycle can meet the needs of people who wants a simple and lightweight plant medium and can carried everywhere. It can say as consumer-friendly product as it does not contain harmful chemicals. The production cost invested to make orcycle is very cheap because most of the ingredients used are recycle materials, so it does not have to spend a lot of money to produce it. The main objective that wants to achieve is to save money and save the environment from pollution. The materials used is dried leaves which have a high value in the manufacture of compost. Next is recycle paper can decomposed when it joined to the soil because originally it made from woods. Furthermore, cocopeat which is a good cultivation medium because of its pH value, electrical conductivity, and other chemicals properties suitable as cultivation medium. Moreover, starch water which serves as a glue to combine all ingredients. The aim is to raise public awareness of the importance of recycling reusable waste. For future expectation, this orcycle well known in the world and there are other choices other than rockwool and germination sponge for hydroponic and aquaponic cultivation.

Keywords: Orcycle; seed germination; recycle materials

INTRODUCTION

The innovation was created because of the problems that we discovered while conducting research and surveys in the nursery and on the internet. It is an environmentally unfriendly product on the market that cannot be composted. The current market product does not use natural ingredients and is not biodegradable. Rockwool has always been the preferred medium. As we all know, rockwool is a mineral fibre insulation made of basalt rock and recycled slag. When it been thrown, it ends up in a landfill and cannot be composted. This will result in increased garbage disposal in the country, which will have an impact on our environment and, worst of all, will increase the risk of global warming (Espiritu, 2019). As a result, it will indirectly promote 3R usage, i.e., reuse, reduce, recycle, to consumers. The next issue is a lack of available planting space in urban areas. Most of us do not have a large enough plot of land to cultivate our own food. It is a concern for residents who live in flats or apartments and do not have a lot of land to cultivate. As a result, it must devise a novel solution to this problem.

A product called Orcycle because of this problem. ‘Or’ stand for organic and ‘cycle’ stand for recycle. In this product, we reuse newspaper and dried leaves to create a planting medium, recycle it, and create a new product for beginning farmers. Orcycle is made of dried leaves that have been recycled to create a new medium for seed germination that is also user friendly. The process of creating Orcycle was relatively inexpensive because most of the materials required were recycled. This product is also known as a compost product because it is made entirely of organic materials that are high in plant nutrients and suitable for seed germination. The orcycle process begins with dried leaves being blended into pulp and mixed with all the ingredients before being shaped into a container and placed outside to dry (Alonso, 2021). Because of its ingredients and texture, Orcycle is best suited for seed germination.

INNOVATION DEVELOPMENT

Orcycle is made of recycled materials, including dried leaves from trees. This orcycle can meet the needs of people who want a simple and lightweight plant mix medium that they can carry with them wherever they go. This orcycle contains dried leaves, which have a high value in the production of compost. (Alonso, 2021) Following that is worn paper or newspaper, which can decompose when exposed to soil because paper was originally made of wood. Furthermore, coconut fibre is a good cultivation medium due to its pH value, electrical conductivity, and other chemical properties that make it suitable for cultivation. Furthermore, starch water acts as a glue to hold all the ingredients together so that they do not decompose easily.



Figure 1: On the black fabric, rockwool leaves a fine dust mark. The fine dust is extremely hazardous to one's health.

Why change the use of rockwool to orcycle? there are several reasons to be stressed about it. among them, rockwool is a medium based on mineral fibre which comes from basalt rock and recycled slag. this product leaves an impression like fine dust coming out of the rockwool itself. if this fine dust meets human beings, it will cause their health to be compromised. Furthermore, discarded rockwool cannot decompose. Because it is made of mineral fibre, it cannot be disposed of in the same way that plastic can. This will increase the amount of garbage that cannot be disposed of in the country even further.

The purpose of orcycle is to save the world from garbage piles and to protect humans from diseases caused by fine dust that can penetrate skin cells. Orcycle is made from organic materials such as dried leaves and recycled paper, which is a compostable material that can decompose if discarded. Because the materials can increase soil fertility, they can be used as compost for the soil. Because it is made of organic materials, consumers do not need to be concerned about their health because orcycle will not harm their health. As previously stated, orcycle is made of environmentally friendly materials, making it a user-friendly product. If want to compare prices, orcycle is likely to be less expensive than the rockwool that is currently on the market. The goal of this product is to save money and time while also being environmentally and consumer friendly.

The benefits of Orcycle are it save space for farming because Orcycle has a small size and light weight and it easy to move everywhere. It is very suitable for use in small areas such as the balcony of the house. This Orcycle can be used for hydroponic cultivation where it is a container with its bottom water reservoir. Next, Orcycle manufacturing does not incur much expense because most of the materials used come from recycled materials that can be composted after use. So, it is very cost effective as well as saving the environment from too much garbage in the world. (benefit) Furthermore, because of this product made from recycle materials, it can prevent from open burning from happening which can cause smoke pollution to happen and can deplete the ozone layer. As result, it can reduce disposal and recycle reusable items and can provide new benefits to human beings.

A fun fact about orcycle is, if users no longer want to use the product, they can dissolve it and simply dump it on the ground, where it will be broken down by soil organisms. It can be used as compost material on the soil indirectly demonstrate how environmentally friendly our product is here.



Figure 2: Orcycle original design

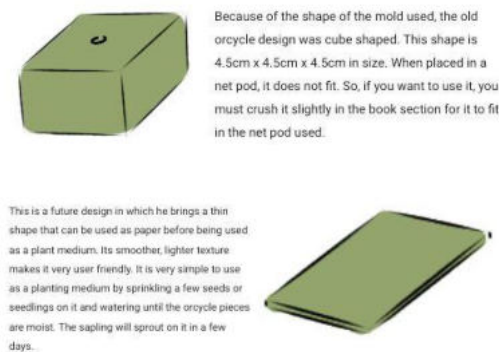


Figure 3: Differences between original and future design of orcycle

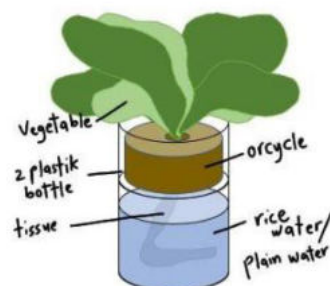


Figure 4: Illustration orcycle functioning

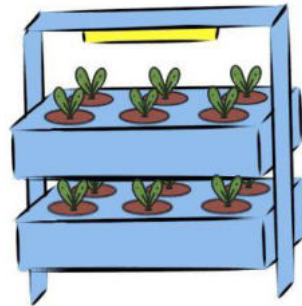


Figure 5: Orcycle in hydroponics style

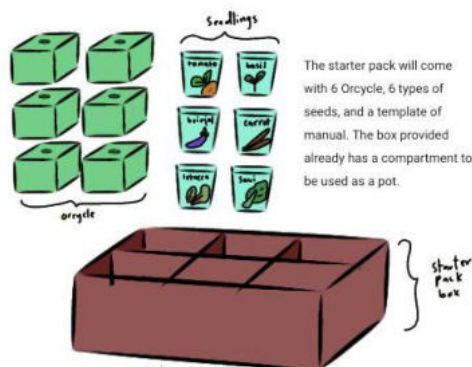
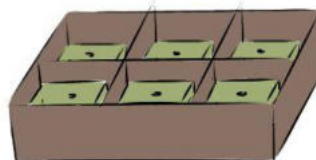


Figure 6: Starter pack of orcyle items



the picture above shows a picture of the box that will be received by the user when purchasing the starter pack. its uses are as shown above. inside the box have been provided several parts to make it easier for users to use it as a pot

Figure 7: Illustrations method used starter pack orcyle

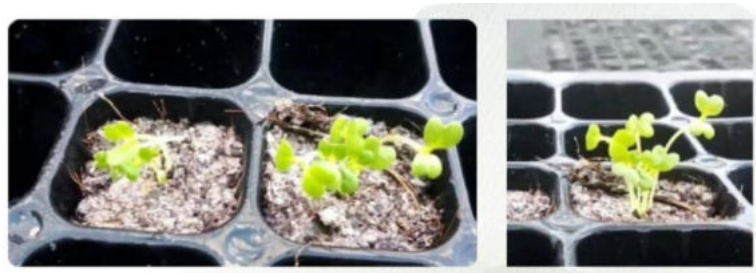


Figure 8: The results obtained 5 days after using the orcyle show the germination of Pak choy seedlings. This demonstrates its suitability as a plant medium.

COMMERCIAL POTENTIAL

Agricultural marketing strategies are utilized in all aspects of "agribusiness," including small farms, corporate farms, and collectives; distributors; makers of farm equipment, herbicides, and genetic improvements for crops and livestock; feed and seed suppliers; and others (Agricultural Marketing, 2020).

Firstly, introduce the product, Orcycle, to gardeners so that they can test the quality of Orcycle themselves. If it is suitable for the use of many people and they are satisfied it will propose this product to the agriculture manufacturer. This is where the beginning of Orcycle production can be made on a large scale. Before that, study the durability and strength of the product as well as plant medium products that are already on the market so that when the product is released it will attract people to buy. In Business the things need to know is the strengths and weaknesses of competitors.

Next, is the buyer's focus is on farmers as well as people who love gardening at home. The estimated age is between 25 to 45 years old because they are among the people who are diligent in gardening and interested in starting small-scale gardening activities at home. In addition, those who buy and eat farm food are the ultimate target for agricultural marketing strategies. People from various locations, as well as from various cultural and social backgrounds, prefer to buy different foods.

Furthermore, this Orcycle can be officially launched on the social media portal. This is because social media portals are very easy to send information all over the world and the speed of the information is very fast compared to us promoting through print newspapers or magazines. The world of social media can viralize a product in the blink of an eye. Among the platforms that can be used are Instagram, twitter, TikTok, Shopee and even Lazada.

In addition to introduce Orcycle to the world, maybe can open a small booth shop and introduce it to the world that this product can help in sowing trees on a small scale. This booth can show the use of Orcycle live in front of the public so that this product can trust the public about its success in the agricultural sector. This is because it is not easy for me who has just released a new product to gain people's trust about it, it is feared that many will not believe it if it is shown on social media only. So, one of the successful ways is to open a small booth to launch new products to the world.

Thus, efforts promoting "organic" food and "environmentally responsible" activities are more effective among the wealthy than among the poor. Local goods and, by extension, the local economy promotion campaigns are more effective among the middle class. Other advertisements capitalize on goods' applications in ethnic cuisine or as replacements for traditional ingredients, recognizing that food consumption varies greatly among ethnic groups.

Furthermore, about the sale price of Orcycle. because Orcycle is an item made from recycled materials so the price for a unit of Orcycle will not exceed RM1. It is also we want to promote to the public about the luxuries that we will get after recycling so that the community is aware of the importance of recycling reusable waste. We will create a gardener starter pack with 6 Orcycle, 6 types of seeds, and a template on how to use the product at the beginning of producing the product (Figure 7). We have set a price of RM 12 for this starter pack. For buyers who want to buy in bulk, we will sell one-unit Orcycle for RM 0.20.

Lastly, because orcycle packaging is made dry, users must soak it in water for 5 to 10 minutes before use, until the entire surface of orcycle is moist. The orcycle texture is currently rough, so in the future, we will upgrade to the maximum fineness level and, as a result, be able to reduce the product's weight even further. Future expectation for this product is to build an orcycle out of small dry pieces that expands when soaked in water and can be used to plant trees. As a result, before it is used as a planting medium, it can be a piece of paper for drawing or writing (Figure 3). So, it can be used in two ways here, and it can be used by every level of society.

CONCLUSION

To conclude, this Orcycle product is a place to sow seeds very effectively. Orcycle is an environmentally friendly product because it does not contain any chemicals that will affect human health or pollute the environment. The material contained in Orcycle is a natural material that can be disposed of after use, and it does not leave an odour on the vegetables grown. The Orcycle is made up of fertilizer so, users who use it do not have to worry about the fertility of the soil being planted. It can be said that Orcycle is very pleasant to the user as it saves time and even money to start farming. There are two suggestions on how to use Orcycle. The first way is to soak the Orcycle in water for 5 minutes until it feels moist then place it in a plant container and put 2 seeds in it but, this method should be alert where the Orcycle should always be in a moist state so that the seeds can germinate well. The second way is to use hydroponic techniques where the top of the plant and the bottom there is water as shown below. this way it is only necessary to make sure that the water under the Orcycle is neither too much nor too little.

ACKNOWLEDGEMENT

First and foremost, we would want to praise and thank the almighty God for providing us with the strength and, because of his blessing, we were able to complete this project. We wouldn't have gotten this far without his blessing. This task cannot be completed without the efforts and cooperation of our group members.

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DESIGN, ANALYSIS AND FABRICATION OF FULL-BODY SANITIZING MACHINE

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ABSTRACT

A full-Body Sanitizing machine is a machine that has equal length walls made with the welded metal frame as its entrance and exit are both wide enough. This is to permit a person to step into the machine and passes through while being sprayed with a sanitization or disinfection liquid from above by pumping liquid sanitiser through a reticulation pipe system and through a nozzle. Then a ventilation fan will blow air into the machine to introduce fresh air into the system. This will decrease suffocation in the machine as it pushes liquid particles into the floor. The objective of this product is to promote a high-level of hygiene into the public to reduce microbial infections. The machine is mostly suitable to be used in areas that require high-level sanitization such as hospitals, food manufacturing companies, factories and so on. The usefulness of the machine is not only limited to the current pandemic. There are a lot of ways the machine could be modified to suit different applications. In conclusion, hopefully through the use of my product we could yield positive results in order to prevent fomite transmission therefore finally break free from this chain of cases and eventually curb the COVID-19 spike.

Keywords: Sanitization; disinfection; COVID-19

INTRODUCTION

The flexibility in the transmission of the new SARS-COV-2 virus has posed numerous threats for us and it is critical to develop effective ways to ensure public health and safety [1]. Be that as it may the fabrication of the Full-Body Sanitization Machine wishes to further improve the sanitization process by including the whole body instead of just the hands [8]. Spraying droplets of diluted liquid sanitizer could prove to be helpful in preventing the spread of pathogens and encouraging a healthy lifestyle. The machine is also equipped with a fan to blow away the vapour sprayed by the nozzle. This is to ensure that fresh air is supplied into the system thus preventing suffocation to the user [4]. Moreover, the fan is also used to help dry out the user's clothes after the spraying process.

INNOVATION DEVELOPMENT

In order to conduct a full-body sanitization, first a space must be made where the sanitization spraying will be held. This can be done by using metal frames and surrounding the walls with a thin sheet of metal and covering both entrance and exit with thin plastic film.

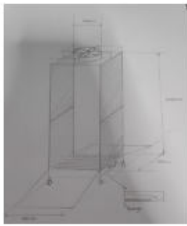


To spray sanitizing liquid, first a polymer tank will be used to hold the liquid then one end of the hose will be put there while the other end will go on an electric booster water pump to pump water into the nozzle. So as to not cause uneasiness to the user, the liquid will be

sprayed in the form of mist. This can be achieved by using a nozzle with a small hole diameter either 0.1 - 0.3 mm.

To solve problems regarding the improper disposal of liquid sanitizer the stepping platform for the machine is elevated and a container is set at the two sides to catch sanitizer droplets dropped from above.

Regarding the ventilation process, a fan will be installed at the top of the machine to blow air inside the space [7]. This will also drop the suspended mist sprayed by the nozzle and into the container. Proper ventilation also introduces fresh air in the space therefore reducing suffocation in the space.

Table 1: Pugh Chart of Design Concepts made

PUGH CHART				
Sketch				
Criteria	Weight	Design Concept 1	Design Concept 2	Design Concept 3
Environment	1	+	+	-
Ease of assembly	2	-	+	0
Low Cost	2	-	+	0
Durability	2	-	0	0
Safety	2	-	0	0
Easy to transport	1	+	-	-
Minimum Part	1	-	+	+
Manufacturability	1	0	+	+
+		2	7	2
0		1	2	6
-		7	1	2
Total net		-5	6	0

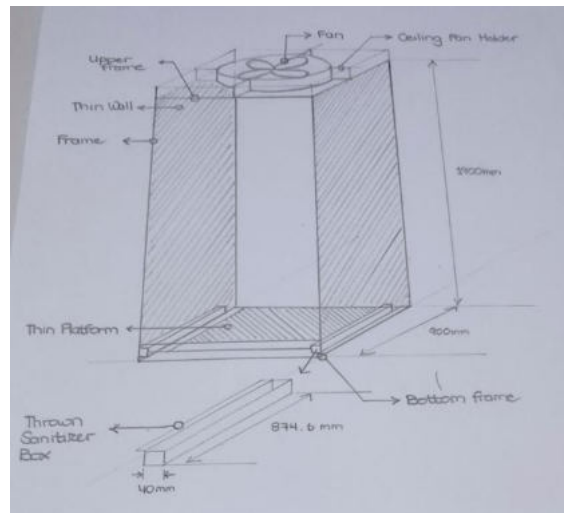


Figure 1: Concept design selected

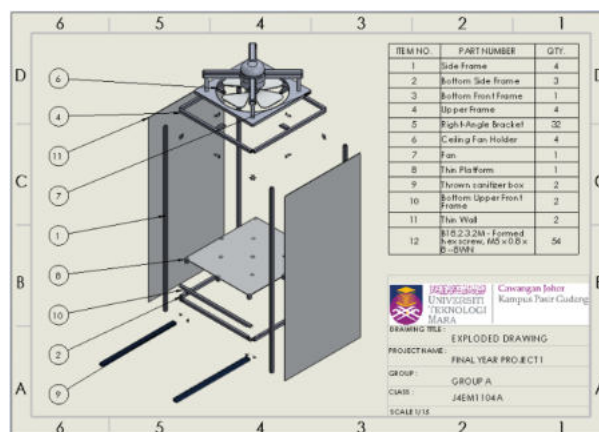


Figure 2: Finalized concept design in SolidWorks



Figure 3: Finalized fabricated product Full-Body Sanitization Machine

COMMERCIAL POTENTIAL

According to the World Health Organization [5], the frequent washing of hands can help reduce the rate of transmission of SARS-COV-2 [2]. The creation of Full-Body Sanitizing Machine wishes to further improve this process by including the whole body instead of just the hands. This machine is mostly suitable to be used in areas that require high-level sanitization such as Hospitals, Food manufacturing companies, Factories and so on. It is estimated that this product can be sold on the market for the price of RM 1135.00 with a profit margin of 15%. Other marketed full-body sanitizers are also sold on the market [9] for the price range of RM 3900.00 – RM 4199.00. The machine can also be integrated to suit different applications. For instance, the frame of the machine could be adjusted to provide suitcase sanitization in aviation industry. Other than that, it can also be used to regulate humidity in a room for agricultural purposes.

CONCLUSION

It is undeniable that COVID-19 has transformed the lives of humans everywhere. We have been forced to quickly adapt to this new normality due to this pandemic. We hope that through the use of this product we could yield positive results in order to prevent fomite transmission [3] therefore finally break free from this chain of cases and eventually curb the COVID-19 spike.

ACKNOWLEDGEMENT

The author would like to thank the College of Mechanical Engineering for their support to conduct this prototype.

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The Gum Diary: The Improvisation

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ABSTRACT

Periodontitis is one of common gum disease among Malaysian populations. Patient's awareness on their gum condition and adherence to continuous home plaque control regime is very important for successful gum treatment. Unfortunately, level of patient's motivation is not normally constant due to lack of understanding and lack of reminder on their gum condition. Thus, the Gum Diary has been developed and improvised to increase patient's understanding of their gum condition so that it will increase patient's adherence to self-plaque control especially on the interdental cleaning. The diary provides a medium for written communication between the dental practitioner and the patient. It has been improvised by including bigger space for the written update on patient's gum condition and detail instructions on interdental cleaning. Result of our surveys showed that 77% of the operators and 100% of the patients find that the diary is useful in delivering information and increased patient's adherence to plaque control regime. It also has commercialization potential as it was designed to be used by most dental practitioners, such as dental students, dentists, and periodontists for their patients. Thus, the usage of the Gum Diary will be a useful innovation to ensure successful gum treatment.

Keywords: Compliance; gum diary; maintenance; patient's adherence; gum treatment

INTRODUCTION

Periodontal therapy includes the maintenance and improvement of periodontal and peri-implant health, comfort, function as well as aesthetics. The clinical signs of a healthy periodontium feature the absence of inflammatory signs of disease such as redness, swelling, bleeding on probing and suppuration [1]. Therefore, comprehensive periodontal therapy should be implemented to every periodontal patient. Successful periodontal therapy heavily relied on patient adherence to oral hygiene care routine and maintenance visits [2]. The adherence to oral hygiene regime indicate more awareness in maintaining oral and periodontal health through effective plaque removal.

Currently, there is an abundance of studies that were investing in innovation to improve patients' adherence towards self-plaque control. A randomized control trial studied the effectiveness of different risk communication plans on periodontal disease patients in United Kingdom. They concluded that the periodontal status of participants, such as bleeding score and plaque score, improved in those with individualized risk communication plans [3].

Unfortunately, patient's continuous adherence to plaque control is sometime disappointing as not all periodontal patients could maintain excellent plaque control as suggested. Even, study showed that only 30-60% of the information given to patients during oral hygiene instructions (OHI) will not be remembered by them within an hour [4]. Thus, the

objective of this project is to produce an improvised diary which could help the periodontal patients adhere to the information given during OHI.

INNOVATION DEVELOPMENT

The Gum Diary (Figure 1) was developed to increase the adherence to self-plaque control among periodontal patients. The diary is small in size, which is $\frac{1}{4}$ of the A4 size (A6). This pocket-sized dimension will enable the patient to keep it in the bathroom during daily plaque control activities. The book is also protected with a plastic cover to ensure humidity resistance in the bathroom environment and for ease of regular sanitization.

The function of the Gum Diary is to remind the periodontal patient of daily interdental cleaning, by either using dental floss, interdental brush, or single tufted brush (referred to as apparatus). Other than that, the Gum Diary will also be the platform for two-party recording of periodontal care i.e the operator and the patient. The operator will record patient's periodontal condition whereas the patient will record their daily plaque control activities.



Figure 1: The Gum Dairy

The 'Operator Page' should be filled with information such as patient's recent plaque score (ie. the distribution of dental plaque in the mouth which also indicates area of improper cleaning), bleeding score (indicates level of gum inflammation) and active periodontal pockets which is set at three-monthly intervals (Figure 2a).

The operator also needs to record important information regarding changes in interdental brush sizes which the patient needs for any specific interdental areas. The column in the Gum Diary has been improvised by making the spaces for written instructions bigger for easy writing. Other than that, the area for instructions on the sizes of interdental brushes and area to be used has been divided to at least 3 separate boxes (Figure 2b). This is because, different sites of interdental area in the dentition may need different sizes of interdental brush depending on the sizes of interdental area (Figure 3).

Date:

Medical Updates:	
------------------	--

Risk Factors	Notes
BOP %	
PS %	
PPD \geq 5mm	

Oral Hygiene Instruction

Dental Floss Location:

Interdental Brush

Size/Colour 1:

Area:

|

Size/Colour 2:

Area:

|

Size/Colour 3:

Area:

|

Single Tufted Brush Location:

(a)
(b)

Figure 2: The ‘Operator Page’ for recording patient’s gum condition (a) and updated instructions on plaque control (b)



Other than that, the diary also designed for patient to indicate their completion of daily routines by ticking on the appropriate boxes (Figure 4) based on the recommendations given by the operator.

The Gum Diary

Date: Floss <input type="checkbox"/> IDB <input type="checkbox"/> STB <input type="checkbox"/>	Date: Floss <input type="checkbox"/> IDB <input type="checkbox"/> STB <input type="checkbox"/>	Date: Floss <input type="checkbox"/> IDB <input type="checkbox"/> STB <input type="checkbox"/>
Date: Floss <input type="checkbox"/> IDB <input type="checkbox"/> STB <input type="checkbox"/>	Date: Floss <input type="checkbox"/> IDB <input type="checkbox"/> STB <input type="checkbox"/>	Date: Floss <input type="checkbox"/> IDB <input type="checkbox"/> STB <input type="checkbox"/>
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Use interdental brush to clean the interdental space

Figure 4: The column for patient to record their daily interdental cleaning

The Gum Diary has been used by several Periodontology postgraduates and dental undergraduates in Faculty of Dentistry, Universiti Teknologi MARA as a pilot study and simple survey has been conducted. Results of the survey indicated that the patients feel the information and instructions provided by the operator in the Gum Diary is ‘useful’ (60%) and ‘very useful’ (40%) as shown in Figure 5. However, 33% of the operators ‘satisfied’ and another 44% were ‘very satisfied’ with the usage of the Gum Diary for their patients (Figure 6).



Figure 5: The survey among patients on the usefulness of The Gum Diary in monitoring their compliance to self-plaque control

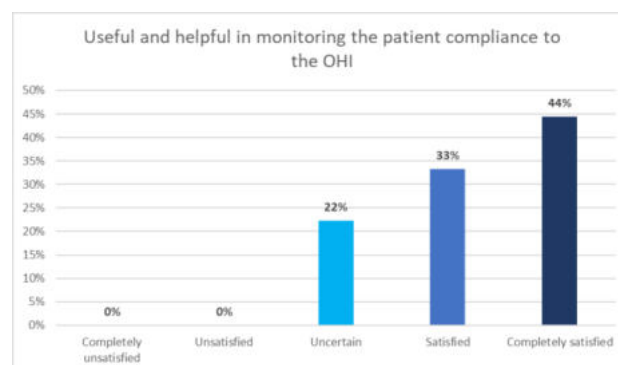


Figure 6: The survey among operators on the usefulness of The Gum Diary in monitoring patient’s compliance to self-plaque control

COMMERCIAL POTENTIAL

The Gum Diary will be beneficial for most dental practitioners as currently, a designated tool for written information on the patient’s gum condition which patient can refer to is lacking. It could be used for all patients with gum problem and marketable to all dental clinics that treats periodontal patients. As number of patients with gum disease is quite high in Malaysian population, this Gum Diary would be easily marketable. The selling price for the Gum Diary will be less than RM8 per unit.

CONCLUSION

The Gum Diary will be a useful innovation to ensure the success of periodontal therapy by simplifying communication between the operator and the periodontal patients.

ACKNOWLEDGEMENT

We would like to extend our deepest gratitude to Dr. Nurul Qamar Salehuddin as this project would have not been possible without her contribution during the initial stage of developing this gum diary. We would also like to thank all the patients for their participations in the surveys.

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Halal Slaughtering 3D Printed Model

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ABSTRACT

Halal meat industry is one of the biggest market sectors in Malaysia. Halal meat is also considered as the butter and bread for local food supply chain since Muslim consumers relies heavily for daily consumption. Recent COVID-19 pandemic and flash floods has changed many aspects of food industry. Worker's health and safety as well as the continuous supply chain of raw materials are paramount and become the top priority of concern. These circumstances create food supply chain disruption can further trigger alarming state. Recently, meat product both ruminant and poultry supply has been affected. Despite all of these challenges halal aspect, in terms of halal integrity and the need for competency is also vital in order to thrive during and after the pandemic and endemic phase. To enhance the competency during COVID-19 era, this study presents alternative solution in halal slaughtering practical or training especially when the live animal supply is limited and during online learning condition. The innovation that presented in this paper is 3D printed model of animal both ruminant and poultry for halal slaughtering practical. Combined with further simulator platform, this product can be packaged as 'kit' and can be used by prospective students during Open Distant Learning (ODL) or Blended Learning (BL).

Keywords: 3D printed technology; halal slaughtering; halal practical; online learning; simulation

INTRODUCTION

Malaysia is one of the leading nations that upholds halal concept into standards and certification scheme that applies in industry application. To date, the total number of 26 standards have been developed pertaining to halal in Malaysia [1]. This shows that Malaysia is giving full commitment in spearheading halal industry both systematically and economically. Malaysia's Halal Certification Scheme has now offered for 9 schemes in total that includes food products, food premise, slaughterhouse, pharmaceuticals, consumer goods, cosmetics and personal care products, logistics, original equipment manufacturer (OEM) and medical device [2]. OEM and medical device are the latest scheme that introduced by Jabatan Kemajuan Islam Malaysia (JAKIM), under the new manual procedure, Manual Prosedur Pensijilan Halal Malaysia (MPPHM 2020) as well as the Malaysian Halal Management System (MHMS 2020) shows that the expansion of halal application in wider scope of industry. Many industry players have now realized the potential of halal products and invested to tap the Muslim consumers' market as it is the biggest market sector within Malaysia.

In other aspect, halal education and academics is also now booming. With the new requirement set by JAKIM, halal executive to be appointed for each organisation that are applying for halal certificate, the knowledge development and human resource for the position has now become even more significant. According to Malaysian Halal Management System

(MHMS 2020), Halal Executive must be trained under halal executive training course under any training provider that recognized by Halal Professional Board (HPB). Furthermore, a Halal Executive is required to have educational background of at least Diploma level in Halal Management or equivalent and this shows that halal talent and professionalism is now needed. To cater this, many training provider offers various courses including halal executive program, internal halal auditing, Halal Assurance Management System (HAS), and others. Public and private institutions also offering academic programme at all level, from undergraduate study to postgraduate study in halal discipline [3]. Therefore, competency in halal is currently an important skill.

The competency in halal is now is more competitive. Thus, continuous supply of halal workforce is vital to the industry. It is however, can be hindered due to circumstances like pandemic. The knowledge transfer is obstructed due to imposition of new normal procedure such as Movement Control Order (MCO) and social distancing where face-to-face interaction is no longer a viable option. Therefore, an alternative solution for this matter has to be considered. Halal animal slaughtering, in particular, is one of the core subjects in halal discipline and commonly involving practical aspect. However, it is challenging to be carried out during COVID-19 pandemic. COVID-19 pandemic and other unprecedented condition such as 2022 flash flood in Malaysia has caused supply chain disruption especially commodities such as meat and meat-based products [4]. This can lead to severe food inadequacy or food security issues. Food security is more prioritized in times of emergency as it is directly affecting the stability of a country [5]. Therefore, maintaining a good supply of commodities particularly meat is paramount.

Due to the condition of COVID-19, uncertainties remain a big concern. Nevertheless, the knowledge transfer in halal is still important and needs to be continuously implemented. One of the core subjects, halal animal slaughtering can be challenging in terms of teaching and learning experience. Halal slaughtering or zabihah (ذبيحة) is part of the requirements in Islamic dietary law for consume halal animal such as poultry and ruminants [6]. Therefore, this study intends to provide alternative solution for the learning experience in particular for halal slaughtering practical. Disruptive technology such as 3D printing technology can be utilized to assist the learning experience that halted due to condition like COVID-19 where teaching and learning mostly carried out through online or Open Distant Learning (ODL). In fact, 3D technology and halal food are now an emerging development. Since halal slaughtering requires live animal, and with the condition of COVID-19, the supply is limited, substitution can be made by using 3D model printing that emulates the real live animal for the slaughtering training purpose. In this paper, it is proposed to develop a product named: 'Halal Slaughtering 3D Printed Model'. The objectives of this study are to create a 3D model for halal slaughtering practical and secondly, to design a 3D model based on the actual halal animal anatomy related to halal slaughtering. This study however needs further research in order to enhance the quality of the 3D printed material is close as possible with the real experience for the halal slaughtering practical.

INNOVATION DEVELOPMENT

Generally, halal slaughtering course involved at least two types of animals which are poultry and ruminant. For this study, it is focused on the development of ruminant 3D model printed material. The ruminant 3D model is developed and constructed only the head area with some extension on the lower part of the neck as these parts are the most important aspect in halal slaughtering. The construction of this headpiece will also involve multiple layers that emulates the bone/skull layer, the major veins and the outer layer i.e., the outer skin. Based on

the actual anatomy, the design of headpiece is including the major veins for halal slaughtering: Halqum (trachea), mari' (oesophagus), and both the carotid arteries, jugular veins (wadajayn)[7]. Therefore, student or user can learn to identify the main veins for halal slaughtering requirements. The production utilizes cutting-edge 3D printing technology to precisely construct identical to the real anatomy of ruminant. The material used can be resin type material, that is environment-friendly material, biodegradable and non-toxic.

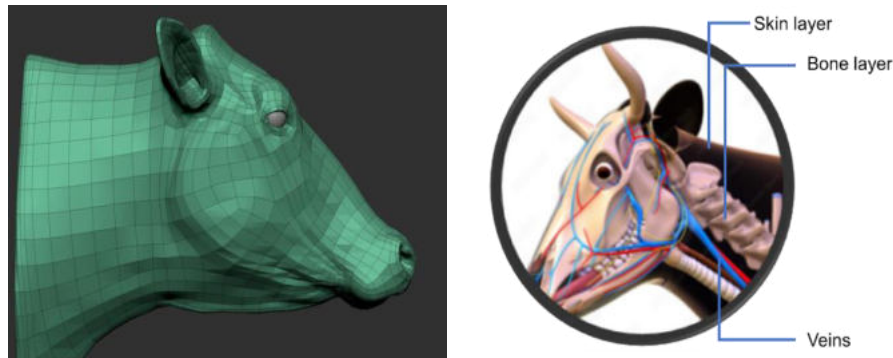


Figure 1: Product prototype of Halal Slaughtering 3D model for ruminant. (Image source: Google.com)

COMMERCIAL POTENTIAL

This model allows the user to experience the 21st Century Learning approach with personalized 3D model for their own hands-on. Furthermore, the value added for this product is that it does not waste live animal if the slaughtering is not correct as part of learning process. This product has the potential market for both Malaysia and global users. Target market can be both local and Halal Certification Body (HCB) as part of training module. Currently, there are 84 foreign halal certification bodies that are recognized by JAKIM [8]. Furthermore, it has significant potential be marketed to public consumer and all levels of society. It is also suitable any education institution especially that offers halal slaughtering course.

CONCLUSION

Halal Slaughtering 3D model is found to be the alternative solution for learning experience pertaining to halal slaughtering. More research is necessitated to be carried out in order to improve and enhance the quality of the model that includes physical look including texture as much as identical to the live animal. Therefore, this product also can be further enhanced and expanding the innovation in halal discipline.

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Tocilizumab, A Choice of Treatment for Cytokine Storm in COVID-19 Patients: A Systematic Review

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ABSTRACT

Tocilizumab (TCZ) is a competitive interleukin-6 inhibitor agent that has been proposed to combat the COVID-19-related cytokine storm. There are many studies have been conducted on the benefit of TCZ individually. Therefore, we conducted a systematic review to study the treatment of cytokine storm by TCZ in COVID-19. After conducting the search strategy using specific search strategy, we identified five articles that were included in the analysis. These studies reported the involvement of 649 patients (48% received TCZ) among moderate to severe COVID-19 patients. Findings show that there were variabilities in the TCZ dosage given with some combination with other medication. TCZ lower hospital mortality and improves respiratory function and inflammation and immune cell function, reducing the incidence of respiratory syndrome and less-invasive mechanical ventilation usage. The level of inflammatory markers such as C-reactive protein, ferritin and lactate dehydrogenase were significantly higher in the TCZ group. We created the step-by-step on how to conduct a systematic review. It can be a template for the researcher on how to conduct and write a manuscript on systematic review. We concluded that TCZ given at the doses of 400 – 800mg may increase survival and improve the favourable clinical course in cytokine storm induced by COVID-19. Therefore, with this review, a guideline for managing severe COVID-19 cases can be developed for usage in medical institutions.

Keywords: Tocilizumab; Cytokine storm; IL-6; systematic review; COVID-19

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a contagious illness caused by a novel coronavirus which is now known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. The virus spreads primarily by droplets of saliva or discharge from the nose when an infected person coughs or sneezes. The symptoms exhibited varies among COVID-19 patients with the most common symptoms being fever, dry cough, and tiredness. Additionally, some patients may show less typical symptoms such as aches, sore throat, diarrhoea, conjunctivitis, headache, loss of taste or smell, and rashes on the skin [2].

In the wake of COVID-19, the term ‘cytokine storm’ becomes more familiar than ever before and a common term among members of the scientific community, but now the general public is also aware of it [3]. It is defined as a severe immune reaction in which the body releases too many cytokines into the blood too quickly. Cytokines play an important role in normal immune responses, but they can be harmful when it released in a large amount simultaneously in the body [4]. A cytokine storm can occur as a result of an infection, autoimmune condition, or other diseases. It may also occur after treatment with some types of immunotherapies. In the development of the cytokine storm, there are many main components involved such as Interferons, interleukins, chemokines, Colony-stimulating factors and TNF-alpha [5].

Based on several studies, tocilizumab (TCZ), a humanized monoclonal antibody needed invasive mechanical ventilation and ICU intervention. It has been suggested as a favourable agent for moderate to severe COVID-19 cases. It was designed to inhibit the JAK-STAT or MAPK/NF- κ B-IL-6 signalling pathway and finally stops the cytokine storms syndrome [6]. Therefore, it can reduce the mortality rate and length of hospital stay.

Since there were many studies conducted individually on the impact of TCZ for Cytokine Storm in COVID-19 patients, this review was conducted to determine the impact of the use of TCZ on inflammatory marker level, ICU stay duration, mechanical ventilation requirement and mortality rate among patients with COVID-19 related cytokine storm.

INNOVATION DEVELOPMENT

A systematic review is another study design that can be conducted concurrently while students write the literature review of their theses. Many journals have published systematic review papers and students can take this opportunity to publish their work on the literature review even though they still did not collect their data yet. However, writing a manuscript is not easy. Many steps need to be followed. Therefore, this manuscript will show them step-by-step how to conduct a systematic review and at the same time, it shows the result of the study that has been conducted.

COMMERCIAL POTENTIAL

There are many steps on how to conduct a systematic review. The detailed methodology for conducting the systematic review is shown in Figure 1 below. It can guide the student on how to conduct and write a manuscript on systematic review.

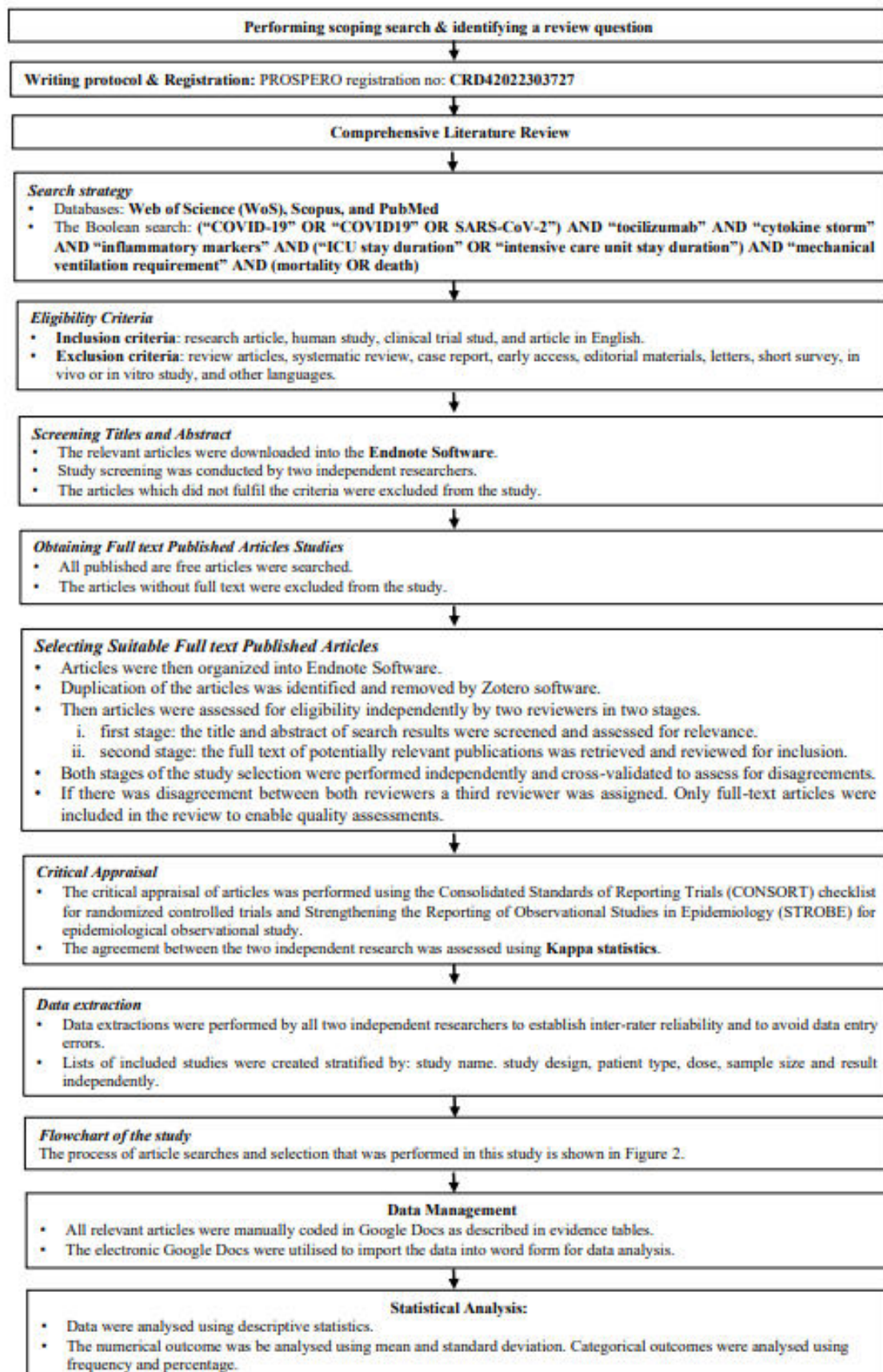


Figure 1: Step-by-step on conducting a systematic review

RESULTS

A total of 237 records was identified through searches in three databases (Web of Science (WoS), Scopus, and PubMed). After excluding the duplicates, titles and abstracts were screened, 150 articles were selected for the eligibility of the study. However, 140 articles were removed due to various reasons as such: review article ($n = 75$), systematic review articles ($n = 15$), short survey ($n = 21$), editorial materials ($n = 27$), and In vivo / in vitro studies ($n = 17$). 5 articles were selected for the quality assessment and all articles were included in the study. An overview of these selected studies in research characteristics created in the PRISMA chart is shown in Figure 2.

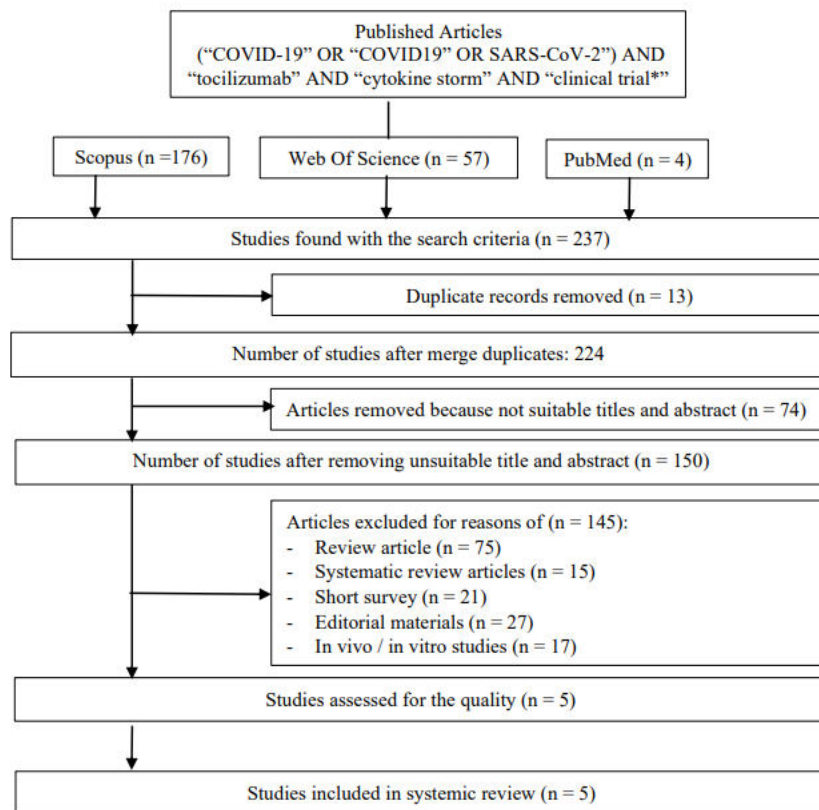


Figure 2: Flowchart of the systematic review

A total of five articles were reviewed and summarised in this study, as shown in Table 1. The studies were conducted in Italy [10], China [11,12], the Netherlands [13], and the United States of America (USA) [14]. All of the studies involved patients infected with COVID-19 ranging from severe COVID-19 patients [14], moderate to the severe stage (cytokine storm syndrome) associated with either pneumonia [10], moderate (bilateral pulmonary lesions) or severe COVID-19 [12], Severe COVID-19 patients with extensive lung lesions [11] and Severe COVID-19 associated cytokine storm syndrome [13].

DISCUSSION

In this systematic review, we summarised and analysed the effect of TCZ as a treatment for COVID-19 patients related to cytokine storms. The activation of various cytokines is reflected by clinical manifestations in COVID-19 infection. Pyrexia, malaise and chills may convey an increase in the interferon levels while acute symptoms such as vascular damage and lung contusions along with general symptoms may indicate high TNF levels [7].

TCZ is a key cytokine leading to an inflammatory storm act by inhibiting the IL-6 receptor which may result in increased alveolar-capillary blood glass exchange dysfunction [8]. There are about more than 30 drugs have been introduced to treat COVID-19 including Tocilizumab (TCZ) and many research investigate further the efficacy of TCZ for different patients and dosages [9]. The US Food and Drug Administration (FDA) recommended dosage of TCZ is a single 60-minute intravenous infusion for patients less than 30kg weight is 12mg/kg and to patients at or above 30kg weight is 8mg/kg with maximum dosage is 800mg per infusion for COVID-19 patients [10].

Mortality in COVID-19 patients has been linked to the presence of the so-called “cytokine storm” induced by the virus [11]. The majority of the studies reviewed found that TCZ can reduce death, lower hospital mortality or in-hospital death [12-14] except a study by Tsai A, Diawara O [15] did not found any significant difference in death. The mortality is due to an excessive production of pro-inflammatory cytokines which leads to ARDS aggravation and widespread tissue damage [11, 16]. In addition to that, fatal pneumonia can also be a result of mortality in COVID-19 patients after the SARS-CoV-2 completes replication in the lower respiratory tract [16].

Untreated cytokine storms can progress from respiratory failure to cardiovascular collapse, multiorgan dysfunction, and death [17]. In this review, the survival rate was greater in the treated group with a 92% recovery rate and discharged after 12.5 days [12]. However, Wang D, Fu B [18] did not find any significant cure rate although the percentage in the TCZ group was higher than the non-TCZ group and there was a significant difference in hospital stays where TCZ groups had longer stays compared to the non-TCZ group (40 days versus 26.5 days, $p=0.001$) [13].

Invasive mechanical ventilation is a lifesaving tool commonly used in the care of hospitalized patients [19]. Adults with COVID-19 who develop acute respiratory distress syndrome (ARDS) are managed by intubation and invasive mechanical ventilation as a conventional oxygen therapy may be insufficient to fulfil their oxygen needs [20]. Several studies have shown that inhibition of IL-6 with TCZ may help improve the respiratory status and survival of patients with COVID-19 requiring mechanical ventilation [21]. However, Tsai A, Diawara O [15] found no significant difference in ventilator use in treated and without treated TCZ group and [14] found no difference in the duration of using mechanical ventilation once the patients were mechanically ventilated. Although advanced aged COVID-19 patients are presented with greater pneumonia severity scores, need for oxygen therapy, lymphopenia and need of mechanical ventilation it was not associated with age [22]

Prolong ICU admission led COVID-19 patients to worse outcomes. Studies from early in the pandemic have found statistically one in five infected individuals are hospitalised and one in ten may get admitted to an ICU, with most of these critically ill patients experiencing ARDS and requiring mechanical ventilation [23]. However, [13] did not find any significant difference

in the ICU stay between TCZ and control group but TCZ groups had longer stays compared to the non-TCZ group.

Hypoxia and respiratory failure were considered as important causes of exacerbation and even death of COVID-19 [24]. The “Cytokine storm” leads to immune dysregulation and tissue damage in the lungs that cause hypoxia and respiratory failure [25]. With the treatment by TCZ, it was found an improvement in the hypoxia in day-4 to day-12 in severe and moderate COVID-19 patients and it revealed that an increased IL-6 played an important role in the “cytokine storm” [18]. Although Wang D, Fu B [18] found TCZ group had more adverse effects including leukopenia, neutropenia and abnormal hepatic function, all of these side effects remitted spontaneously and no serious adverse events occurred.

It can be suggested that CRP can be the biomarker for assessing disease progression and mortality in COVID-19 patients [26]. Besides CRP, ferritin is another biomarker for inflammation in COVID-19 patients. Ferritin has been characterized as an acute phase reactant and mediator of immune dysregulation in severe COVID-19 [27]. The remarkable increase of serum ferritin level routinely indicates liver damage. However, a study by Tsai A, Diawara O [15] found the level of ferritin raise than the normal level in COVID-19 patients which specifies more risk of liver injury and severe illness. Therefore, analysis of ferritin at an early stage can recognise liver damage, disastrous disease, and prognosis of COVID-19 patients [28]. Cytokine can induce ferritin expression and ferritin can induce expression of pro-inflammatory cytokine as well.

There are several limitations in conducting this systematic review. The summary provided is only reliable depending on the methods used to estimate the effect in each of the primary studies. The systematic review also relied on the relatively limited number of databases for the identification of potentially eligible studies therefore there may not be enough research in the literature to analyse. The systematic review can quickly become outdated because COVID-19 is a newly emerged disease in which many ongoing types of research are conducted.

CONCLUSION

It can be concluded that TCZ given at the doses of 400 – 800mg may reduce mortality rate, mechanical ventilation requirement, ICU stay duration, and IL-6 level if it is administered before entering the moderate to a severe inflammatory state of cytokine storm induced by COVID-19.

ACKNOWLEDGEMENT

We would like to express our appreciation to Dr. Muhammad Huzaimi bin Haron and Dr. Mohamad Rodi bin Isa, our supervisor in guiding all along with the production of this research. Thank you to the Faculty of Medicine, UiTM for giving us this opportunity to be involved in this project which will benefit us in the future.

Table 1: Summary of study

Study Name	Study Design	Patient Type	Dose	Sample Size	Result
Tsai A, Diawara O [15]	Single-centre matched cohort study	Severe COVID-19 patients	All patients received hydroxychloroquine and azithromycin in both groups + for TCZ group: 10 (15.1%) received TCZ 800 mg 3 (4.5%) received TCZ 600 mg 53 (80.3%) received TCZ 400 mg. 4 patients received a second dose of tocilizumab.	Total 132 patients: 66 TCZ treated (50%) 66 no-TCZ treated (50%)	Inflammatory markers: Ferritin – TCZ: 1432.30 (1307.96); 848.35 (684.84), $p < 0.001$ CRP – TCZ: 13.01 (7.79); no-TCZ: 9.95 (5.71), $p = 0.002$ LDH – TCZ: 42905 (154.50); no-TCZ: 331.19 (128.75), $p < 0.001$ Ventilator use – TCZ: 16 (24.2%); no-TCZ: 12 (18.2%), $p = 0.450$ Intubation - TCZ (9 patients) Mortality – TCZ: 18 deaths (27.3%); no-TCZ: 18 deaths (27.3%) (OR: 1.0; 95% CI: 0.465–2.151; $p = 1.00$).
Capra, De Rossi [12]	Multicentre, retrospective case-control study	COVID-19 related pneumonia and respiratory failure, not needing mechanical	Standard care: hydroxychloroquine (400 mg daily) + lopinavir (800 mg daily) ritonavir (200 mg daily) Treated group: Standard care +	Total of 85 patients: 62 treated (73%) with TCZ 23 controls	Survival rate - greater in patients received TCZ, with (hazard ratio for death, 0.035; 95% confidence interval [CI], 0.004 to 0.347; $p = 0.004$) Death - 2 (3.22%) - treated group; 11 (47.8%) - control group Recovery rate - 92% - treated group (discharged after 12,5 days); 42.1% - control group.

		ventilation patients	TCZ (did not mention dose)		Improvement in respiratory function - 64.8% in hospitalized TCZ group while none from the control group Conclusion: TCZ results have a positive impact if used early during COVID-19 pneumonia with the severe respiratory syndrome in terms of increased survival and favourable clinical course.
Wang D, Fu B [18]	Multicentre, A randomized, controlled trial, open-label study	Moderate (bilateral pulmonary lesions) or severe COVID-19	2 doses given: 1st dose: TCZ 400 mg, diluted in 100 ml of 0.9% saline 2nd dose is given if the patients still febrile for 24 hours	Total of 65 patients: 33 treated (51%) with TCZ 32 controls.	Cure rate - TCZ (94.12%); control (87.10%) (p=0.4133, 95%CI: -7.19%, 21.23%) Hypoxia - severe patients: TCZ - higher from day 4 onward and statistically significant from day 12 (P = 0.0359). Moderate diseases: TCZ (8.33%); control 66.67%) (p=0.0217; 95%CI: -99.17%, -17.50) Mild temporary adverse effect - TCZ (58.82%); control (12.90%). Conclusion: TCZ improves hypoxia without an unacceptable side effect profile and significant influences on the time virus load become negative. For patients with bilateral pulmonary lesions and elevated IL-6 levels, tocilizumab could be recommended to improve outcome
Tian J, Zhang M [13]	Multicentre, retrospective cohort study	Severe COVID-19 patients with extensive lung lesions	IV 400 mg up to a maximum of 800 mg. Dilution was to 100 ml with 0.9% normal saline, and the infusion time was more than 1 h.	Total of 195 patients: 65 treated (33%) with TCZ 130 did not receive	In-hospital death - TCZ group (21.54%); non-tocilizumab group (32.31%) (p = 0.012); hazard ratio = 0.47; 95% CI: 0.25, 0.90; p = 0.023) ICU stay - TCZ (10 days); non-TCZ (12.00 days) (p=0.27) Hospital stays - TCZ (40 days); non-TCZ (26.5 days) (p = 0.001)

			If fever continues within 12 hours an additional dose is given		<p>Incidence Respiratory distress syndrome - TCZ (36.92); non-TCZ (70.77%) ($p < 0.001$); Adj OR: 0.23 (95%CI: 0.11, 0.45; $p < 0.001$) (odds ratio = 0.23; 95% CI: 0.11, 0.45; $p < 0.001$)</p> <p>Inflammatory markers:</p> <p>IL-10 - TCZ (5.00pg/ml); non-TCZ (7.35 pg/ml) ($p = 0.013$)</p> <p>C-reactive protein – TCZ (1.52mg/l); non-TCZ (22.55 mg/l) ($p < 0.001$)</p> <p>Conclusion:</p> <p>TCZ improves clinical symptoms and represses the deterioration of patients (prolonging survival) with severe COVID-19.</p> <p>TCZ was associated with a lower risk of the in-hospital proportion of death.</p> <p>TCZ improves inflammation and immune cell function</p>
Ramiro S, Mostard RLM [14]	Single-centre, Retrospective case-control study	Severe COVID-19 associated cytokine storm syndrome	<p>IV 250mg high methylprednisolone (MP) (D1) + 80mg (D2–D5).</p> <p>If the respiratory condition had not improved, the interleukin-6 receptor blocker TCZ (8mg/kg body weight, single infusion) was added.</p>	<p>Total of 172 patients:</p> <p>86 treated (50%)</p> <p>86 control (50%)</p>	<p>Improvement respiratory status - 79% higher likelihood (HR: 1.79; 95%CI: 1.20, 2.67), 7 days earlier.</p> <p>Hospital mortality - 65% lower (HR: 0.35; 95% CI: 0.19, 0.65)</p> <p>Ventilation:</p> <p>71% less invasive mechanical ventilation (HR: 0.29; 95% CI 0.14 to 0.65).</p> <p>Among patients not mechanically ventilated at baseline, the daily incidence of mechanical ventilation (new start) was 1.3% vs 5.4% ($p=0.0003$).</p> <p>Once mechanically ventilated, the duration of mechanical ventilation was not significantly different.</p>

					<p>Conclusion: strategy involving a course of high-dose MP, followed by TCZ in case of insufficient improvement, may accelerate respiratory recovery, lower hospital mortality and reduce the likelihood of invasive mechanical ventilation</p>
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NiShop Web System for NIS TD.Co

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ABSTRACT

The NiShop online system was intended to help the NIS TD Co. The first issue was that the numerous platforms used to market and connect with customers jumbled the order information and client details. The second issue was that consumers regularly delayed payments for over 24 hours, necessitating admin to hold purchases until payment was received. Third, client payment receipts were not appropriately recorded and sometimes duplicated. Based on the observed issues, it recommends creating a NiShop online system to assist admin handle client orders in the future. Customers may also track their transactions online by receiving e-mail notifications. This project's technique followed the Waterfall Model. The Waterfall model included three stages, 1) gathering requirements, 2) system design and 3) system implementation. This project is a working prototype of the NiShop online system, a web-based online shopping solution that may effectively replace an existing business procedure.

Keywords: Web-based system; transactions online; online shopping system

INTRODUCTION

Online shopping is part of E-Commerce and is the act of purchasing goods or services digitally, over the Internet [1]. It entails visiting a seller's website, choosing something, ordering delivery, and making payments online with a credit or debit card or at delivery. [2] stated that online shopping is a part of e-commerce that is buying and selling the products or services over an electronic network, or we can call it the Internet.

A program that can be accessed over a network connection using HTTP is named 'Web-based Application'. Based on the research, web-based applications are being used through web browsers. It might differ in terms of displaying web pages because it depends on the web browser itself. It needs to be customised to fit with different web languages such as HTML, PHP and XML so that the browsers can interact quickly and smoothly.

Using web-based applications can be more attractive, especially when applying the visual aesthetic because, based on the definition stated in the research, visual aesthetics is an element of visual design and quality that gives a sense of charm to the system. Shopping websites are more attractive and functional to attract and provide more opportunities for customers. Based on [3], the service quality in the website was indicated by the website interface usability itself and the indicating effect is controlled by shoppers' requirements or basic needs.

The development in mobile technology is changing the dynamics of customer and company relationships. Mobile applications have entered the world of business, especially as a marketing tool [4]. To develop mobile applications, the limitations and features of mobile

devices need to be thought about [5]. Based on [6], the field of mobile shopping is booming and has sparked high interest in academics and industry.

NiShop, an online shopping web-based system, is developed to assist the stakeholder NIS TD Co with effective order management, such as generating or arranging the list of orders based on date and time. NIS TD Co., a shopping organisation located in Seremban, Negeri Sembilan, was founded by Puan Nazrah Salleh under Hazel TShirt Dakwah, but now her daughter has handled it. The main products sold in this organisation are Muslimah T-shirts and Muslimah hoodies under Hazel Tshirt Dakwah. There are some products from other organisations, such as sweatshirts, branded shirts, hoodies, and bags.

Various social media platforms are used to promote the shop and products, such as Instagram, Facebook, and Whatsapp applications. These platforms are also used to connect with customers who wish to buy or enquire about a product.

The problem statements in this project are, due to numerous social media platforms employed, the customer's order data such as name, address, tracking number, and notably, product specifics such as size, pattern, colour, and quantity were mixed up. To establish which client's order information corresponds to which customer, they must explore many platforms for customers one by one.

Second, when the customer delays payment, which wastes the stakeholder's time because she needs to locate and identify each customer across multiple platforms to remind them whether they still want to proceed with the order or not, which is made even more frustrating if the customer suddenly intends to cancel the order after the stakeholder checked the available stock of the order with the headquarters (HQ).

The third reason is that payment receipts are not correctly recorded due to the multiple platforms utilised in the business process. As a result of this issue, the stakeholder will be unsure if receipts have been recorded or not. The likelihood of a receipt being duplicated or recorded twice is fairly high.

Finally, the stakeholder must communicate the status of the orders to customers. Still, with several platforms being used and numerous customers placing orders, she may accidentally update the order to the wrong client. Additionally, the stakeholder forgot whether or not she had informed the customer of the order's status.

Hence, based on the stakeholder's problems, NiShop, a shopping web system, is developed based on the gathered and analysed requirements for the NIS TD Co.

INNOVATION DEVELOPMENT

The Waterfall Model is used in this NiShop, a shopping web-based system and has gone through into 3 phases of Waterfall Model: requirement analysis, design and implementation. The Waterfall model is one of the oldest models in the System Development Life Cycle (SDLC) and the most popular among other models [7]. For the basis of software development purposes, it is important to use a waterfall model. The waterfall model can help the developers, especially students, understand the required steps to develop software or projects [8]. It can also guide the developers to choose the better procedure before designing the system.

Occasionally, the stakeholder must read through the order data because there are so many unknown phone numbers from various social media platforms. Therefore, this system helps the customers place the order as well, as both admin and customer can view the order details and know the order's progress in one platform. Figures 1-4 show the platform's pages related to ordering the goods.

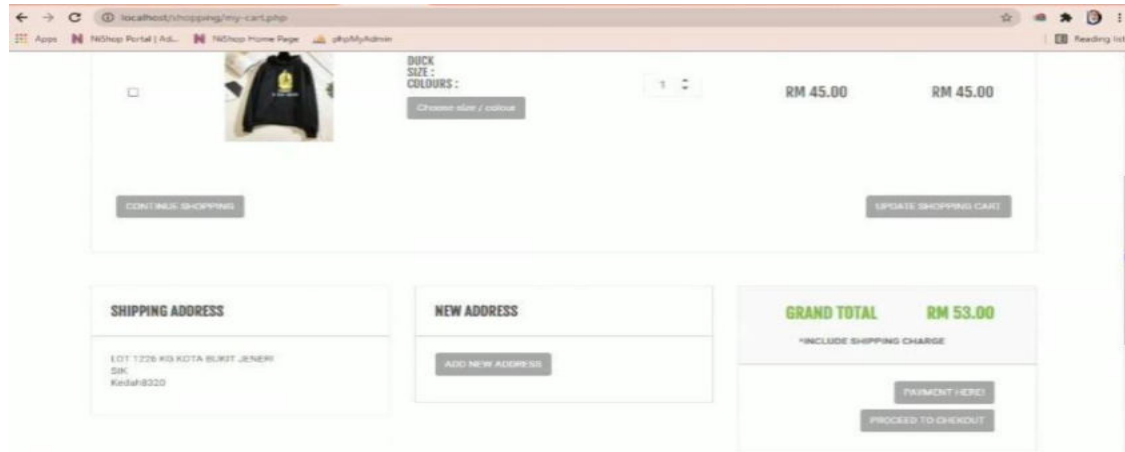


Figure 1: Create Order

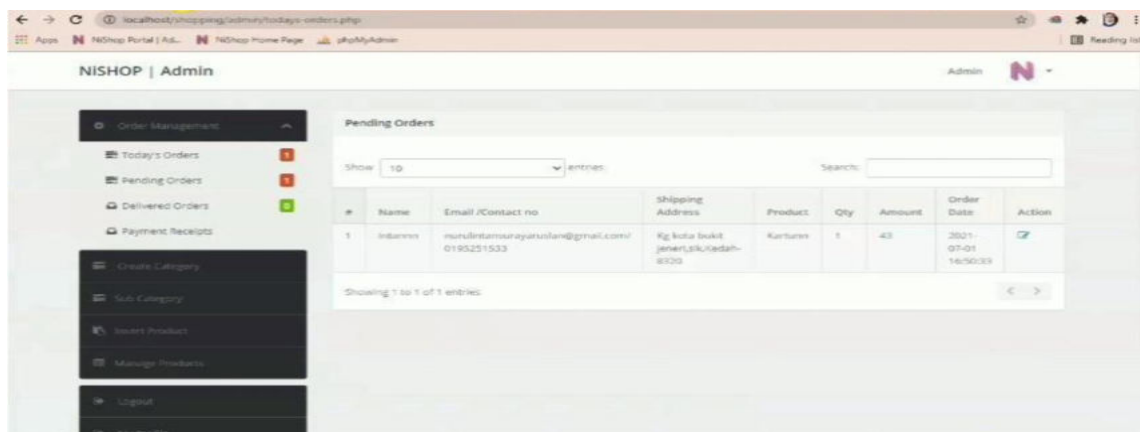


Figure 2: View Order page by Admin

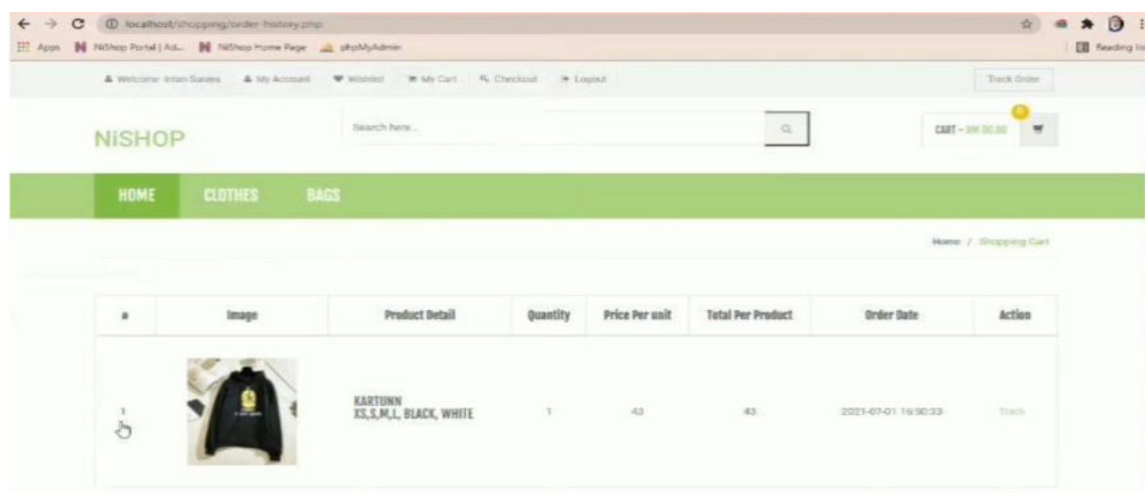


Figure 3: View Order History page by Customer

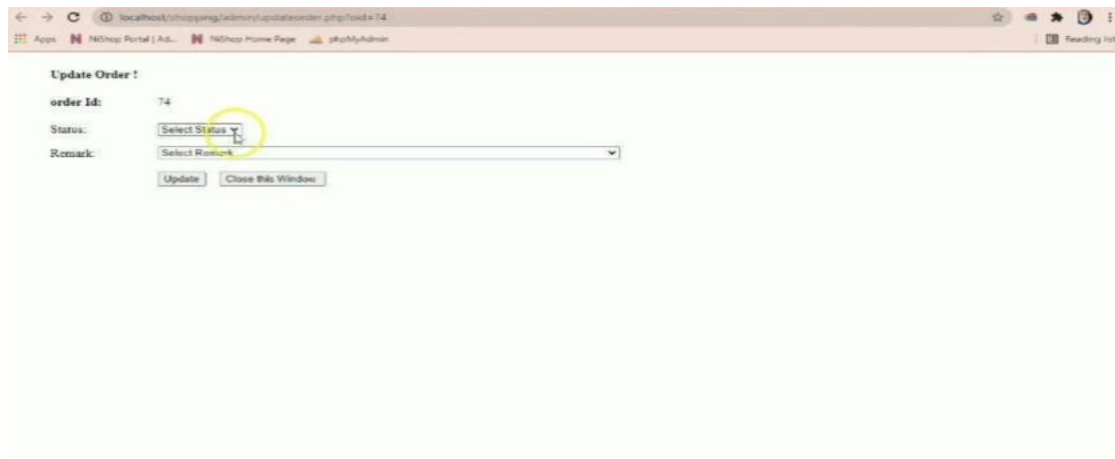


Figure 4: Update Order page by admin

The stock's availability depends on the customers' confirmed and paid goods. If no payment was made, it is a hassle for the stakeholder to identify each customer across multiple platforms and liaise with HQ of the updated order's available stock. Checkout or Payment Receipt Upload Form page is for charges that have been paid only, where Customers need to upload the payment receipt first before submitting the order. This is to ease the ordering process to HQ and save time for the admin, as shown in Figure 5.

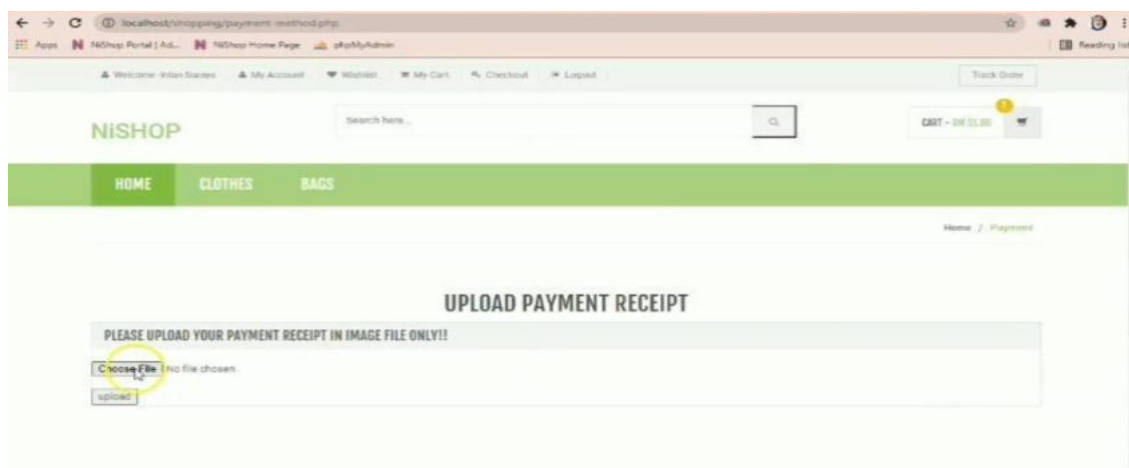


Figure 5: Checkout or Upload Payment Receipt page for customer

The stakeholder encounters a problem where the Payment receipts are not recorded properly due to the usage of the various platform in the business process. To solve this problem, by using this system, admin can view payment receipts uploaded by a customer by clicking the rightmost column of the box, as shown in Figure 6 below, as it shows the payment receipt list.

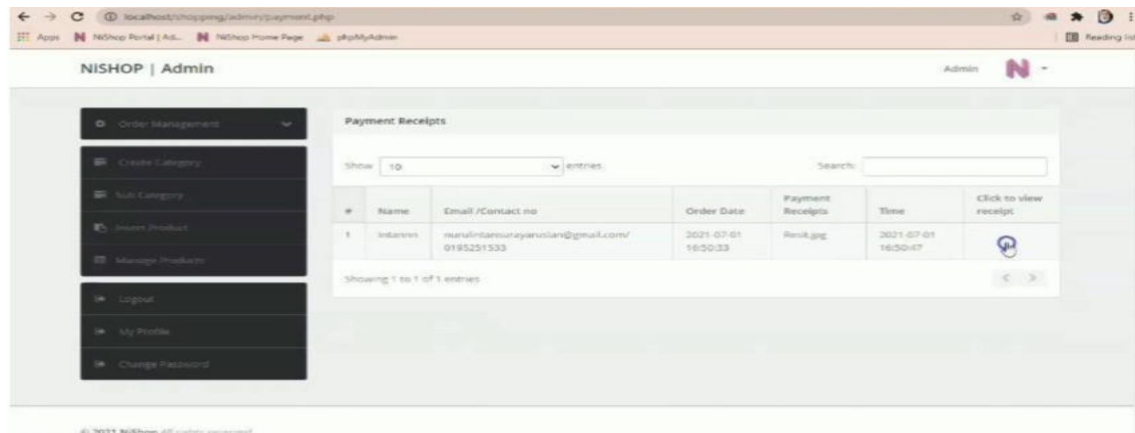


Figure 6: Payment Receipt page for admin

The stakeholder must notify clients on order progress, but with several platforms and many consumers submitting orders, she may update the incorrect customer. Also, the stakeholder failed to update the customer on the order's status. The admin can send e-mail notifications to the customer after updating the order to counter this problem, shown in Figures 7 and 8 below.

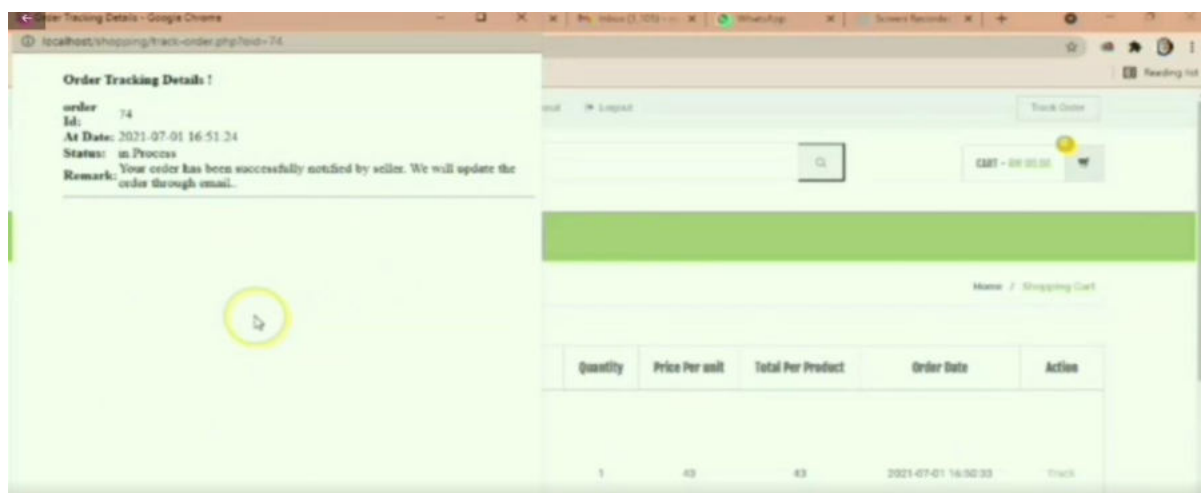


Figure 7: Notification to the customer page

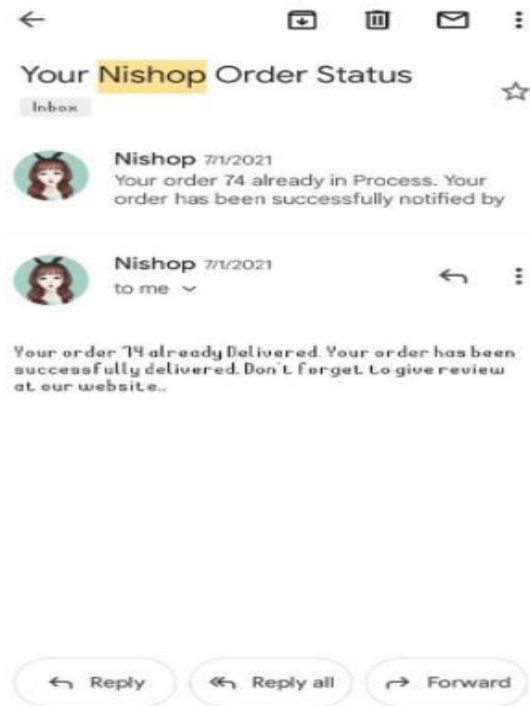


Figure 8: E-mail notification in the customer's e-mail

COMMERCIAL POTENTIAL

Information systems are utilised to create corporate value-added systems. Using information systems tailored to typical business operations such as manufacturing, supply chain, and personnel procedures help simplify company processes and eliminate wasteful activity [9].

NiShop Web System, an online shopping web-based system for NIS TD Co, can make a significant contribution and a valuable tool for business owner, Pn Nazrah Salleh to improve and ease the business process and the together in realising Malaysia for the Digital Economy.

CONCLUSION

In conclusion, NiShop, an online shopping web-based system, is intended to help the stakeholder NIS TD Co manage orders effectively for their customers to improve the online shopping experience using e-mail notification.

There are some recommendations for system improvement in the future. Instead of using e-mail notification only to notify the customers, the system might apply the push notification since it easily popup on the user's mobile phones, because not everyone checks their e-mail daily. Apart from it, it would be ideal if the system could accept proofs of payment in PDF format and image files. This is because most online banking applications provide the function of saving the successful transaction in PDF format. Based on [10], PDF images are also a good option for online picture storing, and they may also be saved and downloaded. Finally, the client should be able to cancel orders using the cancel order feature. The system should allow clients to cancel orders if they commit mistakes, allowing them to be happy with the system's service.

This project is hoped to make a significant contribution and a helpful tool for the improvement of experience with internet purchasing and having the potential to be commercialised to other SMEs.

ACKNOWLEDGEMENT

The authors would like to thank Puan Nazrah, founder of the NIS TD Co., for her time, effort and contributions.

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Motorized Bench Vice

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ABSTRACT

A bench vice is an essential tool used in most manufacturing operations. However, it is usually heavy and the user must exert considerable effort to move the vise's jaw in order to clamp the workpiece. Therefore, this research developed a user-friendly motorised vise that required minimal human effort to operate. The development of the vise consists of several phase which can be summarized as fabrication of body frames from mild steel, the assembly of a scissor jack to the body frame to operate as a movable jaw and lastly, the mounting of the motor on the vise. As a result, a user friendly, simple to operate vise with a dimension of 554 (l) x 110 (w) x 250 (h) mm and a weight of 9.5 kg has been successfully developed. This device is a motor operated vise that can clamp and hold the workpiece securely by simply pressing a switch and it can clamp larger and heavier workpieces. Hence, as compared to a typical bench vise, this device is meant to reduce human effort and labour time for a better work experience.

Keywords: Vise; motor; mild steel; user friendly

INTRODUCTION

A bench vise is a mechanical device that holds a workpiece in place while it is being worked on. As part of the design, it has two parallel jaws. A conventional bench vise is made up of various components. One of the key components is a set of vice jaws that grip a workpiece [1]. One jaw is normally fixed, while the other can move parallel to the other jaw utilising a screw mechanism to keep the workpiece snugly in place. On vises, there are two sorts of jaws: hard and soft. To improve precision, hard jaws are provided with either a coarse gripping surface or are ground flat and smooth. Instead of a rough surface, the latter relies on pressure to grasp. An inexperienced operator tends to overtighten jaws, resulting in part deformation and errors in the final product [2]. Bench vises are typically made of grey cast iron and weigh roughly 15.9 kilogrammes. Hardened steel is typically used for the jaw surfaces, handle, and screw of a vice. Bench vise sizes usually utilised by users range from 4 inches to 6 inches in length. These vises have the same maximum jaw opening as their size, which ranges from 4 to 6 inches. Jaw depths that can accommodate a workpiece's height range from 2.40 inches to 3.31 inches [3].

A benchtop vise is a type of bench vise that is extensively used in the industrial business, especially for mechanical and woodworking activities, and was previously built of wood [4]. However, these vises were discovered to be short-lived. They were improved until the late nineteenth century made from the highest quality cast iron vise, which served as a model for modern vises [5]. Front vises, unlike traditional bench vises, are connected to the front of the

workbench [6]. This vise costs more than a benchtop vise because it has a quick-release mechanism for quick opening adjustment [6].

Most bench vise available in the market are made from cast iron and therefore it is heavy and needs to be mounted on the edge of the working table. Besides, the operation of clamping or loosening the workpiece solely depends on the significant human effort thus it varies according to gender, age, and capabilities. Lesser effort may result in increasing production time. While exaggerated effort may result in breaking or changing the dimension of soft metal workpiece. In addition, one of the disadvantages of available bench vise is that the grip is limited to thin or average workpiece size, and it cannot firmly clamp the larger workpiece.

Therefore, a motorized vise is developed and tested to be used during workshops by mechanical engineering students in UiTM Johor Pasir Gudang campus. The vise will be designed to be fully automated using a motor to move the jaw of the vise. The vise will be of appropriate size and weight so that it can be easily transported, at the same time it is sturdy and reliable to be used on flat surfaces.

INNOVATION DEVELOPMENT

Part 1: Body Frame

1. Cutting

With a grinder machine, the steel frame with a measurement of 334 mm is cut as the basic frame. Furthermore, the front and back sections of the frame are measured and cut at 110 mm, while the central section is 25 mm wide and 280 mm long.



2. Assembly

To produce the project's major section, the body frame, all the parts were assembled using an arc welding equipment.



3. Drilling

Using a marker, the holes were marked and drilled at 14 mm.

Part 2: Vise Jaw

The scissor jack's tip is welded to the mild steel frame to act as the vise jaws. Then, a small hollow bar is welded to the rotator of the shaft to connect the shaft with a motor. A 40mm flat bar is welded to the bottom part of the vise jaw as shown in Figure 1. The base part of scissor jack is aligned to the back part of the body frame.



Figure 1: Completion of Vise Jaw

Part 3: Mounting of motor

Two steel L-brackets are welded to the jack to hold the motor in place. The motor's wiring consists of connecting the motor's wire to a forward-reverse switch, as well as another two wires to a 12 V rechargeable battery as shown in Figure 2

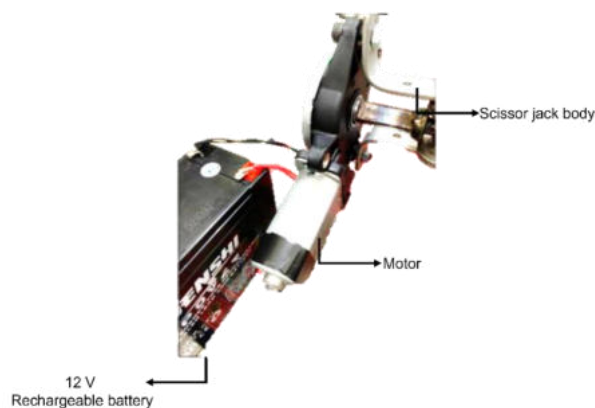


Figure 2: Mounting of motor to the vise

COMMERCIAL POTENTIAL

A functional motorized bench vise had been successfully developed using an assembly of scissor jack and customised mild steel body frames and powered by a motor. Figure 3 shows the photo of the developed product and Table 1 summarizes the final product specifications.

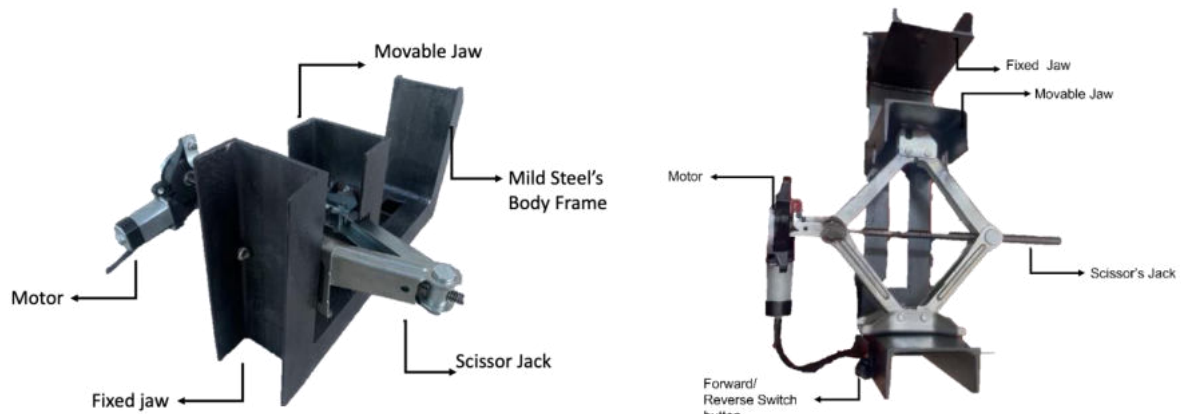


Figure 3: Innovation Prototype Side View (Left) and Top View (Right)

Table 1: Product Specification

Product Specification		
Product Name: Motorized Bench Vise		
No	Component	Specification
1	Material	Mild steel
2	Height	250 mm
3	Width	110 mm
4	Length	554 mm
5	Weight	9.5 kg
6	Additional info	Motor is detachable

The newly developed bench vise is made of mild steel thus it is lighter compared to existing vise. Due to limited space, students need to work in a tight corner to drill, sand, or weld their workpieces. Therefore, it is designed with adequate size and weight to be carried around by an adult, thus making it portable and easy to be moved to places during workshop. While in use, the device does not need to be mounted on the table like typical bench vise. The size of the vise is ergonomically designed so that the students can be working comfortably.

In addition, this product has a wide base to make it stable and sturdy on a flat surface. Thus, this ensures that if the student needs to work on their workpiece on the floor, the bench is still reliable to secure the workpieces without the risk of collapsing during operation. This vise ensures that the students manage to work safely on the workpiece even if all the working tables are fully occupied.

The motorized bench vise is equipped with a two directional switch to clamp or unclamp the workpiece. The user needs to press the reverse switch to open the jaw and press the forward switch to tighten the jaw, thus securing the workpiece. These uncomplicated steps make it user friendly and reduce training, consequently reducing time and effort during operation. The automated bench vise is also reliable to be working at constant speed.

Furthermore, the automated bench vise is a versatile tool that can exert a firm grip on the workpiece. Besides, it offers a larger jaw width to secure a better grip and enables it to hold larger and heavier workpieces. Ultimately, the users will enjoy a notable precision on their works with this product.

Currently this product is very useful help in the workshop and has the potential to be marketed with affordable prices and may become a great contender among the existing products with similar functions. Since the product was manufactured using bolts and nuts, and the motor is detachable, the maintenance of the device will be convenient and uncomplicated.

CONCLUSION

The design process is completed by developing a functional vise that clamps and unclamps a workpiece with a push of a button, minimizing human effort and reducing labour time. It is made of mild steel but with adequate size and weight to be portable and reliable to be used on a flat surface. This vise can also clamp larger and heavier workpieces, which is very useful for mechanical engineering students at UiTM Campus Pasir Gudang. In the future, some suggestions should be made, such as using heat shrink tubing to cover and shield exposed wires from damage, and using a smaller battery size to reduce product weight.

ACKNOWLEDGEMENT

This work is supported by Ministry of Higher Education (MOHE) Malaysia and Universiti Teknologi MARA under the Fundamental Research Grant Scheme (600-RMI/FRGS 5/3 (220/2019)).

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M3KBAT+Digital Literacy

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ABSTRACT

M3KBAT + Digital Literacy is developed to improve the HOTS mastery and digital literacy of Mathematics subject in secondary school. However, it is difficult to see any children from different age stage without using technology in their daily life. Although Generation Z students use technology more often than traditional learning methods. But when in come to solving mathematics questions, they rely solely on scientific calculator as their main technology device. Therefore, this innovation product will focus on solving mathematical problems by applying these mathematics software's such as Desmos, ClassPad II Series V2, Microsoft Excel, Google Spreadsheet and GeoGebra. Beside using software's, hands-on mobile applications such as Socratic Google, Symbolab, Microsoft Math Solver and PhotoMath are also utilized in this module to assist students in problem solving. The product was designed based on the nine main elements in the Morrison, Ross, Kalman and Kemp (MRKK) instructional design model. The product also has been validated by ten experts and gone through a pilot study. The target market is as wide as the teaching staff and students in public and private educational institutions that focus on the field of application of technology and software in learning Mathematics. Currently, this product can be commercialized because there already has a joint venture with secondary school around Malaysia. The main aim of this innovation is to make sure our children are not only evaluated based on how well they can solve mathematical problems on paper, but also will be assessed on how well they can master the mathematics digital literacy skills for instance, technical skills of using software's and digital devices to solve mathematical problems. For example, in addition to using the manual method, students can also obtain the value of x in a quadratic equation question using Desmos or Microsoft Excel software.

Keywords: M3KBAT; Digital Literacy; Mathematics; HOTS

INTRODUCTION

1.1 PROJECT BACKGROUND

The researcher has found that students have limited understanding on the implementation of digital literacy skills for the teaching and learning of Mathematics. Furthermore, the results also prove that the teaching style of Digital Literacy Skills is still based on the existing hardware and software such as calculator. Notably, there are various up-to-date software and mobile device applications that have been made specifically for teaching of the mathematics that students can explore and introduce to students. Thus, this innovation product will focus on secondary students in solving mathematical problems by applying these mathematics software's such as Desmos, ClassPad II Series V2, Microsoft Excel, Google Spreadsheet and GeoGebra. Beside using software's, hands-on mobile applications such as Socratic Google, Symbolab, Microsoft Math Solver and PhotoMath are also utilized in this module to assist students in problem solving. The product was designed based on the nine main elements in the

Morrison, Ross, Kalman and Kemp (MRKK) instructional design model. This is a project from a line of educators and not from a commercial software developer who understands the school environment

1.2 PROBLEM STATEMENT

In the 21st century, students should no longer be assessed merely on their ability to answer mathematics test questions but also on their digital skills mastery for them to communicate and provide ideas effectively when using digital resources during the teaching and learning process. But sadly, recent research show that the school students utilized technology for recreational and non-educational purposes (Dashtestani & Hojatpanah, 2020).

The criticality of this issue has been raised by many researchers as showed in Table 1.0:

Table 1: Systematic Literature Review of Literacy Digital in School

Researcher	Finding
Salleh et al. (2015)	Extremely low level of ICT literacy skills among the indigenous students in the district of Negeri Sembilan.
Mohamed et al. (2012)	Level of information and communication technology literacy among 585 students from a secondary school in the state of Johor and have reported that the majority of students are in the category of very weak, weak, or moderate.
Shariman et al. (2012)	Digital literacy competency of Malaysian students, especially their information seeking skills, is at a low level.
Robabi and Arbabisarjou (2015)	Computer literacy skills of students are at an unsatisfactory level.
Perdana et al., (2019)	Students' digital literacy skill in senior high school was very low and there must an effort to force these skills.
Dashtestani and Hojatpanah (2020)	Questionnaire results showed that the students had a low to moderate level of digital literacy.
Purnamasari et al., (2021).	The results showed that the digital literacy of students was in the sufficient category
Arslantas & Gul (2022).	The qualitative findings suggested that the students only possessed basic DL skills such as accessing information and creating files; however, they lacked skills in information management, effective collaboration and communication in digital content.

This serves as a clear indication that the students' mastery in digital literacy skills is still at an unsatisfactory level, and this issue needs to be addressed.

1.2 OBJECTIVE

This project was designed to develop a teaching and learning module applying a HOTS and Digital Literacy instructional strategy integrated into a multimedia-based presentation for teaching mathematics namely as M3KBAT+ Literacy Digital.

INNOVATION DEVELOPMENT

2.1 CONTENT DEVELOPMENT

The M3KBAT + Digital Literacy module was developed based on the Morrison, Ross, Kalman and Kemp instructional design model instructional design model with nine elements, namely instructional problems, learner characteristics, task analysis, instructional objectives, content sequencing, instructional strategies, designing the message, development of instructional and evaluation instruments. The language in the module is in Malay because the target of the study is rural students to have the opportunity to master mathematical digital literacy skills in a language they can understand.

Each lesson unit developed is unique and isolated in order to contain the knowledge of HOTS and Digital Literacy Skills that need to be mastered by students. Therefore, the modules can be delivered without following the sequence as prescribed. The scope of content for teaching is as shown in the display in Figure 1 and Figure 2:

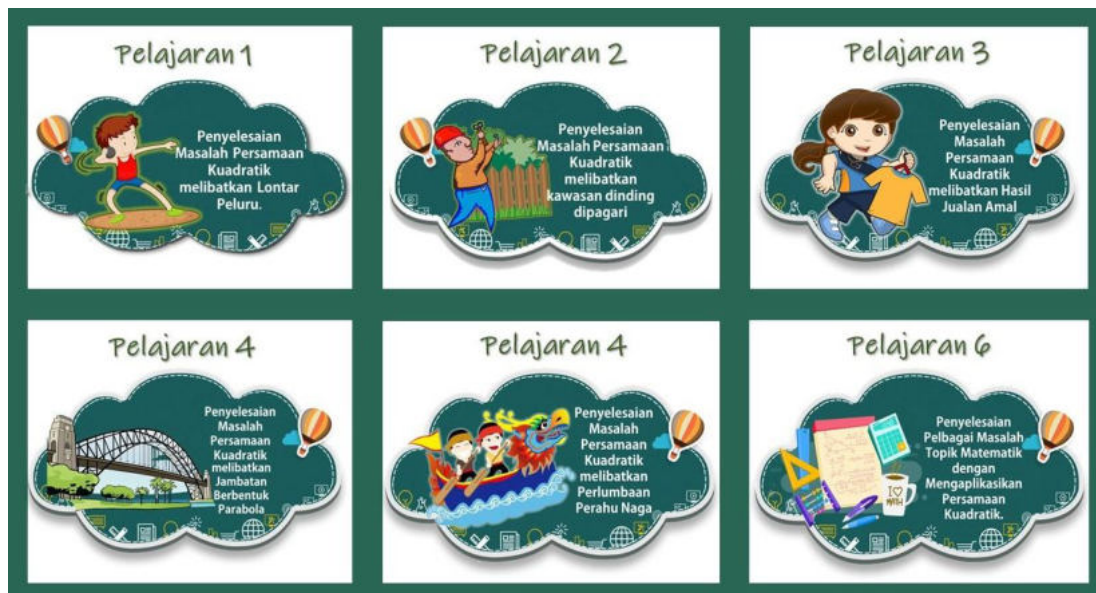


Figure 1: Arrangement of HOTS Lesson Content in Modules

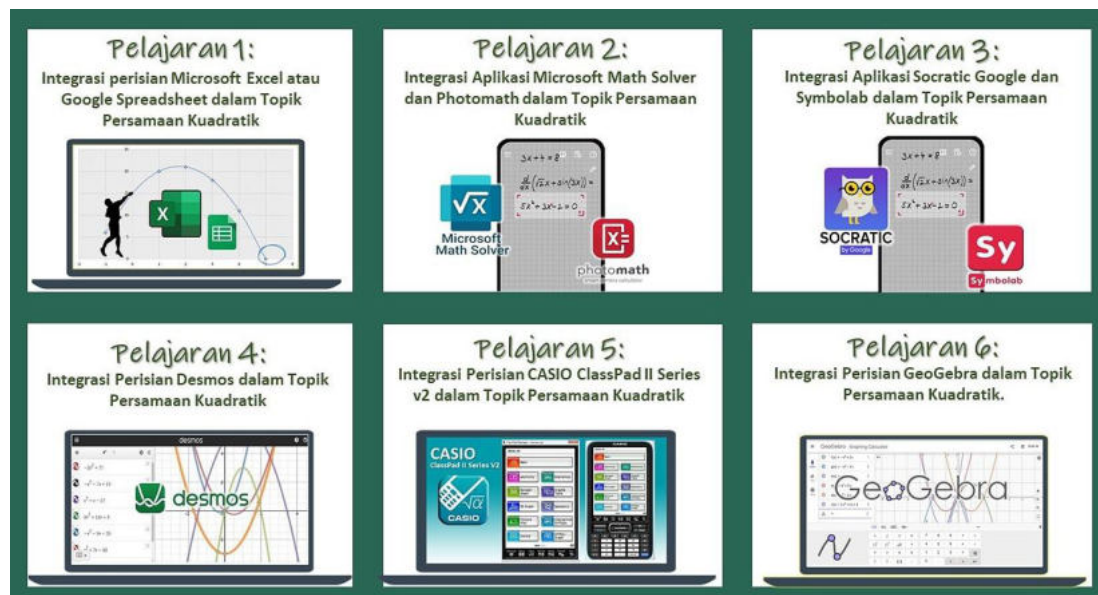


Figure 1: Arrangement of Digital Literacy Lesson Content in Modules

2.2 RESULT AND FINDING

After completing the development of the M3KBAT + Digital Literacy module, the validity of the module was identified by referring it to five experts. In addition, pilot studies in schools were also conducted. Analysis shows that the M3KBAT + Digital Literacy module has high reliability and validity. Thus, the module is acceptable and can be implemented in the real context.

COMMERCIAL POTENTIAL

3.1 NOVELTY AND INVENTIVENESS

Here are the special features of an M3KBAT + Digital Literacy which are it does not require additional software installation while using the module, suitable for low performance computers. The software that helps students master three skills simultaneously: Lower Order Thinking Skills, Higher Order Thinking Skills and Digital Literacy Skills. It also provide Lesson Plans for teachers as well as worksheets that can be printed in black and white for students to use using native languages to learn technology to suit the resilience of rural school students. Other than that, learn the use of technologies such as Excel, Desmos, GeoGebra in strategy through game -based learning and teachers can edit the content of the module freely to suit the level of knowledge of students.

3.2 INDUSTRY/ INSTITUTION PARTNER

Department of Mathematics, Segama Secondary School and Lahad Datu District Education Department.

3.3 ENVIROMENTAL FRIENDLINESS

This software can be used offline without using an internet network which consume less power than online networking.

3.4 IP PROTECTION

This software has been successfully registered in MyIPO for copyright protection. (CRLY2021S06318 and CRLY00017757)

3.4 AWARDS

This software previously won, Best Invention Award from Malaysian Research & Innovation Society (MyRIS), Gold Medal Award from National K-Novasi Teaching & Learning Competition, UKM, Winner Three Minute Thesis 3MT from Borneo Business Research Colloquium (BBRC), UNIMAS, Kuching, Best Virtual Presentation Award from International Innovation Competition (INNOCOM 2020), AID Conference.

Note: Improvement comments from past jurors were conducted into this module such as the addition of mind maps, background voice assistance, induction set videos and game-based learning. The improved modules were presented in this competition.

CONCLUSION

In this 21st century, students should not be assessed solely based on solution steps on an examination paper. But also, students need to specialize in determining the accuracy of work steps through the help of technology such as GeoGebra, Casio ClassPad and various other mathematical software. Digital Literacy provides additional opportunities for learners to see and interact with mathematical concepts. With this innovation, students can explore and make discoveries with games, simulations and digital tools.

ACKNOWLEDGEMENT

The highest appreciation is extended to the Ministry of Education Malaysia and the Faculty of Education, University of Malaya for their support during this study.

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Mosque Event Web-Based System with E-mail Notification

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ABSTRACT

Mosque Event Web-based System is developed to assist committee members of Kampung Sri Kendong in managing the mosque's event. There are few problems faced in the current business process. The first problem encountered is the current process is quite tedious and may lead to overlap of booking or Imam forget the booking. The second problem is, there are no reminders available when the event held and the final problem statement is that there is no proper platform to record people's details who attend the mosque's event. Mosque Event Web-based System provides a platform for the Kampung Kariah Sri Kendong to book online and the committee can handle the event smoothly. The system allows them to approve or decline the event, and an email notification will be sent to the user regarding the event's held application status. The methodology used in this project is the waterfall model which included three stages, 1) gathering requirements, 2) system design and 3) system implementation. The e-mail notification is deemed as the novelty of the project while the web-based system is a suitable platform to substitute the current business process which having the potential to be commercialize to other mosques or other religious institutions.

Keywords: Web-based system; online system; mosque system; event management

INTRODUCTION

Mosque is significant to all Muslims community for its many purposes. Besides being a place for Muslims to come and pray, mosque provides educational, political welfare, and conflict resolution services between individuals [1]. It acts as a social, community, and educational centre.

Committee members are appointed to handle all matters related to the mosque, whom play role in carrying out their respective tasks. Because mosque play a crucial role in society, the organization need to manage the mosque well and in order to realize it, good management and integration are required [2].

Implementation technology in doing tasks may enhance work productivity [3]. [4] found that the majority prefer to use devices. Yet, to implement this kind of approach, there are cost to be invested. Web-Based application development is the process of creating and developing programs that can be accessed through the internet [5]. Web application development traditionally had a short development life cycle, with small development teams employing the Waterfall Methodology [6].

Software Development Life Cycle (SDLC) is a framework that describes the steps involved in software development at each phase. It is used for creating and modifying current

software applications [7]. Waterfall model was the first System Development Life Cycle (SDLC) model introduced. This model is straightforward and easy to apply. This approach has also been used in government projects and other major companies [8].

Notifications are a technique of informing users that something new has occurred. When a user is idle, notifications are crucial in ensuring that the user does not miss essential information or action [9]. Short Messaging Service (SMS) deliver and receive a short message over mobile network while email allow people to send and receive message using the Internet. Due to security, messaging length and authentication provided by email, it is still widely used for digital marketing and formal platform of communication. Moreover, sending and receiving emails are free and do not require additional payments [10].

Masjid Kariah Kampung Sri Kendong, located in Rembau, is a place for wedding solemnization, Tahlil/Doa Selamat, religious lectures and programs, apart from its main purpose of holding congregational prayers. Based on an interview session with the Bilal of the mosque, the current system practiced is unorganized. All bookings of events were received personally by committee members and being recorded manually in a record book by the Imam.

Overlapped bookings and unnoticed events were among the situations faced by the mosque committee members especially for Imam, whose attendance is required.

In addition, the residents of the area were unaware of the events held by the mosque. The group chat among the residents was unable to properly acknowledge the residents regarding the events held. Printed materials were insufficient to promote the events to the residents.

Due to COVID-19 pandemic, the attendance to the mosque must be recorded and monitored to align with current Standard Operating Procedures (SOP). Besides the obligatory of using MySejahtera mobile application, the mosque community has to set restriction on the number of attendees to events.

Hence, Mosque Event Web-Based System with E-mail Notification is developed to enhance the effectiveness of managing events related to the mosque and improve attendance. All events can be organized more efficiently. This gives benefits to all attendees and residents.

Objectives for this project are to gather and analyze the requirements of the Mosque Event Management web-based system, to design the Mosque Event Management web-based system based on the analysed requirements and to develop the Mosque Event Management web-based system.

INNOVATION DEVELOPMENT

There are six phases in Waterfall model. Those are requirement analysis, design, implementation, testing, deployment, and maintenance. Firstly, in this phase, the requirement analysis began as an interview with the Bilal was planned and conducted. Feedbacks from the interview were recorded. An online questionnaire was also distributed to the residents of Kampung Sri Kendong. These results were collected and analyzed to construct the requirement of the system. Use Case Diagram, Use Case Description (UCD), Domain Class Diagram (DCD), Activity Diagram, and System Sequence Diagram (SDD) documented in Software Requirement Diagram (SRS).

Secondly, the design phase of the system was initiated based on the requirements. All the requirements collected were used as the guidelines to design the system. This phase emphasized how the system was built with specified hardware and system requirements. Overall system architecture for the development process was defined here. A multilayer sequence diagram (MSLD) and design class diagrams (DCD) were constructed.

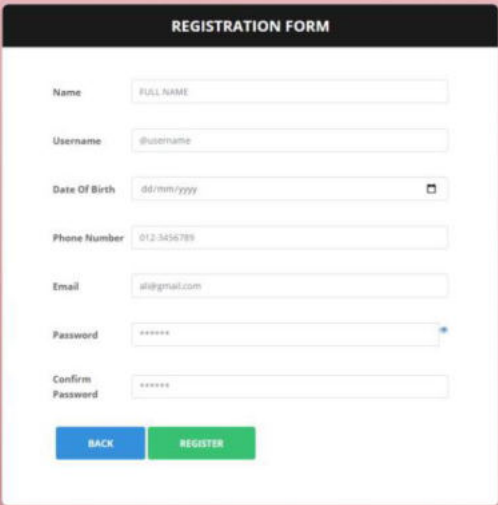
Then, for the implementation or coding phase, all software designs were converted to the production environment. The user interface of the web-based system was built according to the previous design diagram. In this phase, the developers implement the approved design and create the code from the two earlier stages. This web-based system was developed using PHP language and the operating system used was Windows 10. Laravel, PHP and SQL were used for the system implementation. The final three phases which were testing, deployment and maintenance, were not included in this project because of the time constraints.

The use case diagram for Mosque Event Web-Based System (MEWS) is shown in Figure 1. There were three actors in the use case diagram: Admin, Committee, and Regular User. Twelve use cases were applied in the system.



Figure 1: Use Case Diagram for Mosque Event Web-based System

The main system function is to book the event and get approval from the admin. First, user must Create Account as shown in Figure 2.



REGISTRATION FORM

Name

Username

Date Of Birth

Phone Number

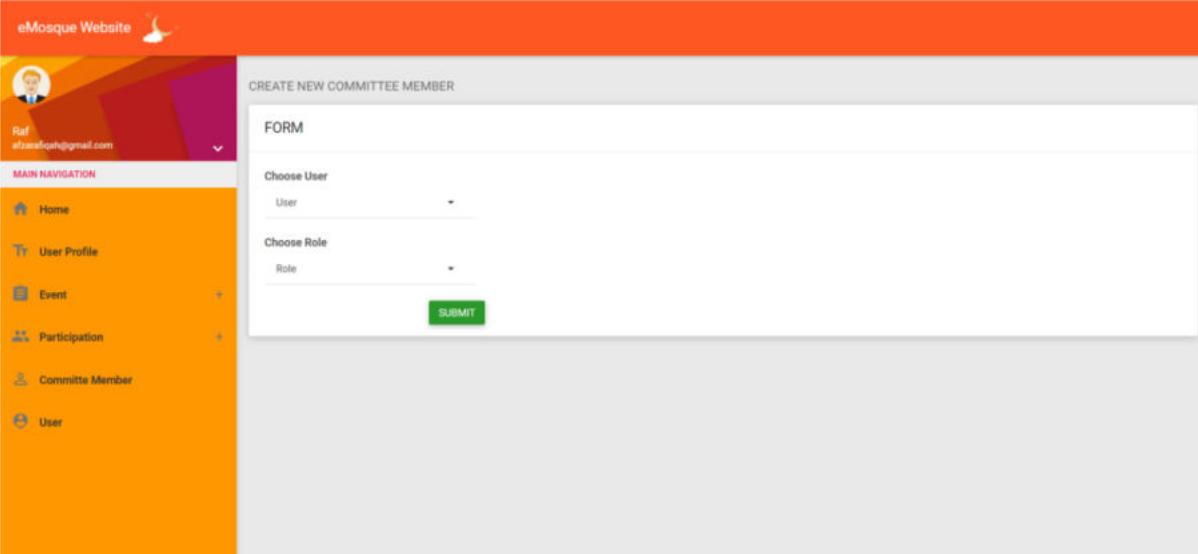
Email

Password

Confirm Password

Figure 2: Create Account

Upon successful registration, users are allowed to update the account details. User can update username, email, phone number and password.



eMosque Website

Raf
rafarafah@gmail.com

MAIN NAVIGATION

- Home
- User Profile
- Event
- Participation
- Committee Member
- User

CREATE NEW COMMITTEE MEMBER

FORM

Choose User
User

Choose Role
Role

Figure 3: Assign Committee

Figure 3 shows the form to assign committee. This feature only can be used by Admin. Admin needs to choose the user to assign role of committee or admin.

Figure 4 and Figure 5 respectively shows the interface of creating event for booking. Only Regular User and Committee can use these features. The users were asked to fill all the events details before submission.

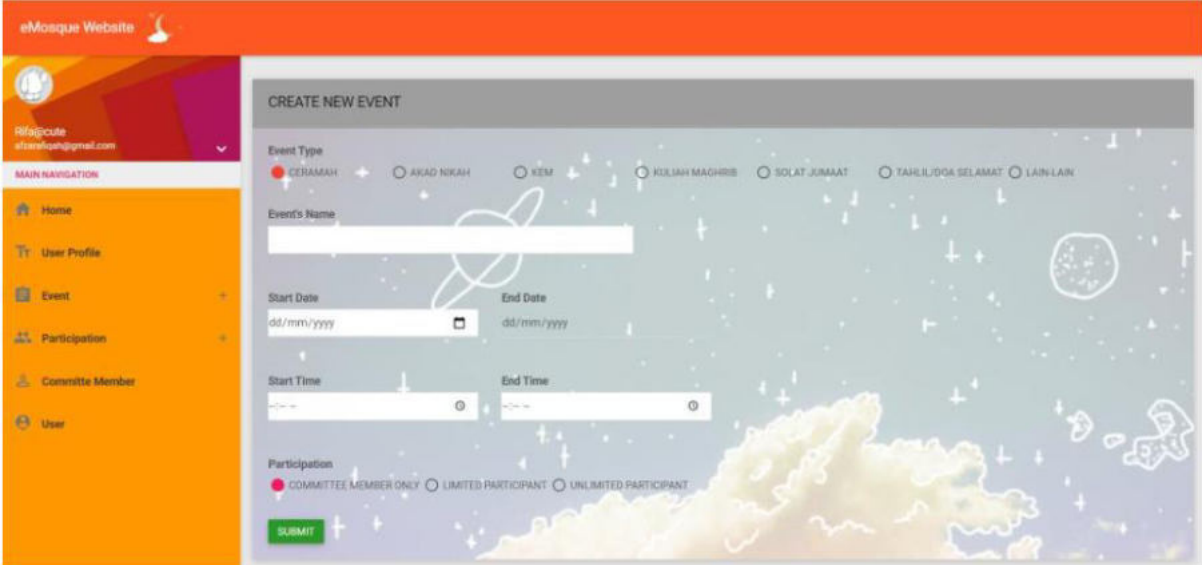


Figure 4: Create Event Form by Regular User

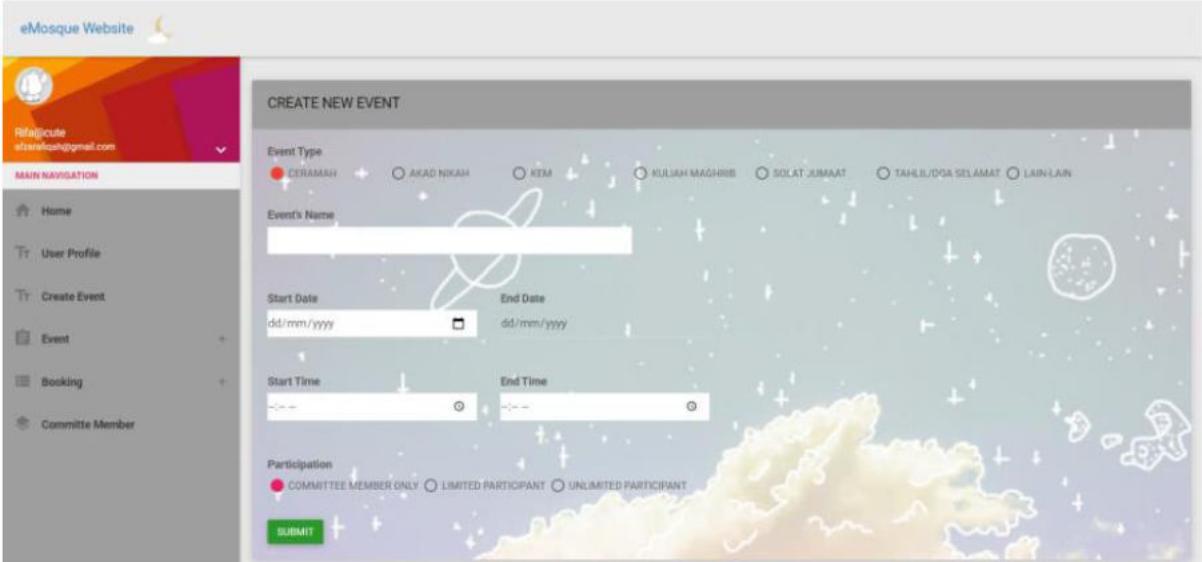


Figure 5: Create Event Form by Committee

After the form is submitted, the event created will appear at the Admin side. Only Admin can approve or decline the event. Figure 6 shows the interface of the list of requested events. The Admin can click on “Approve” button to approve the event or “Decline” to reject the request. After the event was approved or declined by Admin, the system will send email notification to the event’s creator. The email would be sent to inform either the system is approved or declined, as shown in Figure 7. After the email is sent, the system will display message the email is successfully sent to the user.

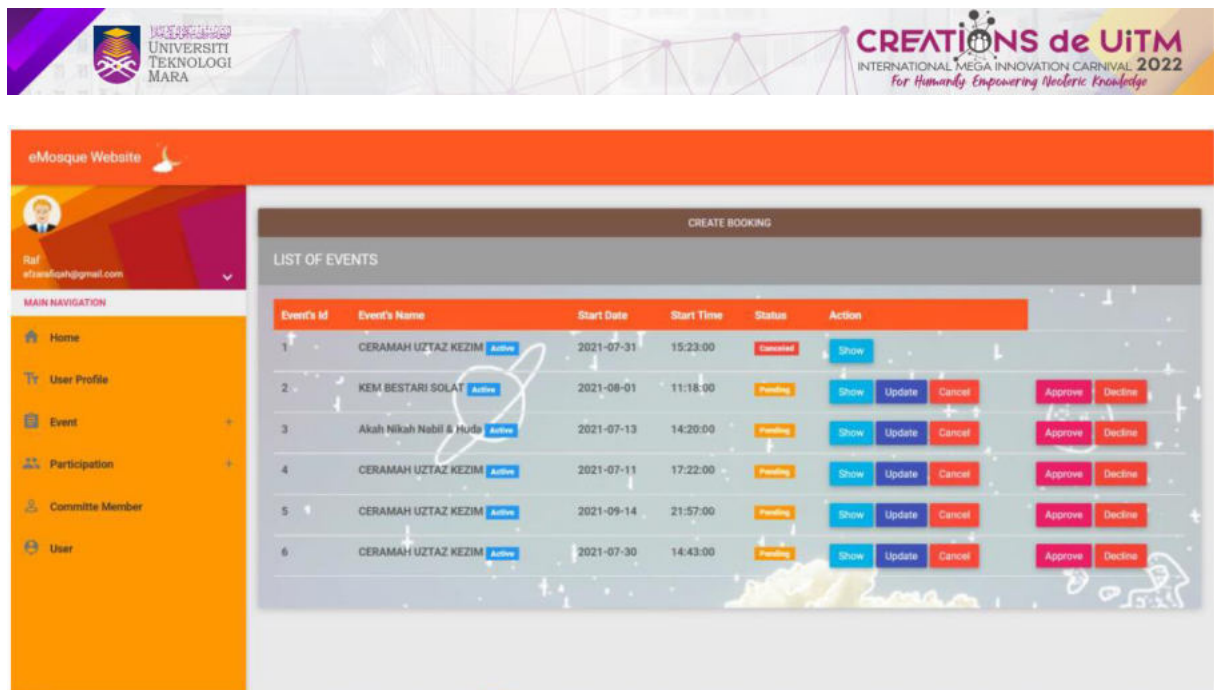


Figure 6: List of Events



Figure 7: Email message to notify approval of booking

Next, Figure 8 below shows the page for user to join event. User just need to click button at the top of the card. There are two icons at the top of the card. If user wants to register for others, click on the icon people with plus sign. However, if application for own self, the system automatic retrieve data from the database. User does not need to enter data again.

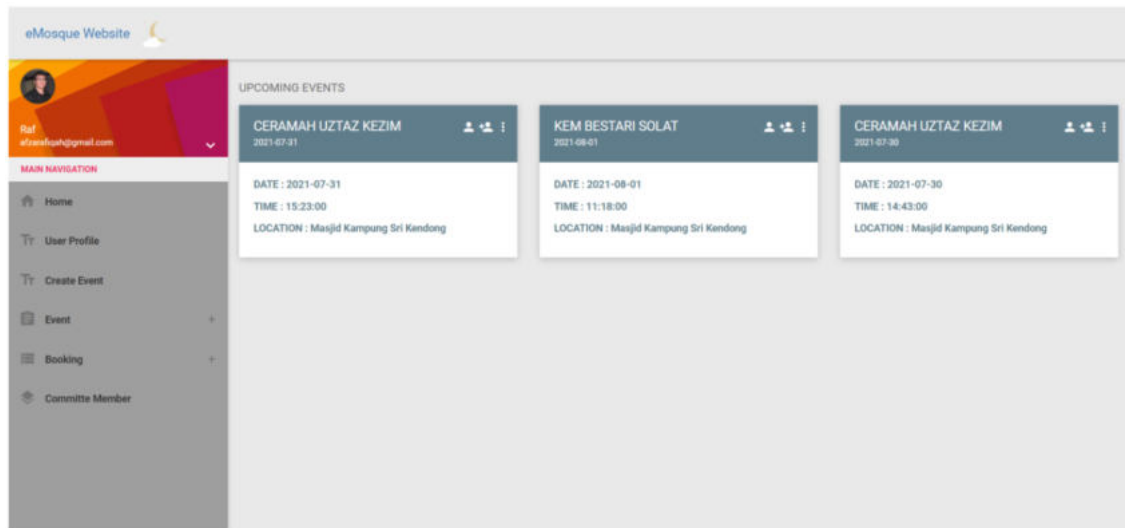


Figure 8: Apply Participation

Finally, is the notification of event sent as reminder to admin and committee, as shown in Figure 9 below.

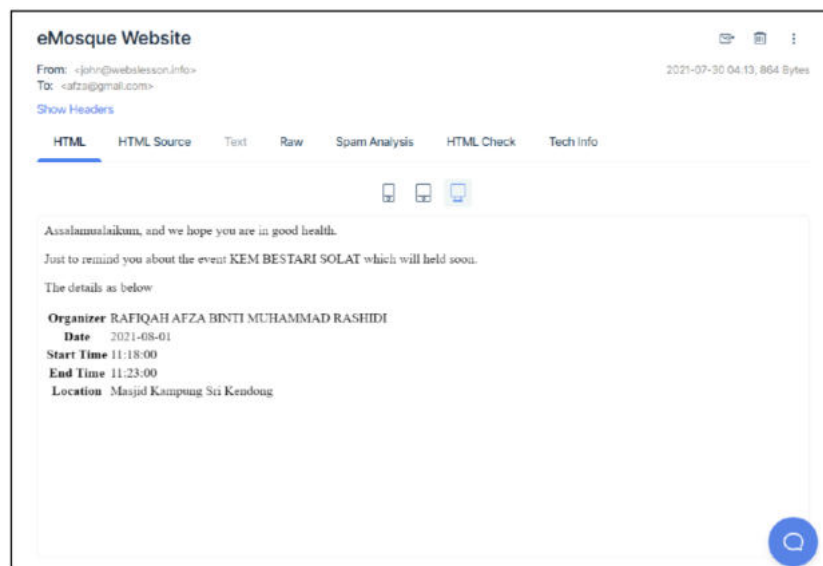


Figure 9: Reminder email

COMMERCIAL POTENTIAL

Mosque Event Web-Based System with Email Notification enabled to enhance the effectiveness of managing events at the mosque. All events can be organized more efficiently. As the COVID-19 is now become an endemic, event management in public spaces requires crucial plannings. Participants should gain benefits from the event while maintaining security and safety. Interactions between residents and committee members of the mosque would be nurtured inline with the enhancement of the technology. Mosque, which can be labeled as a center of worship should take advantage of technology to reach people. This system could be commercialized and used for small or big mosques as committee members were able to add and manage their events according to their own capacity.

CONCLUSION

The project was aimed to develop Mosque Event Management System that can manage the event booking and notify users regarding the event status via email notification. The system that was developed will assist the mosque committee in managing events while dealing with the identified problems. The problem faced were unorganized process of managing all the bookings; absence of proper platform that can record and restrict the participants of events, and inexistence of reminders to notify the committee about the upcoming events.

Based on the project outcome, a few recommendations were identified to improve the system functionality and quality to be favored by the users of the system. As the system highlighted on notification of the event to the committee members, it would be beneficial if the participants would be able to receive reminders of the events. For users who are in need of venue for their event, it would be a disappointment to know if their application is declined. Thus, the system must allow remarks on reasons of disapproval for users to make amend of their events. Lastly, push notification could be implemented in the system. This would help the committee to be alert with the booking event made by users faster. So, the processing time becomes shorter than to regularly log into the website.

ACKNOWLEDGEMENT

The authors would like to thank Encik Muhammad Rashidi as Bilal of Masjid Kariah Kampung Sri Kendong for his time, effort and contributions.

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E-Appointment Dental Clinic System for Klinik Pergigian Norazleen (e-DENT)

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ABSTRACT

Appointment systems are becoming increasingly popular because they allow people who live a long distance away to make a reservation before visiting the location. Klinik Pergigian Norazleen is a dental clinic located in Perak which have three branches and is offering a wide range of services and treatments. Currently, the clinic is managing patient's appointments via WhatsApp messenger and phone calls. In addition, staff will manually check for availability date and log the appointment in the logbook. E-Appointment Dental Clinic System for Klinik Pergigian Norazleen (e-DENT) were created to make it easier for clinic staff and managers to manage appointments while also allowing patients to easily access their needs without having to call the clinic to schedule an appointment. The methodology used in this project is the waterfall model which included three stages, 1) gathering requirements, 2) system design and 3) system implementation. The web-based system of e-DENT is deemed as a novelty project because currently, not many dental clinics has implemented an appointment management system. Therefore, it has a big potential to be commercialize to other dental clinic or any industry that having appointment as one of their business processes.

Keywords: Web-based system; online system; appointment management system

INTRODUCTION

Oral health is a primary indicator for general health, welfare and quality of life. People nowadays have realized the importance of oral health as poor oral healthcare would bring agonizing pain and brought financial burden for society. It would also hinder one's confidence to be in public. Hence, visiting dental clinics is essential. In Malaysia, public-private sector involvement in providing dental services and treatments were balanced.

To manage and keep efficient tracking of daily functionalities in health sector, appointment and medical scheduling is necessary [1]. It was mentioned that a well-designed appointment scheduling system help to deliver timely and convenient access to medical services and enhance patient satisfaction and physician efficiency. Hospitals and clinics were looking for technical innovations to reduce outpatient registration time and improve patient appointment service as computer and network technology advances [2].

Prior to its high sensitivity, the healthcare sector is one of the most important sectors that requires more attention. As a result, developing such systems is very difficult and requires greater accuracy as well as a high level of confidentiality. In medical appointment system, all important features and functions would be implemented and adopted in accordance with patient needs [3]. According to [4], it is not necessary to remind patients of appointments to increase patient arrival rates and decrease cancellations, rather, it is necessary to identify cancellations

in advance so that appointment slots can be rescheduled. The importance of determining the priority of outpatients and allocating capacity based on the priority classes must be considered when scheduling outpatients [5]. In order to improve the service of appointment scheduling systems that serve multiple priorities, the access time should be expanded. Online appointment booking systems could help maximise the use of appointment slots, centralise operations across multiple service units, and respond quickly to high-volume patient groups [6].

Technology's rapid advancement in the current era of globalisation has resulted in numerous benefits in various aspects of life. People are beginning to use technology as assistant in completing tasks. The use of a computerized system would save more time and energy, along with accuracy of data presentation and surveillance [7]. [8] stated that web-based system is more than a simple website. It is a server application that uses Web browser as its client programme and connects to servers over the Internet. It is also dynamically tailored content based on request parameters, monitored user activity, and security concerns.

There are several software development methods that have been established and designed for usage throughout the software development process. These approaches are also known as Software Development Life Cycle (SDLC). In order to achieve the aim and objectives of e-DENT System, Waterfall is the most suitable methodology in SDLC, due the duration of development is relatively short. [9] stated in a waterfall model, development occurs in a sequential order, meaning that each step must be completed before moving on to the next, necessitating the use of a formal process to make changes. These steps are repeated in a recursive manner until the system is finished.

Klinik Pergigian Norazleen are private dental clinics with three branches of dental clinics in Perak that are located at Ipoh and Seri Iskandar. These clinics offer dental treatments such as extraction, filing, scaling & polishing, denture, whitening, crown & bridge, implant, orthodontic. The clinic is constantly full of patients that already make an appointment. While patients that walk-in to the clinic and ask for treatment must wait for their turn because the clinic prioritise monthly check-up patients. For that reason, the waiting time is longer for outpatients.

Based on an interview with personnel from the clinic, there were some problems identified. Appointments were made manually as patients are still booking via calls and WhatsApp. The process consumes more time and energy for the staff. On the other hand, returning patients could not view their past treatment examination and payment paid to the dental clinic. The clinics provide receipt every month, but the usage of paper is not practical to track the full payment. There were cases where patients did not remember the appointment time especially for patients that make appointments through phone calls but could not check the appointment schedule online.

The objectives of this system were to gather and analyse the requirement of E-Appointment Dental Clinic System (e-DENT), to design the system based on the analyse requirement, and finally to develop E-Appointment Dental Clinic System (e-DENT) based on the system design. The system managed to solve several problems. The time a patient spends waiting in the clinic were reduced and productivity and efficiency of the manager were built. The appointments made by the patients managed efficiently and all the information needed could easily viewed in the system. Patients could make appointments by themselves through the system without contacting the clinic, while doctors could easily manage the schedules from time to time.

INNOVATION DEVELOPMENT

The waterfall methodology was used for the development and deployment of the system. This methodology is the first paradigm that is frequently use as a successful system development strategy. Waterfall Model contains five phases that need to go through in the development of this system, which were Requirement Analysis, Design, Development, Testing and Maintenance. Hence, e-DENT system only uses three phases of this methodology.

During the requirements analysis stage, extra attention was given to ensure that the objectives were met. Interview questions were prepared before meeting the staff of the clinic. The system's requirements were mapped from the interview. Due to the Movement Control Order (MCO), interview session was only done through calls and messaging. A study and analysis of existing systems was conducted to determine the requirements for developing the appointment system. The information acquired throughout the research provided better understanding of the process flow as well as resolving the question of how to achieve the system's main purpose. Then data was analyzed, and the requirements diagrams were produced.

System design is a phased method that analyze the details of four features: data structure, software architecture, and interface representation. The design phase consists of activities related to designing the system based on the analyzed requirements. This includes designing the user interfaces, designing system databases, producing data flow diagram (DFD), developing the Domain Class Diagram (DCD), Use Case Diagram (UCD), and Entity Relationship Diagram (ERD). After the requirements and design activities were done, the software implementation or development phase of SDLC begins. Developers begin to code the system based on the requirements and design specified in earlier phases. There are some of the applications that need to be used in the development of the web system. The software is Visual Studio Code, Xampp, and phpMyAdmin.

The use case diagram for E-Appointment Dental Clinic System (e-DENT) is shown in Figure 1. There were three actors in the use case diagram: Staff, Patient and Manager. Twelve use cases were applied in the system.



Figure 1: Use Case Diagram for E-Appointment Dental Clinic System

The main system function is to make appointment at the clinic and manage patients' record and payment. First, user must Register Account in the system as shown in Figure 2.

Figure 2: Register Account in E-Appointment Dental Clinic System

After the registration is successful, patients are allowed to login and view the account. Viewing patients details is authorizes for Patients, Staffs and Managers. For Patients, once logged in, thy were able to make booking of appointment as shown in Figure 3. Only Patients and Staff can make bookings and only available slots are shown.

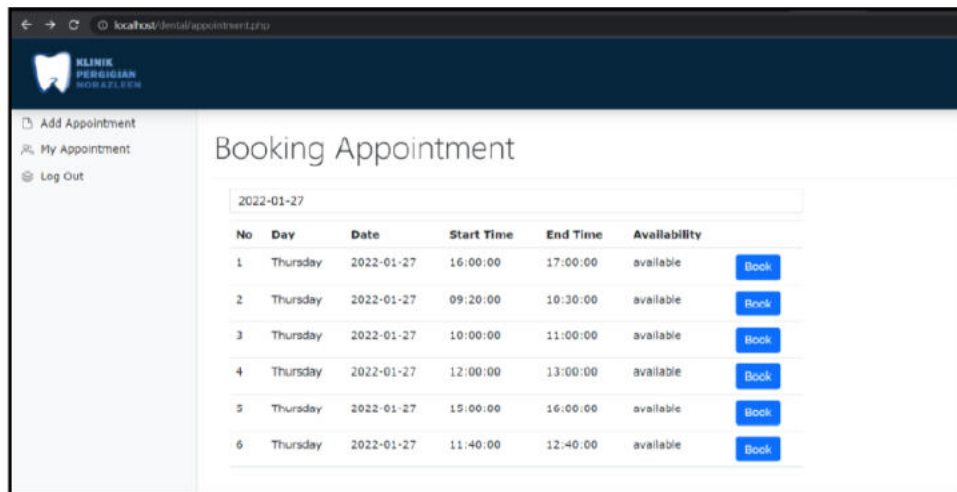


Figure 3: View Schedule Page for E-Appointment Dental Clinic System

This list of slots was recorded in advance by Staff. Create Schedule interface is shown in Figure 4.

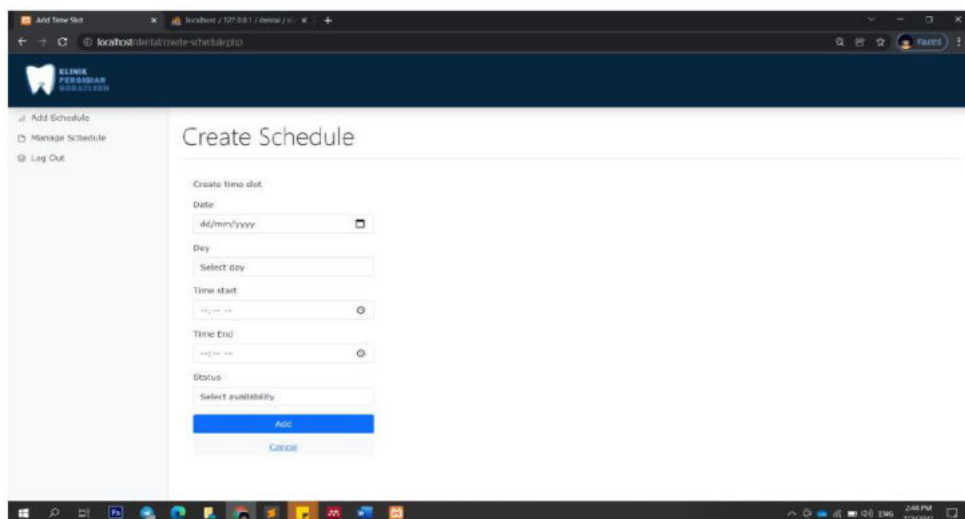


Figure 4: Create Schedule by Staff for E-Appointment Dental Clinic System

Staffs were also responsible to manage the doctor's schedule, as shown in Figure 5.

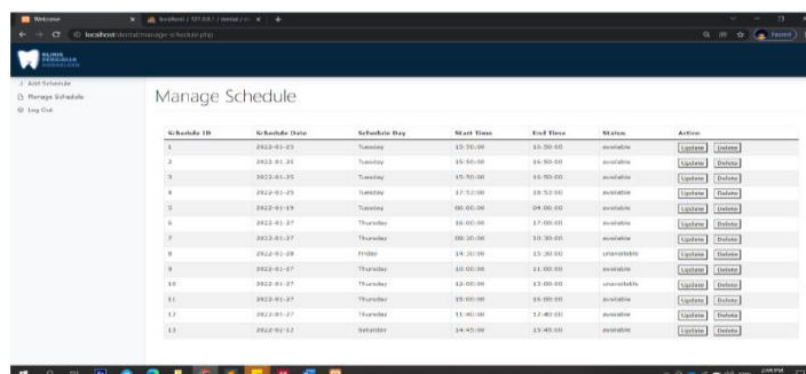


Figure 5: Manage Schedule by Staff for E-Appointment Dental Clinic System

After the Staffs have set the schedule, patients were able to book the date. Figure 6 shows the booking page for patients.

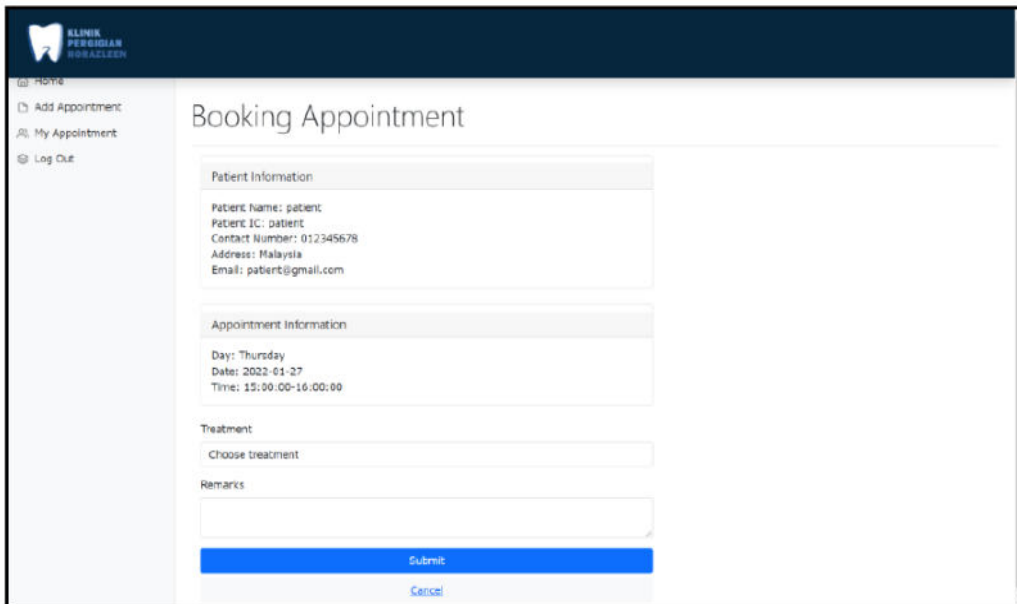
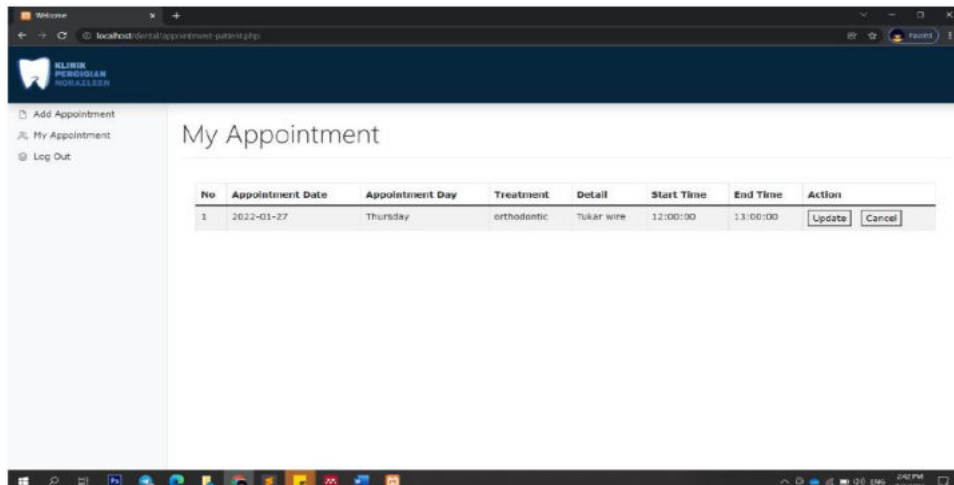


Figure 6: Book Appointment for E-Appointment Dental Clinic System

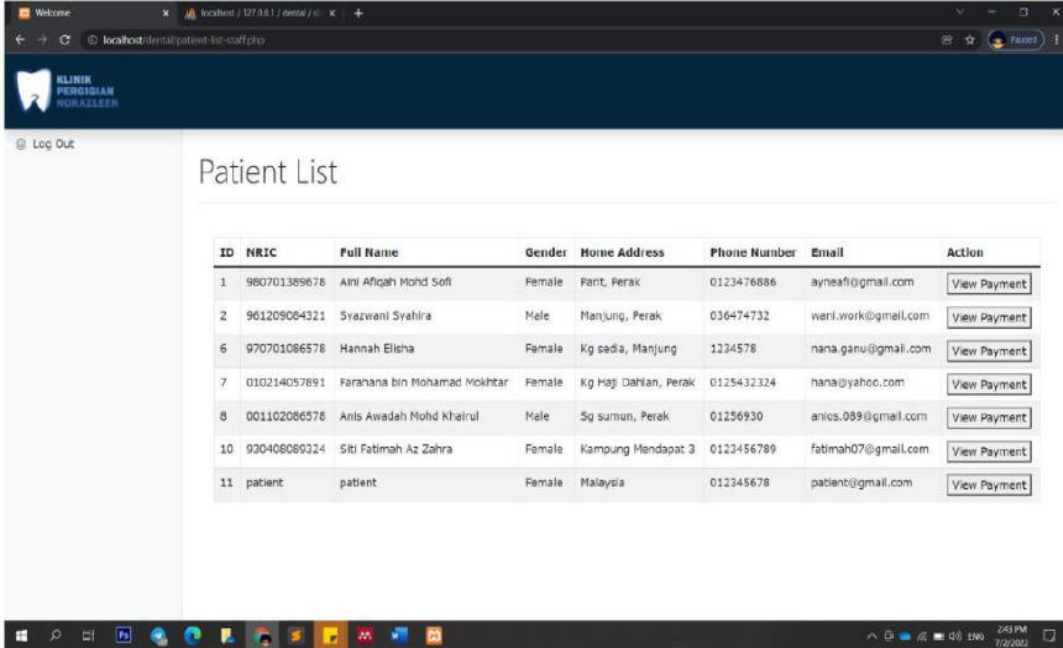
The appointment is confirmed as the booking date and time do not overlap with other bookings. Once it is confirmed, the system will display the Appointment List, as shown in Figure 7.



No	Appointment Date	Appointment Day	Treatment	Detail	Start Time	End Time	Action
1	2022-01-27	Thursday	orthodontic	Tukar wire	12:00:00	13:00:00	Update Cancel

Figure 7: View Appointment by Patient for E-Appointment Dental Clinic System

As for Manager, the role is to manage users details, which are patients and staffs. Manager is able to view the payment details of patients. The list of patients details are shown in Figure 8.



ID	NRIC	Full Name	Gender	Home Address	Phone Number	Email	Action
1	980701389678	Aini Afiqah Mohd Sofi	Female	Pant, Perak	0123476886	ayneaf@gmail.com	View Payment
2	961209084321	Syazwani Syahira	Male	Manjung, Perak	036474732	weri.work@gmail.com	View Payment
6	970701086578	Hannah Elisha	Female	Kg sedia, Manjung	1234578	nana.ganu@gmail.com	View Payment
7	010214057891	Farhana bin Mohamad Mokhtar	Female	Kg Hagi Dahlan, Perak	0125432324	nana@yahoo.com	View Payment
8	001102086578	Anis Awadah Mohd Khairul	Male	Sg sumun, Perak	01256930	anics.089@gmail.com	View Payment
10	930408089324	Siti Fatimah Az Zahra	Female	Kampung Mendapat 3	0123456789	fatimah07@gmail.com	View Payment
11	patient	patient	Female	Malaysia	012345678	patient@gmail.com	View Payment

Figure 8: View Payment by Manager for E-Appointment Dental Clinic System

COMMERCIAL POTENTIAL

The system had solved most of the problems related to appointment management of Klinik Pergigian Norazleen. It has reduced the time a patient spends waiting in the clinic and increased the productivity and efficiency of the manager. Manager also can easily manage the appointments that were made by the patients and view the information needed. Patients could make appointments by themselves through the system without contacting the clinic. Besides, doctors can easily manage their schedules from time to time. Hence, it is deemed as a novelty project because currently, not many dental clinics has implemented an appointment management system. Therefore, it has a big potential to be commercialize to other dental clinic or any industry that having appointment as one of their business processes.

CONCLUSION

E-DENT is an online appointment system that assist the clinic to manage patient's appointments every day. This system helps lessen workloads of the staff and doctor. The patient can key in their data when they are signed up into this system and the manager can retrieve it easily by using their Identity Card Number (IC). Patients need to sign-up for new patients or login for existing patients before proceeding to the appointment phase. Then after the patient have login into their account, they can check the availability by choosing the available date and time slots would be displayed. Users can set their appointment and cancel the appointment anytime. For the staff and doctor, there are features for them to set their schedules or day off in the system.

For this project, there are some recommendations for future improvement. The system should be developed as a mobile application as an alternative, so that more functions could be implement such as queuing system at the clinic and many others. Apart from that, this system could be enhanced by allowing online payments and integrating with third-party devices to make it easier for staff to retrieve payment status and connect to the database.

ACKNOWLEDGEMENT

The authors would like to thank Encik Zulkhairi bin Muhamad Luding, the manager of Klinik Pergigian Norazleen for his cooperation in giving required informations for the system development.

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Kahfi Shield: Hygienic Touch Tool

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ABSTRACT

Harmful pathogens can survive on frequently-touched surfaces for days, still posing a threat to all who interact with these contaminated surfaces and promote transmission. Copper is antimicrobial, the only material registered by the United States Environmental Protection Agency (EPA) to continuously kill more than 99.9 % of the bacteria and viruses that cause infections. It kills bacteria and viruses, sometimes within minutes. It is highlighted that the coronavirus is destroyed on copper surfaces within four hours compared to other surfaces. This highlights that copper could help prevent the spread of infections. The Kahfi Shield was fabricated by electrodeposition process with excellent surface properties, environmentally friendly with non-toxic and minimal waste during production. The antibacterial activity showed Kahfi Shield was active against *S. aureus* and *E. coli* bacteria within the designated contact time under ambient room temperature and normal humidity conditions. The small size of Kahfi Shield, and easy to carry are suitable to be used as travel accessory whilst the design and features offer users friendly and easily gripped to open door handles, flush toilet and press any buttons to prevent avoidable contact. It is also convenient, for those who want to avoid harsh and possibly toxic alcohol-based sanitizers, or who have dry hands or eczema. Beside good hygiene practice, Kahfi Shield can be used as one of the protection strategies to combat spread of transmission. The introduction of Kahfi Shield will help to break the chain of infection by acting as a barrier between our hands and contaminated touch surfaces. Kahfi Shield will be highly beneficial, ideal and economic resources especially in the development of antimicrobial touch surfaces.

Keywords: Antimicrobial copper; copper; electrodeposition; infections; touch surfaces

INTRODUCTION

Frequently-touched surfaces are a likely reservoir for potentially harmful pathogens like COVID-19 virus, and play a role in the acquisition of infection [1-3]. Pathogens survive by attaching to solid surfaces in sessile structured communities called biofilms, where they can persist for extended periods (up to 9 days for COVID-19) [4], acting as a reservoir of pathogens and multiplying their pathways of transmission. The risk of transmission is increased, however, in clinical facilities and possibly in other crowded areas, including hospitals, healthcare settings, areas of mass gatherings and close contact. Surface contamination has recently been

found to be more significant than originally thought in the spread of infections. Symptoms of respiratory disease often result in continuous re-contamination of surfaces which are then touched, and infectious virus particles may be transferred to facial mucosa. Ensuring good hygiene practice is not enough since the environment rapidly becomes re-contaminated following disinfection. It is clear that besides routine cleaning, additional strategies to reduce microbial contamination should be considered.

The use of copper in surface engineering represents an attractive solution because biologically active copper ions are strong bactericides. Copper holes the crown-shaped virus and then slowly releases ions that interact with oxygen and generate free radicals, or uncharged molecules that typically are highly reactive. Those free radicals create a figurative grenade that goes off and destroys the virus' RNA. The use of copper as touch surface materials can be an extra approach in addition to masks, gloves and hand sanitizer to prevent the spread of the virus infection. Copper and its alloys have been thoroughly investigated as an antimicrobial surface both in the laboratory and clinical trials [5-12]. Potentially pathogenic microbes could be inactivated by coming into contact with copper surfaces. Copper is antimicrobial, the only material registered by the United States Environmental Protection Agency (EPA) to continuously kill more than 99.9 % of the bacteria and viruses that cause infections. It kills bacteria and viruses, sometimes within minutes. Since then, studies have shown that copper is able to destroy the microbes that most threaten our lives. It has shown to kill a long list of microbes, including norovirus, MRSA, Gram-positive bacteria that has resistant to antibiotics, virulent strains of *E. coli* that cause food-borne illness, and coronaviruses including the novel strain currently causing the COVID-19 pandemic [3,4,13].

Copper is already recognized for its antimicrobial properties and used as high-traffic touch surfaces such as push and pull plates, doorknobs, faucets, chair arms, bed rails and other surfaces that are frequently touched. Antimicrobial copper surfaces have been proven to harbour 83-100 % less bacterial contamination than conventional touch surfaces such as stainless steel in hospital trials around the world. Clinical trials using antimicrobial copper and its alloys surfaces were conducted at several hospitals and healthcare settings around the world: for example, The Ochiai Clinic in Japan, Roberto del Rio Children's Hospital in Chile and Ronald McDonald House of Charleston in South Carolina, to be listed.

The Copper SharkTM is a product made with MD-Cu29 antimicrobial copper (Figure 1). It is a touch tool produced as a barrier between our hands and touch surfaces. The awesome product made in the U.S.A has inspired us to fabricate our copper coating-based stick known as Kahfi Shield as a hygienic touch tool. Best of our knowledge, no similar product has currently been produced or marketed in Malaysia. In addition, the Kahfi Shield was coated with nano-sized grain copper structure on the stainless-steel substrate to enhance the performance and shorten the contact killing. As a pioneer in research and development of antimicrobial copper coating, the developed method has been optimized in our laboratory. The production is cost effective and operational simplicity. The produced product is environmentally friendly with minimal and non-toxic waste.

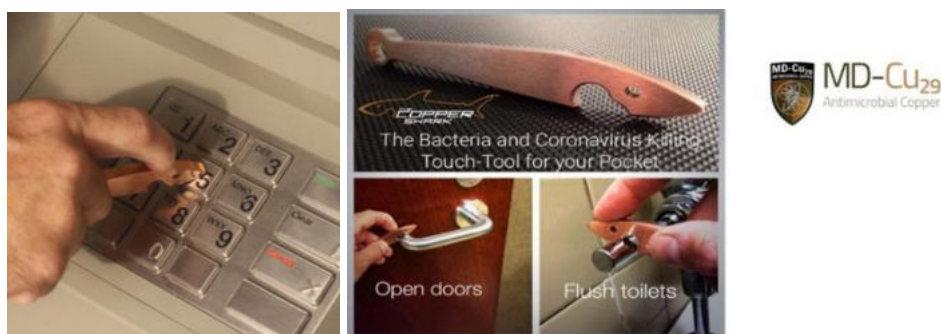


Figure 1: The Copper Shark™ touch tool

Based on the findings obtained [4], the COVID-19 virus can stay four hours on copper surfaces compared to other surfaces, certain up to nine hours [2]. We believe, based on our previous study [11,12,14,15], COVID-19 virus might stay shorter than four hours on the Kahfi Shield due to unique surface properties of the copper coating, which offer nano-sized copper more effective in terms of contact killing, compared to solid copper. Currently, our research group has successfully prepared copper coating with uniform nano-sized copper grain structure, high surface roughness, good wettability and well-adhered coating to stainless steel substrate. Numbers of analysis and characterization were performed on the produced coating including the evaluation of dissolution rate of copper coating in a simulated hand sweat solution and antibacterial activity against *S. aureus* and *E. coli*. The produced copper coating exhibited excellent antibacterial activity towards hospital-acquired infections related pathogens, which are Gram-positive (*S. aureus*) and Gram-negative (*E. coli*). 100 % of reduction within five min of exposure was required for *E. coli*, whereas 10 min of exposure was required for 100 % reduction of *S. aureus*.

Due to the current crisis, it is therefore, the goal of this innovation is to fabricate a hygienic touch tool, which can be used to open lever style doors, turn on faucets, flush toilets and push buttons on ATM's and elevators in public areas. We hope, the usage of the Kahfi Shield as touch tool become an antimicrobial barrier between our hands and touch surfaces that may harbour the disease-causing bacteria and viruses, together with good hygiene practice could help to reduce the spread of infections, improving health and safety to all and reducing the cost compared to replacing conventional touch surfaces with solid copper. The key, perhaps, is to break the chain and reduce the spread of infections. Since nano-sized copper grain structure is more effective than micro-sized copper solid structure in terms of contact killing, an excellent antimicrobial copper coating touch tool (Kahfi Shield) is fabricated via modifying stainless steel surface with uniform nano-sized copper grain structure, high surface roughness, good wettability and well-adhered coating to the substrate.

INNOVATION DEVELOPMENT

Figure 2 shows the results obtained for the characterization of the Kahfi Shield. The Kahfi Shield is fabricated by electrodeposition process with uniform ultrafine nanostructured copper particles (Figure 2a), high surface roughness (Figure 2b), good adhesion between coating and substrate interface (Figure 2c), and environmentally friendly with non-toxic and minimal waste during production. The antibacterial activity showed Kahfi Shield was active against *S. aureus* bacteria within the designated contact time under ambient room temperature and normal humidity conditions (Figure 2d). The bacteria were totally killed with 100 % reduction in cells viability within 10 min of exposure. No reduction in percentage of

viable bacteria when exposed to uncoated stainless-steel surface indicating that the stainless-steel surface exerted no lethal effect.

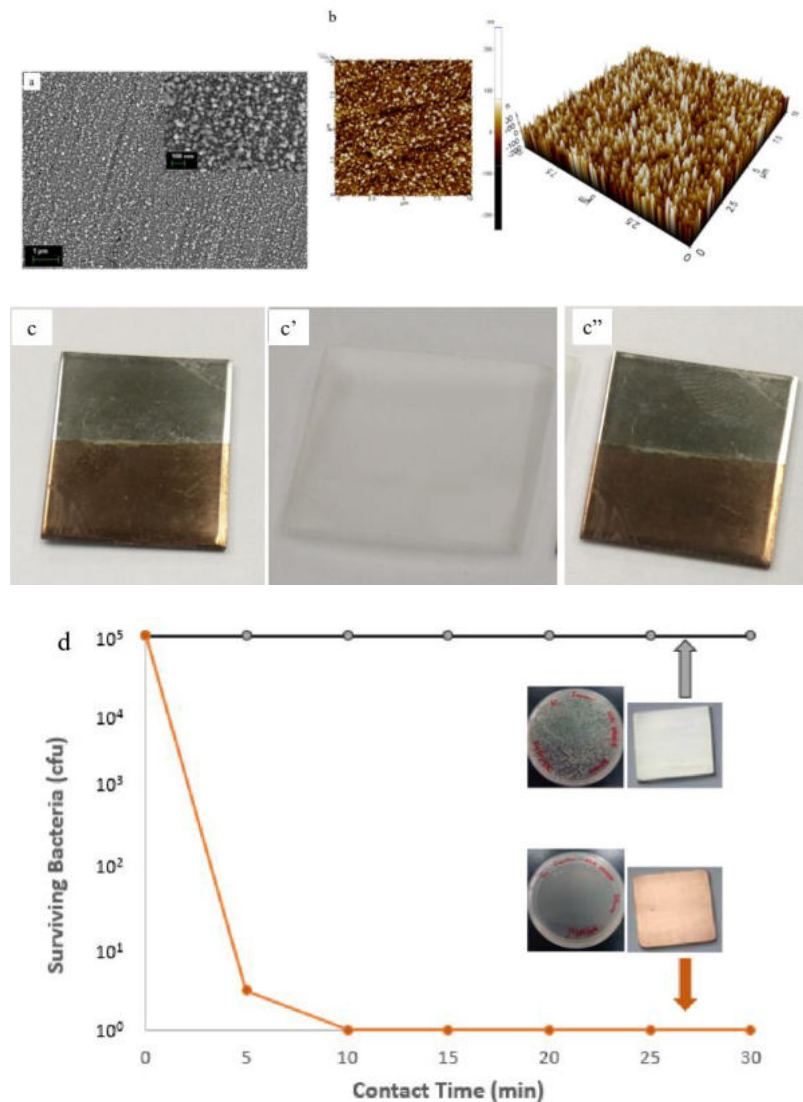


Figure 2: Characterization of copper coating (a) surface morphology, (b) surface topography, (c) adhesion test and (d) antibacterial activity against *S. aureus*

Figure 3 shows the schematic diagram of Kahfi Shield which the stainless-steel substrate was fabricated based on desired design with size 100 mm x 25 mm x 0.5 mm and then coated with copper. The stainless-steel substrate was modified by coating with copper in order to produce nano-sized copper grain structure. The small size of Kahfi Shield, and easy to carry are suitable to be used as travel accessory whilst the design and features offer users friendly and easily gripped to open door handles, flush toilet and press any buttons to prevent avoidable contact. It is also convenient, for those who want to avoid harsh and possibly toxic alcohol-based sanitizers, or who have dry hands or eczema.

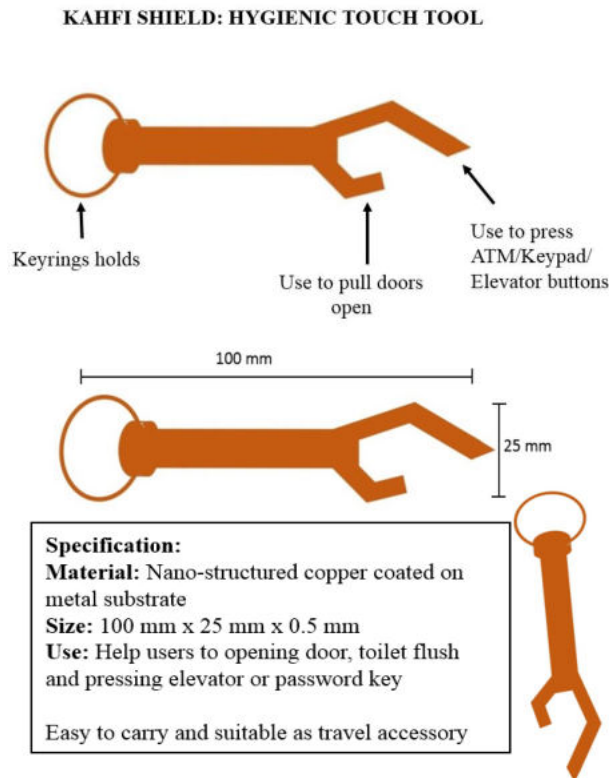


Figure 3: The schematic diagram and features of the Kahfi Shield

Beside good hygiene practice, Kahfi Shield can be used as one of the protection strategies to combat spread of pathogenic viral transmission. The introduction of Kahfi Shield will help to break the chain of infection by acting as a barrier between our hands and contaminated touch surfaces. Kahfi Shield will be highly beneficial, ideal and economic resources especially in the development of antimicrobial touch surfaces.

COMMERCIAL POTENTIAL

Harmful pathogens can survive on stainless steel and plastic surfaces for days, still posing a threat to all who interact with these contaminated surfaces. The Kahfi Shield touch tool can help break the chain of infection by providing a barrier between our hands and contaminated surfaces. Pathogens that land on the Kahfi Shield through a touch are rapidly destroyed, continuously.

The ability to continually develop new alternatives to produce additional weapons in the fight against infections is the major contribution to the success of this innovation. The outcome from this innovation will be highly beneficial for the government and society. The capability of the Kahfi Shield as a touch tool that will help us from touching surfaces that are prone to harmful pathogens. Further study will embark on the production of large touch surfaces commonly used in public areas such as hospitals, playgrounds, nurseries, public transport, shopping malls, etc. Copper coating-based touch tool can bring a new way of thinking and different mindset in the decision to fight against harmful pathogens that cause infections. As stated in a recent publication [4], it was found that coronavirus does not survive past 4 hours on copper surfaces. This finding raises a question: “why are not frequently-touched surfaces made of copper?” Or “May copper be a barrier between our hands and touch surfaces to avoid direct contact to touch surfaces?”.

For the sake of antimicrobial touch surfaces, dry copper surfaces proved to have great killing efficacy against a wide range of microbes [16,17]. When microbes are exposed to copper surfaces, contact killing will take place at the rate of tens to hundreds of millions of bacterial cells within minutes [18]. Cell exposed to copper surfaces accumulated large amounts of copper ions, and this copper uptake will be faster if the surface is rougher and in nano-sized grain structure (based on our previous publications). That is why, we proposed to coat a layer of copper on the stainless-steel substrate for faster contact killing than on solid copper. Hence, from these findings, it is shown that besides good hygiene practice, copper surfaces can be used as one of the protection strategies to combat spread of transmission. The introduction of the Kahfi Shield will help to break the chain of infection by acting as a barrier between our hands and contaminated touch surfaces.

The project is funding by the Ministry of Higher Education (Malaysia) through Fundamental Research Grant Scheme (FRGS) 600-RMI/FRGS 5/3 (139/2015) and Universiti Teknologi MARA through internal grant (GPM) 600-RMC/GPM ST 5/3 (016/2021). At this stage, we focus on formulation of the coating at optimal physicochemical properties, for optimal cost and performance. The success in lab scale and its repeatability is very encouraging. Development using a cost effective and operational simplicity at optimum conditions is translated to lower production cost. The outcomes have been presented at international conferences and published at good impact journals [11,12,14,15]. We have also received 2 Gold, 1 Silver and 2 Bronze medals in innovation competitions. The formulation of the coating has been copyrighted with number CRLY00002511. These achievements motivate us to extend this project for the development of Kahfi Shield and looking forward to the potential for commercialization.

CONCLUSION

Kahfi Shield was successfully designed by coated nanostructured copper onto stainless steel surface using electrodeposition technique at optimum conditions for optimal performance. The uniform nanostructured copper coating onto the stainless-steel surface has high surface roughness and excellent adhesion property at interface. These properties have contributed to the enhancement of antimicrobial activity of copper coating in killing bacteria. As a barrier to avoid our hands directly contact with contaminated touch surfaces, the development of Kahfi Shield will contribute to the additional strategy to reduce the transmission of infections.

ACKNOWLEDGEMENT

The authors wish to acknowledge the Ministry of Higher Education (Malaysia) for the financial support through Fundamental Research Grant Scheme (FRGS) 600-RMI/FRGS 5/3 (139/2015), Universiti Teknologi MARA for internal grant (GPM) 600-RMC/GPM ST 5/3 (016/2021) and Faculty of Applied Sciences, Universiti Teknologi MARA (UiTM) for the facilities provided.

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Thermoelectric Generators Rocket Biomass Cookstove Electrical Power Generation Using Thermoelectric Generators

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ABSTRACT

A cookstove is a combustion device which liberates lot of heat energy during cooking. In India, Africa and other rural communities of developing countries still use a traditional biomass cookstove in daily life. This will lead to indoor air pollution (IAP) and health risks. The excessive smoke increase the air pollution and it is danger to the user especially women. Generally, emissions are seen to increase with increasing power levels. Similarly, higher emissions are observed with smaller stoves. This is due to the lower residence time of fuel in the combustion chamber of the stove resulting in incomplete combustion and hence higher emissions. In this study, the biomass cookstove is improve based on implementation of thermoelectric generator. Thermoelectric generator will collect heat and convert it to electricity. It will provide the user to power a fan, LED light and charging a mobile phone from the generator stoves. This is an approach for electric power generation and pollution reduction can be achieved using stove-based thermoelectric generator. The focus of this research is to design a module using SolidWorks software. There are three modules with different length will be compared on certain aspect such as length, velocity, and temperature. Based on the data, it is found that the module with 400mm length contribute higher efficiency and follow by 800mm and 1200mm length. The TEG module is attached on wall solid temperature. Then, numerical simulation is needed while doing the comparison between previous studies and theoretical evaluation. Rocket stove has been chosen in this research with same material. In this research, the existing of fan will contribute a huge different to rising greenhouse gas emission and environmental degradation.

Keywords: Thermoelectric generator (TEG); biomass cookstove; energy conversion; design; thermal efficiency

INTRODUCTION

Biomass is one of the primary fuels used all over the world. It is intensively used mainly for cooking, space heating and drying. Wood being prime fuel is used extensively since it is available easily and at least cost. By burning of wood, it causes smoke, suspended unburnt carbon. These residues affect environment as well as human beings equally. other than that, the use of biomass such as dried cow dung cake and crop residues in rural is the main reason for household air pollution (HAP) due to incomplete combustion of producer gas and heat losses. According to the WHO (2006) and World Bank (2011) reports, the air pollution gives a major impact in health where the premature death of around 2 million people worldwide[1]. The traditional cookstoves has exposed the user to various diseases such as acute lower respiratory infection, cardiovascular diseases, cataracts, lung function decrement, interstitial lung disease, and respiratory symptoms such as nasal discharge, cough, shortness of breath.

The climate change is one of the results on environment[2]. Currently, the ice melting at alarming rate happening due to main source of pollution clouds over the Indian Ocean. This also effecting the Himalaya and Arctic Sea where they are primarily soot or covered with black carbon particles because of the cooking fires[2]. Current study shows that percentage of India's total populations contribute 66% while 38% of world are using biomass stoves to fulfil their cooking needs. The Government of India has been providing universal price subsidies on LPG for domestic cooking to accelerate to the use of clean cooking fuels for a long time now. However, this subsidy has had a limited impact on household fuel transitions across varied levels of household income groups and rural–urban landscapes. All these leads to more deforestation and that push these people into deeper poverty.

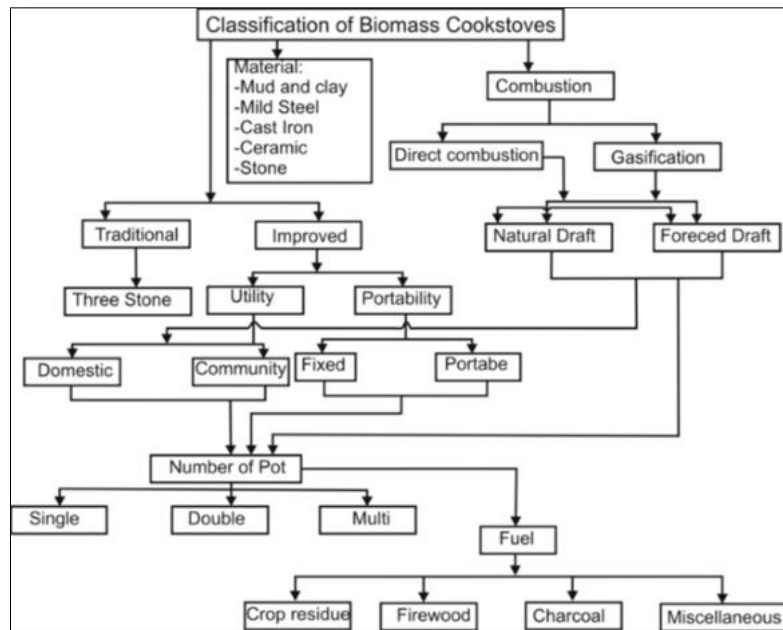


Figure 1: Classification of biomass cookstove[5].

Traditional stove is developed with three stone fires because it is the easiest way to generate flame for cooking [2]. The stones are arranged on the ground to position a cooking pot over the fire that is lit between the stones. They will use any feedstock to produce flame with low heat-transfer and combustion efficiency. As a result, the excessive smoke with high emission of methane, carbon monoxide, nitrous oxides, and black carbon are released due to a low combustion temperature will release to the air [3].

Since the use of traditional biomass cookstove will be use from time to time, so there is a way to help them by improving the design of the cookstove and spare rural communities from acute respiratory infection (ARI). TEG is one of the best choices to ingathering the waste energy and convert it into a useful power. Thermoelectric generator (TEG) is an elective arrangement to have a constrained draft cookstove without depending on an outside supply [4]. Research found that by developing a TEG attached on cookstove where it can generate its own power and reduce dependency on outside power to deliver energy [5]. Then, a sufficient electrical energy for daily usage such as charging phone, LED lights and low powered radio charging [6]. Other than that, TEG range can lessen fuel utilization to be compare with traditional cookstove. It also has capacity on eliminate 98% upon field conditions, maintenance free, silent in operation and involving no moving or complex parts. A small dc-fan is connected to the biomass cookstove as shown in Figure 1 to achieve clean and smokeless combustion and

higher efficiency. This results in a cleaner burning and a more efficient use of fuel. However, the price is considered expensive relative to its efficiency might be difficult for the rural communities to allocate expenses for the improved biomass cookstove [7].

INNOVATION DEVELOPMENT

The used of cook stoves give impact to the environment since it produced a lot of smoke, and this will contribute to the climate change on environment. However, there is a way to channel the liberates the excessive of heat energy with the help of thermoelectric generator. It is very useful since the energy can help in light up the bulb, charging the cell phone and any other device that need small usage of electricity. Firstly, a model design of rocket stove is construct with same size but different number of fans. The DC blower will be use in the forced draft cookstoves. The plan parameters were optimized to extend the in general execution proficiency of the TEG fuelled cookstove. Table 1 showing the parameters chosen for the plan and advancement of the TEG in conjunction with their performance pointers and benefits.

Table 1: Specification of Rocket Biomass Cookstove

No.	Component	Specification
1.	Body Rocket Stove	150 mm X 150 mm X 400 mm
2.	Ash Remover	150 mm X 150 mm X 5 mm
3.	DC Blower (Casing)	100 mm X 100 mm X 5 mm

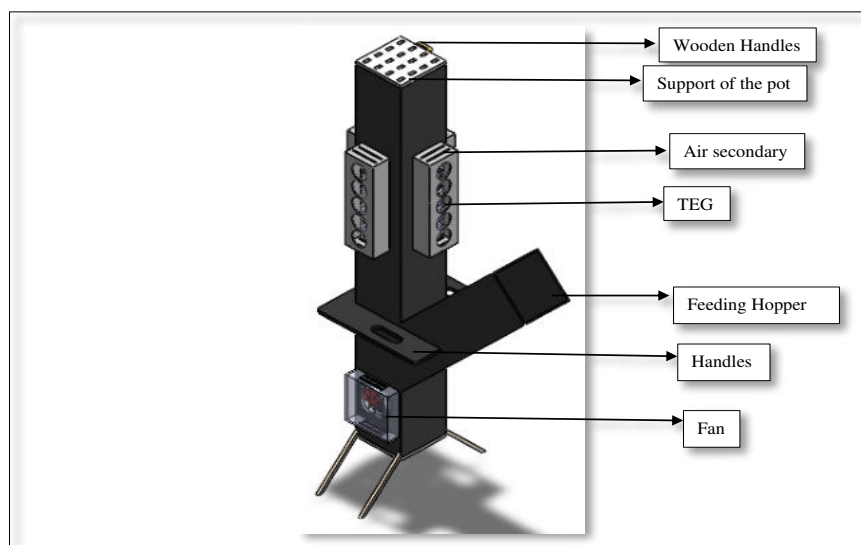


Figure 2: Rocket Biomass Cookstove.

The assembly product show in Figure 2 is produced by few components that have been built separately. The body rocket stove is with 45° of chamber for biomass feedstock. It is design same size as chamber for placing the stove. There is small open on the lid to place the stove for air flow and smoke. This design supposedly portable so that the user can move the stove easily and to make sure the safety of the stove, it is important to put handle around the body. In aspect of removing the ash, there is opening below the vertical chamber. However, it can be closed when it is being used. The ash will be collected on ash tray inside the vertical chamber and to remove them simply open the lid at the bottom area. It is estimate that the amount of generated electricity from the stove will be small, but it can be enough to cover the

needed amount of electricity for charging phones, turning lights on or for running some medical electronic devices, which could make a difference in the lives of less fortunate people. There are still have user who use wood as fuel for cooking and heating. The percentage of the user might be increases since the population will be increase.

COMMERCIAL POTENTIAL

Awareness of clean and improved solutions and their benefits is an important demand driver that has been demonstrated to boost adoption and sustained use of new cooking technologies. The fuel is a good opportunity to improve the performance and user's experience with the cooking system. However, fuels can be a challenging component in the cooking system because designers have little control over which fuel the user will choose. Performance of a given stove is generally different when operated with different types of fuel such as strength of the wood, sizing and the moisture [7]. While a natural-draft wood stove may be designed to operate using 3-4 hardwood sticks at a time with <5% moisture content (MC) in the laboratory, a supply of that exact fuel might not be available in the community. Many cooks will improvise to find alternative solutions. Designing for fuel flexibility is challenging and requires a lot of testing and design iteration. In response to the meal being prepared, household size, availability of fuel, availability of money, or time constraints, it is common for households to practice fuel and stove stacking—mixing use of different cookstoves and fuels [8]. A household may have LPG, charcoal, and wood stoves and use a combination of all three. The more that the designer understands these preferences of and constraints on consumers, the better they can tailor their solution.

The affordability to pay for improved cookstove also might be one of problem they still use traditional biomass cookstove. The traditional biomass cookstove can be use but there are no benefits for them to be compared with improvement biomass cookstove. Although the installation of thermoelectric generator can be installed at exist stove it will need a lot of work due to different house will be using different types of biomasses cookstove [9]. So, it might be possible to do improvement for everyone using their cookstove. Then, with help from others to give them improve cookstove is the only way to give the chance on using improve cookstove.

The traditional biomass cookstove will have to undergoes several design and improvement based on size, material, types of combustion using few software that can be used such as ANSYS, SolidWorks, Computational Fluid Dynamics (CFD) Simulation and MATLAB software[10]. The aim of this software to make sure the module will be capable of solving problems commonly found in design engineering, such as the analysis of displacements, stresses, natural frequencies, vibration, buckling, heat flow, etc [11]. Recently, the study had in common on observation of efficiency, emissions, durability testing, for geometry and materials optimization in the development of advanced biomass of clean and efficient stoves [12]. It is step by step process on sketch into 3D, setting the boundary condition based on purposed design and analyzed the simulation[13]. This processing also to solve mathematical equations of fluid flow. This is a very intensive process and usually it requires the computer to solve many thousands of equations. When the model has been solved, the results can be analyzed both numerically and graphically.

Equations

Simple power-efficiency relations of thermoelectricity. The heat input rate and heat yield rate per couple are gotten by vitality equalizations around the hot and cold intersections. At that point, the condition of warm input rate and warm yield rate can be determined as appeared

underneath. It is the characteristics of the TEGs based on the Seebeck, Fourier and Joule impacts[14]. Where:

$$Q_{in} = 2\alpha IT_H + \frac{2\lambda A}{L}(\Delta T) - \frac{1}{2}I^2 \frac{2\rho L}{A} \quad (1)$$

$$Q_{out} = 2\alpha IT_c + \frac{2\lambda A}{L}(\Delta T) - \frac{1}{2}I^2 \frac{2\rho L}{A} \quad (2)$$

The energy balance that produced by power between the hot side and the cold side will lead to:

$$P = 2\left(\alpha I \Delta T - I^2 \frac{\rho L}{A}\right) \quad (3)$$

As the TEG is open it will produce the highest voltage. The open circuit voltage (V_{oc}) can be expressed using:

$$V_{oc} = (\alpha_p - \alpha_n)(T_H - T_c) \quad (4)$$

The open circuit voltage and the electrical current are given by:

$$V_{oc} = 2\alpha \Delta T \quad (5)$$

$$I = \frac{\alpha A \Delta T}{\rho L (1+m)} \quad (6)$$

To estimate the power output at certain temperature differences is given by:

$$P = \frac{Pref}{\Delta T^2 ref} \Delta T^2 \quad (7)$$

The impact of temperature on the module proficiency is given by Rowe et al.

$$\eta = \left(\frac{T_H - T_c}{T_H}\right) \left\{ \left(1 + \frac{2rL_c}{L}\right)^2 \left[2 - 0.5 \left(\frac{T_H - T_c}{T_H}\right) + \frac{4}{ZT} \left(\frac{L + \eta}{L + 2rL_c}\right) \right] \right\}^{\frac{-1}{1}} \quad (8)$$

CONCLUSION

In this study, the design simulation is drawn using SolidWorks software and CFD of three different height of the rocket stoves is compared. From the results, the rocket cookstove with height of 400 mm performance has been chosen to undergo further simulation after 20 TEG is attached. The total amount of heat generated is effectively transferred to the pot. This is a good indication of improved thermal performance of volatiles at the end portion of chimney height. While for the height of 800 mm, it is found that a moderate thermal performance of volatiles at the end portion of chimney height. According to the result, even the highest rocket cookstove, 1200 mm reach above wall temperature above 244.15 °C but it is lower than wall temperature 400 mm stove which is 283.82 °C. The proposed cookstove was found to be better in terms of emission and performance level. Besides being simple, the proposed cookstove holds high potential for clean and efficient cooking in developing countries. The important of choosing the highest wall temperature for the design because the temperature will be decreasing after the TEG is attached. Future investigations should focus on providing the optimum temperature of hot side and cold side. In this study, the DC blower is set with fixed rotation so that the amount of heat supply will be control manually by the user. By improving the design of DC blower probably an automatic DC blower can be design. An automatic DC blower can reduce the speed as soon as the combustion is decreased in temperature, and it also has maximum speed of rotation. Other than that, a safety design can be improve such as lid to close the open chamber while cooking but has hole to let the excessive smoke to release

safely. It is important to provide an effective and safety requirement in future design. It might be challenging to increase support for clean cooking solutions, while maintaining momentum for intermediate and basic. Then, the government need to support the usage of improved biomass cookstove by providing fund to the user.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my thesis and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor Assoc Prof Ir. Ts. Dr. Baljit Singh a/l Bhathal Singh.

My appreciation goes to my friends especially Azaharul Shahrman Adam and Muhammad Nurshafiq Bin Norizan Zaini for the stimulating discussions, for the sleepless nights we were working together before deadlines, and for all the fun we have had in the last four years.

Finally, I would like to thank my family for continuous support and for the vision and determination to educate me. Alhamdulillah.

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EASY PARENTAL MONITORING APP

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ABSTRACT

"New Norm" as referred to our present pandemic condition COVID-19 where people develop new way of life, working accessibility, and dealing with others. This situation does not reduce the online bullying. Online bullying occurs among the young and old generations. The young generation especially children can easily expose to this threat from the internet. Children nowadays can access the internet easily, spend most of their time on devices and download countless applications on their devices. Even though parents manage to install monitoring applications on their children's devices, the children can uninstall most of the applications. Some features in the monitoring applications are inflexible due to complex functions. Furthermore, it is costly to pay the subscription for multiple devices connectivity. In this work, the concept Easy Parental Monitoring App is designed to reduce the issue for children with online classes activities as well as monitoring online activities out of class session. The design, the layout and the features were developed using a web-based designing tool Uizard.io. As for the control features, Application Programming Interface (API) with JAVA was utilized to request the process from the application and the databases on the application react based on the JAVA programming. The application was tested for each feature in the application to ensure its functions properly.

Keywords: New norm; COVID-19; Easy Parental Monitoring App; children; cyber bullying

INTRODUCTION

The digital platform has become increasingly important. COVID-19, has minimized face-to-face communication. This "New Normal" changes the landscape for the teaching and learning process at schools and educational institutions, working from home and selling and buying the essentials [1]. In addition, the situation has resulted in the rising use of gadgets and the internet among children and teenagers. Their addictions to social media platform such as WhatsApp, YouTube, Twitter, Instagram, and other platforms create concerns to some parents [2]. Without monitoring, the children and adolescents are vulnerable to cybercrimes and indirectly weakens the family institution. Thus, one of the challenges and interventions for digital society in adopting the "New Norm" for parents who do not have time relates to monitor their children online activities. Issues such as how much time a youngster should spend before

a screen; excessive screen time for a youngster from observing and experiencing the regular outdoor activities, may result in a form of 'tunnel vision' that can damage youngster development [3]. Parents also entitle to determine how long their children spending time on screens [4]. Thus, innovation for application in monitoring the children online activities requires some alternatives for parents to reduce the addiction to the devices [5].

In this work, Easy Parental Monitoring App is designed to reduce unlimited access to the phone for parents to control their child online activities. The applications also able to control up to five devices with a single device. Furthermore, the download activities performed by the children can be controlled from the parent's device to prevent from the unpleasant content. Additional filtering feature for bad word is added to counter the cyberbullying issue. Also, another added value features is the removal of icon application on the child's phone is 100% hidden which is commonly available in the existing monitoring apps.

INNOVATION DEVELOPMENT

The specification of the features for Easy Parental Monitoring App caters for the unavailable features in some applications in the market. The features are downloaded app, text-filtering feature, hidden app that can be hidden in a child's phone for the parents to monitor the children's device remotely.

The process for design implementation starts with the idea and the screen concept for the two parts: parents and child phone. The block diagram for device management and screen time limit for parent phone is exhibited in Figure 2.0. The set up starts with the parent must sign in by the email. At the homepage, there will be features for the parents to select, which are screen time limit, list of devices, downloaded apps, and text filter. For a select list of devices, these features will combine with the hidden app feature. Parents can select the list of devices and add new user for the monitoring with by creating new profile user with code to connect with the device. In addition, the screen time limit can be set according to daily usage as well as the on/off bed blocker system. Figure 2.1 depicts the process for device management and screen time limit in child phone. The homepage of a child's phone will not appear the icon for easy parental monitoring app. To illustrate the screen time limit, as the child scrolling the social media or any activities related to media, the notification will appear when the time limit has reached according to the parent's setting time. If the screen time has reached the limit or the bed blocker function at 9 pm the notification will appear on the child's phone, the phone will turn off in 10 seconds.

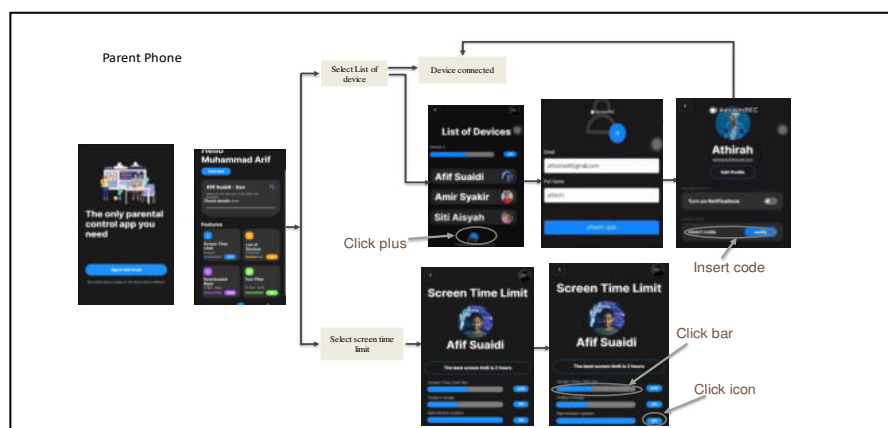


Figure 1: The block diagram for device management and screen time limit for child phone

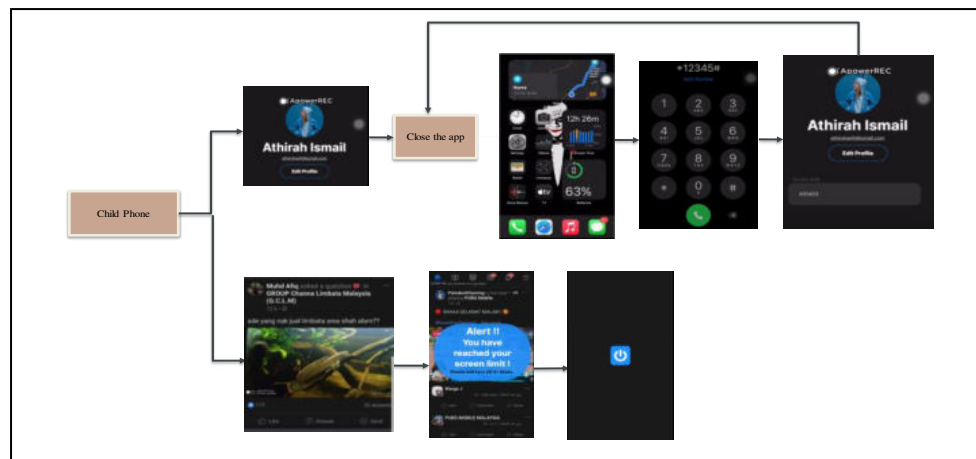
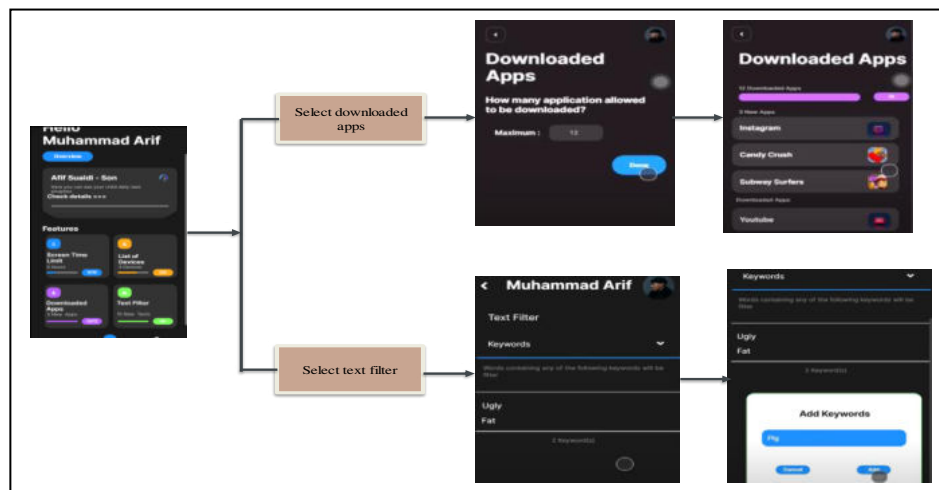
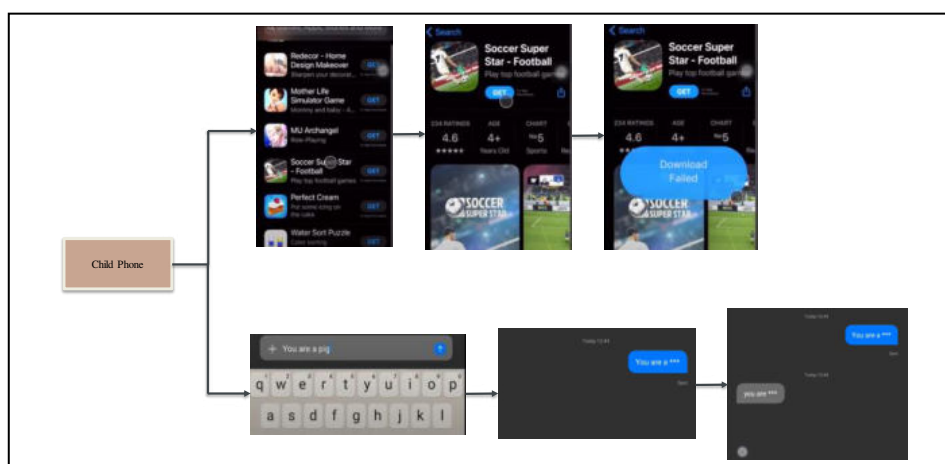


Figure 2: The block diagram for device management and screen time limit for child phone



(a) Parent phone



(b) Child phone

Figure 3: The block diagram for downloaded apps and the text filter feature of parent and child phone

Figures 2.2 (a) and (b) exhibit the block diagram for downloaded apps and the text filter feature in the parent phone and block diagram for downloaded apps and text filters in child phones respectively. Parent can set up the maximum number of downloaded applications for the child. In addition, the parents can select the text filter function to screen the display of the text filter for the child. For the child's phone, when the child opens the Play Store or App Store and selects one of the applications. The notification will appear for the maximum number of downloaded applications. As for the text filter feature, when their child types the inappropriate or receive any inappropriate words, keywords that have been filtered for the word will be replaced with symbol *.

COMMERCIAL POTENTIAL

Several monitoring apps currently in the market such as Qustodio App [6], Norton Family Premier Tool [7], Net Nanny Parental Control [8], Kaspersky Safe Kids [9], Screen Time [10], Unglue Kids apps [11] and Kidslox parental control app [12] were studied. All these applications have common aim for monitoring; however the services are differed based on the design applications. As for instance, Qustodio App [6], Norton Family Premier Tool [7], Net Nanny Parental Control [8], Kidslox parental control app [12] have features for content screening for the child's phone to protect the child for any suspicious activity, within social media apps and services like Instagram, TikTok, and YouTube, for blocking apps, blocking the internet, and filtering web content. As for the screen limit, blocker exist in Norton Family Premier Tool [7], Net Nanny Parental Control [8] and Unglue Kids apps [11]. In conjunction with the above-mentioned instances, the features were incorporated to provide the insight of the specification features for Easy Parental App.

The innovations for the Easy Parental App is packaged for features as summarized in Table 3.1. Figure 3.0 exhibits the overall features specifications for Easy Parental App.

Table 3.1: Easy Parental Application features

Easy Parental Application	Highlights for the child's phone
Screen time limit feature	automatic bedtime blocker at 9pm.
Device management	connect or monitor up to 5 devices without subscription
Applications management	limit and track the downloaded app for the child's device
Text filtering	set up of text-filtering for bad words, the * appear when the child type the bad words
Hide app	parents 100% can access to their child's phone with by dialing *12345# and the app will automatically open.

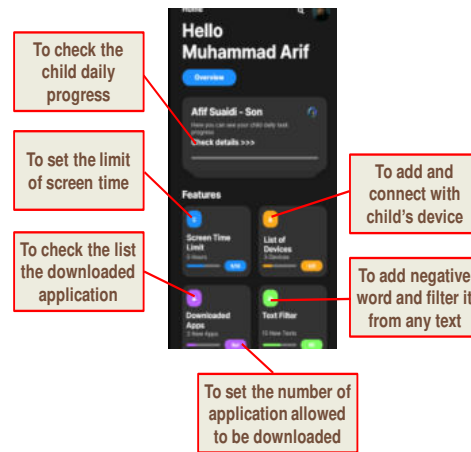


Figure 3.0: Easy Parental App

CONCLUSION

To conclude, Easy Parental Monitoring Apps allows the parents to monitor their children's activities on the device. Parents are only needed to set some limits through the provided features and the application will automatically restrict the activity and provide time limitation for children to use the device. The features include screen time limitation, lists of devices, downloaded apps, text filter, and hidden applications. Parents can add and connect more than one device synchronously. The application, design the layout and the features using a web-based designing tool called Uizard.io. Next, the application will be control by Application Programming Interface (API) with JAVA. API will request the process from the application and the databases on the application react based on the JAVA programming, produce a response for the application to perform as requested. After building the control system, testing each feature in the application was necessary to make sure its functions properly.

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RFID TURBO SCANNER FOR SHOPPING SYSTEM

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ABSTRACT

"Digital Society" is referred as how modern society adopted and integrated information and communication technology at home, work, school, and recreation. Among the transformation that requires digital breakthroughs is line congestion during queuing at the payment counter. The queuing is affecting people's time and emotion especially at supermarket. In this work, Radio Frequency Identification (RFID) item scanner is designed and the concept included the circuit design using Arduino Mega as controller of the system and Bluetooth Module as data communication to the server, RFID system for scanning items, LED bulbs as indicators, LCD display-to-display items bought by customers. The RFID scanner will scan all the items and then the item list as well as the price will be displayed. By using this solution, it helps in speeding up payment process and thus, helps people save time by reducing long queue. Based on the system, RFID can scan multiple items simultaneously which is better compared to barcode scanner that are being implemented nowadays.

Keywords: Digital society; RFID; Arduino simulation

INTRODUCTION

Line congestion has become a serious concern in different sectors in modern digitalized world in embracing new norms. Long line-ups in industries, such as retail resulting in a less productive work atmosphere. Few places such as supermarket, parking space, public transport and hospital or clinic, which related to waiting time in queue, were considered public frequent spaces. In addition, places like spaces to dine in and take away in a famous restaurant, these spaces are often indulge in this kind of situation [1]. Correspondingly, ticketing counter and machine for public transport also relying on physical payment and physical ticketing. In order to buy the ticket, people take quite some time to complete the entire process, which causes line congestion. The situation inside the bus [2] also requires passengers to bring an exact amount of money to pay for the fare. Other instances such as car parking payment machine is easy to use by inserting the ticket and make the payment at the machine payment, but during peak hour there were issues in making car parking payment which people have to take their time to line up to pay their tickets. During peak hours, the situation will become crowded, but with the existing car parking payment system using autopay payment machine, the machine is limited, inefficient and slow to use. This situation also contributes to long queue just to pay for the

tickets [3]. Likewise, in the hospital where patients are expected to receive treatment and services from specialized staff and equipment; the queuing in many hospitals has been a big issue to the public [4]. This is due to the long waiting time to receive health services. Furthermore, the very long waiting time for treatment results in boredom and can cause a patient's health status decline and hence, reduce the treatment efficiency due to patients may not be attended and end up going home without receiving attention.

Waiting time has shown to have negative influence on customer service satisfaction in previous studies. The contentment of customers with the service does not appear to be sufficient to keep them loyal. It is significant to maintain customers with satisfactory services. Hence, in this work, the focus on how line congestion can be reduced and how it can help customers during checkout process at the payment counter is specifically in the shopping system. Some previous studies' methods are costly to retailers, confusing for users to use and not helping to speed up the payment process. RFID Item Scanner concept for shopping system is designed to assist retailers and customers by speeding up the checkout process and can scan items simultaneously.

INNOVATION DEVELOPMENT

Figures 1 and 2 depict the block diagram of the RFID turbo scanner and the flowchart of the system respectively. The Arduino MEGA is a microcontroller that will be configured to scan using an RFID system and report data. The output will be shown on the TFT ILI9341's LCD display. The data will subsequently be transmitted to the server.

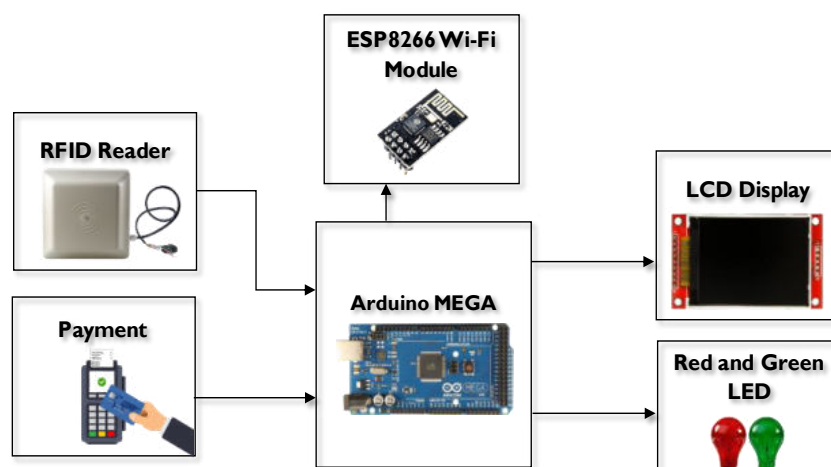


Figure 1: Block diagram of the system

As shown in Figure 2, the flowchart of the system begins by displaying "Welcome" on the LCD display first. Then, the RFID scanner scans the RFID tag making the green LED turn on. If the RFID tag is not present, it will again display "Welcome". If the RFID tag is present, a red LED will turn on and the LCD display will display all the scanned item list and price. Next, the system will ask the customer to make a payment. If the customer does not make payment, the system will reset back the "welcome" display. If the customer makes the payment, the LCD will display "Thank you shopping with us". Subsequently, the system will send the item list bought by the customer to the server.

The circuit of the RFID Turbo Scanner system is designed using Proteus software as shown in Figure 3 (a). The 3D model is drawn as prototype design using Paint 3D software is exhibited in Figure 3 (b). Table 1 summarizes the inputs of this RFID circuit as well as the payment where the outputs are LCD display, green and red LED

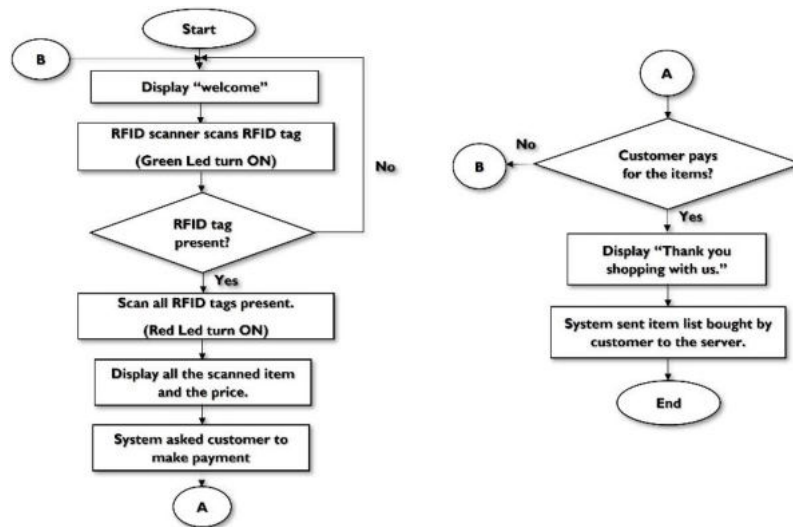


Figure 2: Flowchart of the system

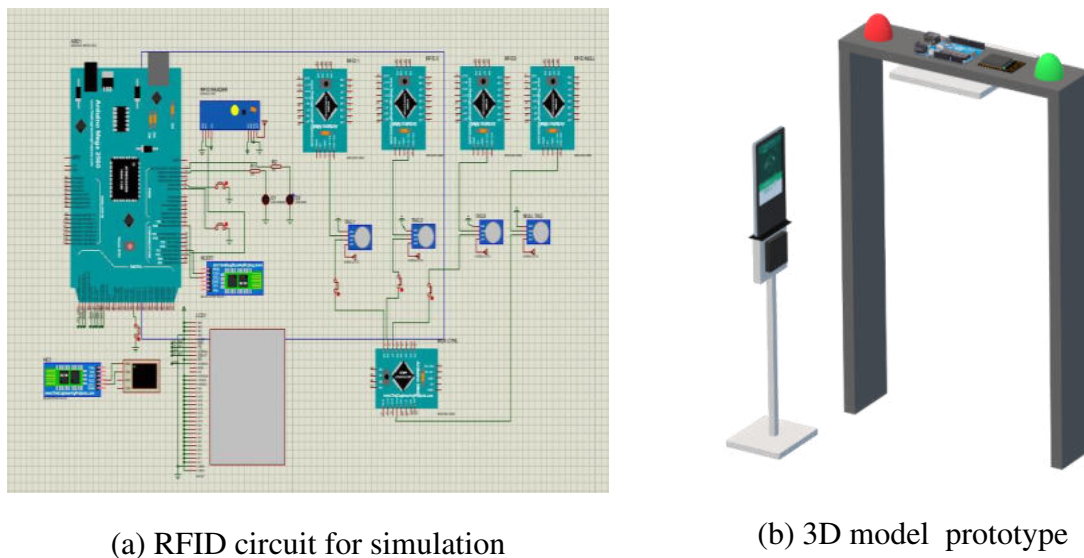


Figure 3: RFID Turbo Scanner system

Table 1: Input and Output of the design system

No	Input	Output
1	RFID Reader -RFID Reader will scan the RFID tag	Green LED turn ON, RFID scanner ready to detect RFID tag. LCD Display displays the items and price. Red LED turn ON, currently serving the customer.
2	Payment -Customer makes payment	LCD Display displays the settled payment and sent to the server via ESP8266.

COMMERCIAL POTENTIAL

Many methods currently available to resolve the queuing issues. There are categorized based on the design to resolve the queuing issues namely applications and systems and self-checkout systems. Table 2 depicts the example of category currently available.

Table 2: Category of method for queuing

	References	Category
QUEQ application	[5]	applications and systems
Tesco and Scan shop app	[6]	
smart parking system	[7]	
Virtual que management system	[8]	
Linear Queuing Systems	[8]	self-service kiosk
Amazon go store system	[9]	
Mobile scanners and smart carts	[9]	
Express self-checkout counter	[9]	

In our work, the survey using google form has shown the responses on the crowded areas and their response toward digital usage on public areas, timing for payment and their emotions toward the when queuing at the payment counter is presented in Figure 3.0.

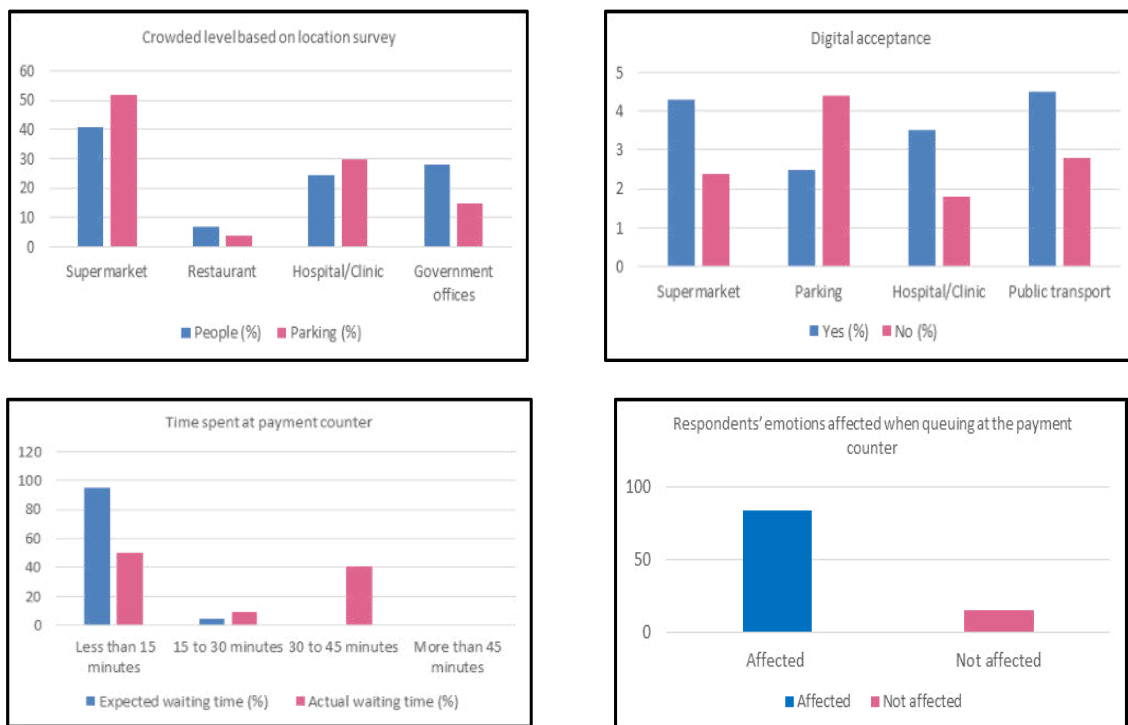


Figure 3: Survey to obtain responses on the crowded areas, digital usage on public areas, timing for payment and their emotions toward the when queuing at the payment counter

In view of these responses, the design using RFID item scanner system at the payment counter is one of the solutions. This is because the sensor can control the crowd when lining up at the payment lane [10]. In addition, cashless payment method added benefits such as better security, more accurate payment transaction and better hygiene [11]. Furthermore, RFID cycle times are more localized around the mean but the mean value tends to vary more than that of barcode. Also, RFID can deliver measurable operational benefits, faster cycle times result in more throughput, productivity benefits and lower product search times [12]. The two self-checkout express counter in single lane can save more time for customers shopping experiences. Customers will also feel comfortable in using self-checkout express counter as self-services as their own. However, supermarket owners should prioritize the extra counter opened for customer that using self-checkout express counter which to avoid line congestion during self-checkout process.

CONCLUSION

To conclude, RFID item scanner system at the payment counter is designed to create and deploy a system that would allow customers to save time when waiting in large lines at the payment counter. The supermarket is the most congested location for line congestion, which is connected to the item checkout procedure at the counter. Slower barcode scanning speed is a factor that contributes to line congestion. The RFID scanner an alternative and the prototype can be visualized using 3D Model representation. RFID item scanners can speed up the scanning process and minimize line congestion at the payment counter. This concept initiative, hopefully, will assist consumers in having a better shopping experience.

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EZ Dumpster

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ABSTRACT

The Malaysia government has conducted various programs and campaigns about environmental cleanliness and recycling. Unfortunately, it is found that about 19 million Malaysians choose to throw rubbish everywhere. This mentality and habit of communities who are throwing rubbish have become a serious issue as it will affect Malaysia initiative to become the cleanest and most environmentally friendly country. This project aims to enhance the community's interest to preserve the environment in an eco-friendly way for a better future life. Also, to attract communities to dispose of rubbish in the right place and being rewarded. The EZ Dumpster is introduced to improve existing garbage bins and plastic bags into a digital concept. With the easy, eco-friendly, and rewarding features, the eco plastic bag can be obtained at collaborated convenient stores at affordable prices and users can get a reward after throwing the trash into the digital dustbin. The EZ Dumpster is integrated with the user's E-wallet account. This product innovation has the potential to be marketable since the digital dustbin will be placed in many attraction places. In a nutshell, the EZ Dumpster portrays our self-identity and self-fulfilment by creating a trendy phenomenon and upholds Malaysia's agenda to become green technology, environmental sustainability, and social inclusion.

Keywords: Innovation; environmental; cleanliness; eco-friendly; digital dustbin

INTRODUCTION

EZ Dumpster Apps is an amazing product innovation that integrates an eco-friendly plastic bag as well as a digital garbage bin. This idea is inspired to improve the existing garbage bins and plastic bags to be more attractive and worth, environmentally friendly, and suits the country's objective of educating the communities to better maintain environmental hygiene.

The President of Manjung Municipal Council (MPM), Syamsul Hazeman Md Salleh expressed his frustration due to garbage collection on the beach has doubled and surprisingly the garbage collected is estimated at 250 kilograms (kg). He added the number of bins provided is sufficient, in fact, some bins are not full but the rubbish is still placed on the side of the bins [1]. In addition, the Minister of Housing and Local Government, Zuraida Kamaruddin, 60 percent of the 32 million Malaysians are still 'not good at throwing rubbish into the bin. She added that the culture we want to adopt is that people have to look for rubbish bins, not rubbish bins looking for people [2].

The Environmental Performance Index (EPI) 2020 shows that Malaysia is ranked 68 with a score of 47.9. Meanwhile, the waste management category ranked Malaysia at 33rd with a

score of 81.4 [3]. Referring to the Garbage Collection Generation Data, an estimated 14 million tons of garbage a year will be collected by 2022 [4].

According to [5], the Malaysian Government currently has introduced Seven Fast-Evolving Technology methods including National Policy on Industry 4.0 and Smart City. This indicates that Malaysia is moving forward to digital technology at par with the developed countries. Further [6] states 84 percent of mobile users used their apps daily and spent their time mostly on social and communications apps. In line with these statements, The EZ Dumpster Apps is initiated to make it more fun, valuable, and attractive towards the clean environment.

The main objective of EZ Dumpster is to raise the community's interest in keeping the environment clean. It is believed that redesigning the existing recycling program to attract the community be more excited to preserve the environment in an eco-friendly way. Indirectly, implementing EZ Dumpster can foster communities to practice a modern lifestyle without polluting the environment. Furthermore, it will have a greater impact on the country to stay up to date with the technical advancement by introducing the digital dustbin.

The EZ Dumpster will collaborate with the Ministry of Environment and Water (KASA) through the Department of the Environment (DOE), Ministry of Science Technology and Innovation, Ministry of Higher Education, and Convenient Stores such as 7 Eleven, Watsons, Guardian, and Petrol Station Petron and Petronas in supporting the campaign about recycling and promoting EZ Dumpster.

INNOVATION DEVELOPMENT



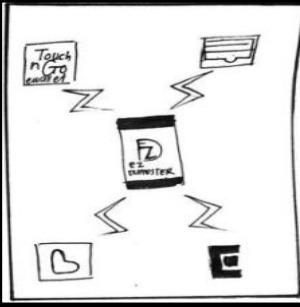
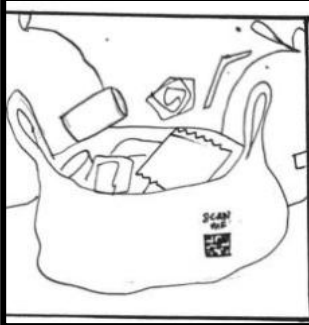
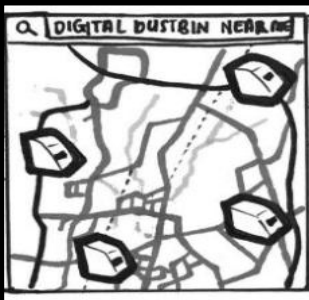
The concept of EZ Dumpster is to improve the existing garbage bins and plastic bags into a product that is more digital use. Besides, EZ Dumpster also implements a system that offers reward point to the users' E-Wallet. The reward point can be credited through Touch N Go, Shopee, Grab, or Boost. The eco plastic bag can get from any collaborated convenience store. For EZ Dumpster account registration, users are required to scan the QR code in the plastic bag. Once ready, the EZ Dumpster concept required a user to scan the QR code at the plastic bag to redeem the points and also to scan the QR code on the digital dustbin. If not, the lid will not open. Then, users will get a reward point whenever they throw the trash using the plastic bag by scanning at the digital dustbin.



The rapid prototype of the EZ Dumpster is presented in two different forms, which are EZ Dumpster Applications and the storyboard of the EZ Dumpster.

Storyboard of EZ Dumpster

The storyboard of the EZ Dumpster consists of 7 steps as shown in Table 1.

Table 1: Storyboard of EZ Dumpster

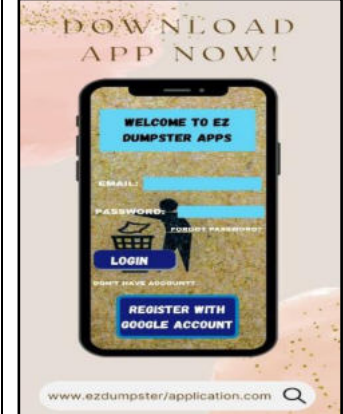
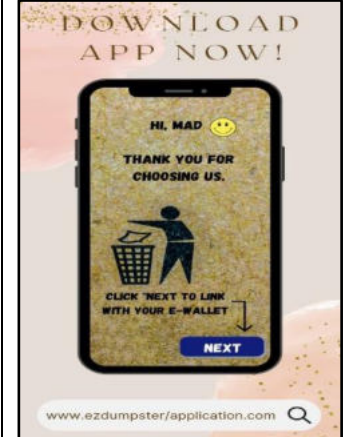
Illustration	Explanation
	Step 1: User buy a plastic bag from any convenience store (7 Eleven, Watsons, Guardian, and Petrol Station Petron and Petronas)
	Step 2: Scan EZ Dumpster QR code to install apps and register.
	Step 3: User can link their EZ Dumpster account with the E-wallet.
	Step 4: The rubbish that users want to dispose of can be collected and placed in a plastic bag.
	Step 5: The user needs to find the digital dustbin which is nearby them.

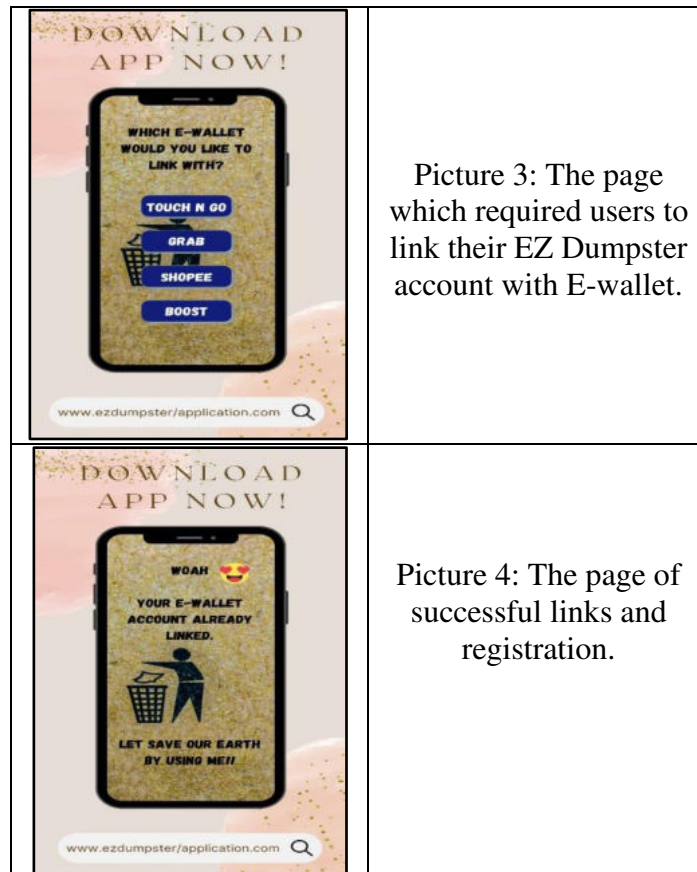
	<p>Step 6: Users need to scan the QR code stated on the plastic bag to open the digital dustbin.</p>
	<p>Step 7: The reward point will automatically credit to the user's E-Wallet and continue the practice</p>

EZ Dumpster Applications

The steps of EZ Dumpster Application are presented in Table 2.

Table 2: EZ Dumpster Applications

Illustration	Explanation
	<p>Picture 1: The front page of EZ Dumpster Application which required users to Log In.</p>
	<p>Picture 2: The home page of EZ Dumpster contains greeting for users.</p>



COMMERCIAL POTENTIAL

With the features of easy, eco-friendly, and rewarding, this EZ Dumpster contributed to the environment and society through the i) Self –Identity: with the EZ Dumpster to show we care and let’s do it together; ii) Self-Fulfilment: an easy to practice environmental care program that helps to save the earth while being rewarded; and iii) collecting trash from being dumped everywhere is a good habit and creating a trendy phenomenon. The EZ Dumpster has a greater impact on Malaysia’s reputation and also supports the Malaysia initiative in strengthening Malaysia’s green recovery efforts in the development agenda. The targeted users of EZ Dumpster involve mixed groups of people from different backgrounds such as university students, public transport users, and local communities. This product innovation has the potential to be marketable since the digital dustbin will be placed in many attraction places including universities, public areas such as a recreational park, shopping malls, and public transportation stations. Further, the use of an E-wallet makes this initiative more enjoyable in collecting users’ reward points. In regards to technology readiness, most of the users are already exposed to the products and services that utilize cutting-edge technologies i.e. Apps, QR code systems. Hence, it is considered a perceived ease of use as it is simple to apply EZ Dumpster.

The EZ Dumpster innovation is not created for solely profit. It was created with the primary purpose of encouraging the community to collect idle garbage, get reward benefits through E-wallets as well as to make our earth cleaner and less polluted. Therefore, the revenue stream obtained from selling an eco-plastic bag with the cost of RM10.

CONCLUSION

The application EZ Dumpster in accordance with developing digital innovations to encourage consumers to practise the environmental sustainability. It is believed that the implementation of a digital dustbin called EZ Dumpster by rewarding the users after use could change people's behaviour for keeping the environment clean. The project of EZ Dumpster prioritizes public areas to attract community interest in recycling and keeping the environment clean. In future, the EZ Dumpster can collaborate with other business sectors in generating the income for both parties as well as future generation. For instance, EZ Dumpster would approach Nestle as they are committed to make 100 percent of its packaging, recyclable and reusable by 2025. Moreover, the EZ Dumpster can be expanded in a wide geographical area.

ACKNOWLEDGEMENT

A thousand of gratitude to Lecturer and Mentor, course Innovative Thinking Strategy (ASM657) for the guidance in completing this project. Thank you to the Faculty of Business and Management, UiTM Campus Selangor, Puncak Alam Branch for the support in this competition. A big congratulations to all team members that have contributed to designing the EZ Dumpster.

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The Invention of KidCadTech STEM Module Solution

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ABSTRACT

According to the Minister of Science, Technology & Innovation, Datuk Seri Dr. Adham Baba, the percentage of STEM student must increase to 60% to ensure the country has an adequate supply of talent pool in the country. Citing the Education Ministry's 2020 Annual Report, the Science, Technology and Innovation Minister said the percentage of students in STEM was 47.18%, with 20.51% involving Pure Science, while the remaining 26.67% was for Technical and Vocational Education and Training (TVET). KIDCADTECH is a series of hand's-on teaching and learning kits for stem subjects. The kits are to solve the problem among teachers and students. The negative reactions in High School Stem Subject, Reka Bentuk Teknologi (RBT), are pretty common, particularly for Form 1 and 2. The failing grades among the RBT students yearly is a factual statistic. The teachers and students have stated that they do not have suitable teaching aids for many topics in the RBT subjects. This issue is monumental. If we don't address these complaints, we will see further downgrades of our GDP in the coming years since research has concluded that 70% of GDP has been primarily attributed to the STEM workforce. KIDCADTECH is a STEM (Science, Technology Engineering and Mathematics) based product in education. KIDCADTECH is to assist teachers by making teaching easier in designing technology subjects. Students also can use these teaching aid materials on their own. KIDCADTECH series of products is a kit in a box with a unique self-assembly/construction to aid in teaching specific subjects. Subjects such as robotics, electronic aquaponic, mechanical, and others. KIDCADTECH also uses Augmented Reality to engage and assist with understanding the topics.

Keywords: STEM (Science, Technology Engineering and Mathematics); learning kits; augmented reality

INTRODUCTION

As a social institution servicing societal demands, education is essential for society's survival and growth. It must not only be comprehensive, long-term, and excellent, but it must also adapt over time to meet the difficulties of a rapidly changing and unpredictable globalized world. School teachers, college professors, administrators, researchers, and policymakers are expected to innovate the theory and practice of teaching and learning and all other parts of this

complex organization to assure the quality preparation of all students for life and work. In this paper, we examine educational innovations, identify challenges to innovation, and sketch out prospective routes for practical innovations. We discuss the current state of innovation in Malaysian education, including what educational innovation is, how it is implemented in schools and colleges, why innovations do not always have the desired effect, and what should be done to increase the scale and rate of innovation-based transformations in our educational system. Following that, we make proposals for the expansion of educational innovations.

Innovation and evolution are essential for an individual, a nation, and humankind to survive and progress. Innovations in education are significant because education plays a crucial role in creating a sustainable future. "Innovation resembles mutation, the biological process that keeps species evolving so they can better compete for survival" (Hoffman and Holzhuter, 2012, p. 3). Innovation, therefore, is to be regarded as an instrument of necessary and positive change. Any human activity (e.g., industrial, business, or educational) needs constant innovation to remain sustainable. The need for educational innovations has become acute. "It is widely believed that countries' social and economic well-being will depend to an ever-greater extent on the quality of their citizens' education: the emergence of the so-called 'knowledge society, the transformation of information and the media, and increasing specialization on the part of organizations all call for high skill profiles and levels of knowledge. Today's education systems are required to be both effective and efficient, or in other words, to reach the goals set for them while making the best use of available resources" (Cornali, 2012, p. 255).

To innovate, we must think beyond what we are doing now and develop a creative idea that will allow us to conduct our jobs differently. The goal of each invention is to develop something different from what we have been doing in terms of quality, quantity, or both. The researcher must put the innovation to work to have a significant, transformative impact, requiring rapid dissemination and large-scale application. As a result, innovation necessitates three primary steps: an idea, its implementation, and the outcome that arises from the concept's execution and results in a change. In education, innovation can take the form of a new educational theory, methodological approach, teaching technique, instructional tool, learning process, or institutional structure that, when implemented, results in a significant change in teaching and improved student learning. As a result, educational innovations aim to increase learning productivity and efficiency while improving learning quality.

The amount of time, money, and resources required to achieve specific goals measures efficiency. In education, learning efficiency is primarily determined by time and money spent. Learning is more efficient if we can attain the same achievements in less time and for less money. Estimating the outcomes obtained vs. the work expended to reach the result is calculated productivity. As a result, productivity rises when we can accomplish more with less effort. As a result, educational innovations should enhance both learning productivity and efficiency. Meanwhile, In Malaysia, Education has always been a contentious debate topic, regardless of the venue: a meeting at the Ministry of Education, a conference, a forum, a blog, a teacher-parent meeting at school, in the classroom, or around the dinner table. We all prefer to contribute our opinions on efficient schooling, whether we are specialists, have undergone basic professional training, or speak from our personal experience as past pupils.

Our educational systems have progressed from the classical Trivium via methods and approaches such as The Silent Way or the Total Physical Response to the full-scale deployment of ICTs, driven by the goal to find the perfect "recipe" for 100 percent successful learning. New classroom ideas, methods, and techniques are constantly being invented, argued, applied, and

subsequently replaced with newer, more effective approaches, methods, and techniques. Is the ideal 'learning recipe' a pipe dream? Perhaps it is? But there is one thing we can all agree on growth is impossible without education. To learn more about the relevance of technology in education, go to Immerse Education. In the development of education, the essential thing is to know what teacher will use materials and requirements in the learning environment in the classroom. To test the effectiveness of technology in education, we should do a study in the field to produce various teaching aids for learning and teaching use.

One of the teaching aids used is to apply innovation into education to make it a valuable resource for use in the classroom. The purpose of this study is to identify the appropriate teaching and learning kit to apply in education so that the effectiveness of the use of this material as a learning material can provide a positive and effective impact on users, especially on school students and teachers. This study also explores the relationship that innovation can bring to be absorbed in daily education in schools, especially in the classroom, to enhance student learning to create critical thinking and problem-solving.

INNOVATION DEVELOPMENT

The learning kit is defined as comprehensive teaching material for learning topics (Dewan Bahasa & Pustaka 2007, p.48). Different teaching aids for a subject can be developed and prepared. Teaching and learning kits are instructional tools stored in containers (plastic, boxes, wood, etc.) (Norzainariah Abu Hassan, 2004). This storage is designed to make management and storage easier. Learning kits usually have non-electronic visual equipment and material, such as alphabet cards, storyboards, photos, plastic blocks, story cassettes (Norzainariah, 2004), and boxes, with tools used throughout the learning process and other activities (Prihatiningtyas et al., 2012). The learning kit is intended to facilitate students' learning and understanding of the topic. The learning kit is used as a learning strategy to help improve student performance that teachers can implement. The students' achievement through learning kits will be more effective, and students can understand and master a concept and improve the test results in the classroom.

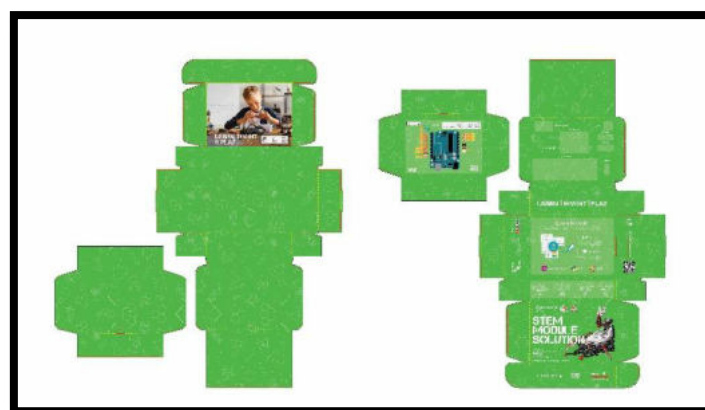


Figure 1: STEM Module Solution Technical Drawing

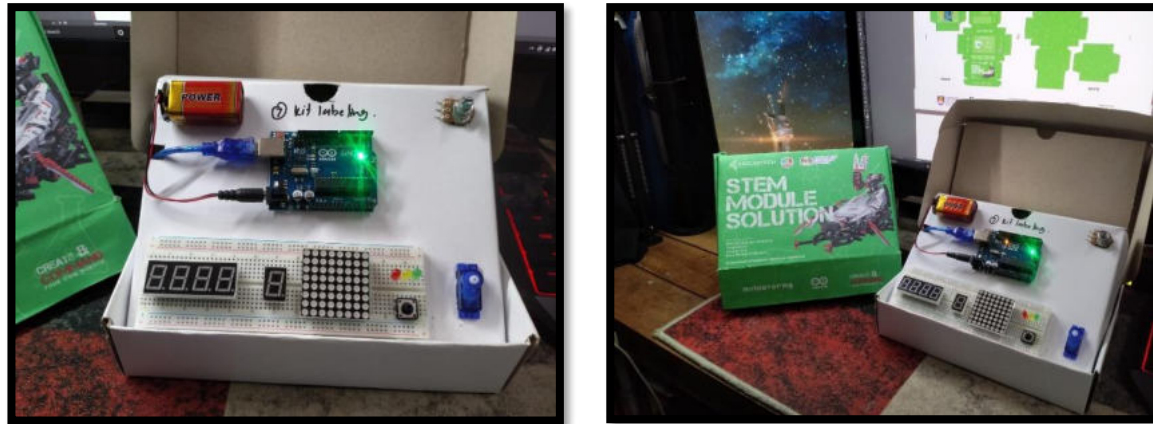


Figure 2: Product Mock Up & Prototype

The invention of a KidCadTech Stem Module Solution begins with using a fluted box for a printed product that can be used as an educational tool. This Stem Module Solution innovation can be viewed as a structured material set for the time being. A Stem Module Box for Education may support a course purpose, a course target, a subject, a principle, or a theme. Instructors can set a structured path through the content objects using a storyboard or a collection of dependencies. Understanding the first notion relies on knowing the second notion. Alternatively, teachers may encourage learners to explore the content in any order and speed in a Learning Module. Education is the most critical factor of everyday life to make it more advanced. Information is often divided into hundreds or even thousands of elements, and technology and robotics are some of their sciences. It contains hands-on instructional kits when it comes to innovation and technology as shown in figure 2. An education module box with almost all the kits used to learn about technology and robotics was born in this respect. Pleasure is also required in the best way and method when finding information. This product makes it essential for teachers and students to build and use this box for this education module.

When education becomes part of human life, education is the primary goal of progress—talking about the development and creation of something modern that is more sophisticated and seeks to promote human work. These changes and innovations are necessary because they must keep pace with the rapidly changing modernization trends. Building and developing a package to satisfy the ever-changing demand is also essential, depending on the situation and needs. The reforms centered on collecting and bundling all the kits required for education in a box used for education. Besides that, it also has its Augmented Reality (AR), which enables digital information to be superimposed and integrated into our physical environment. AR is a tool that can help us transform our immediate surroundings into learning, work, and entertainment spaces as its novelty, as shown in figure 3. Next, this Stem module box also has used the benefit of social media, a filter used in taking photos or selfies that users can use for education purposes. Figure 4 shows that this box contains QR Code so that the student can download our own Instagram filter to attract others to promote technology used in education.

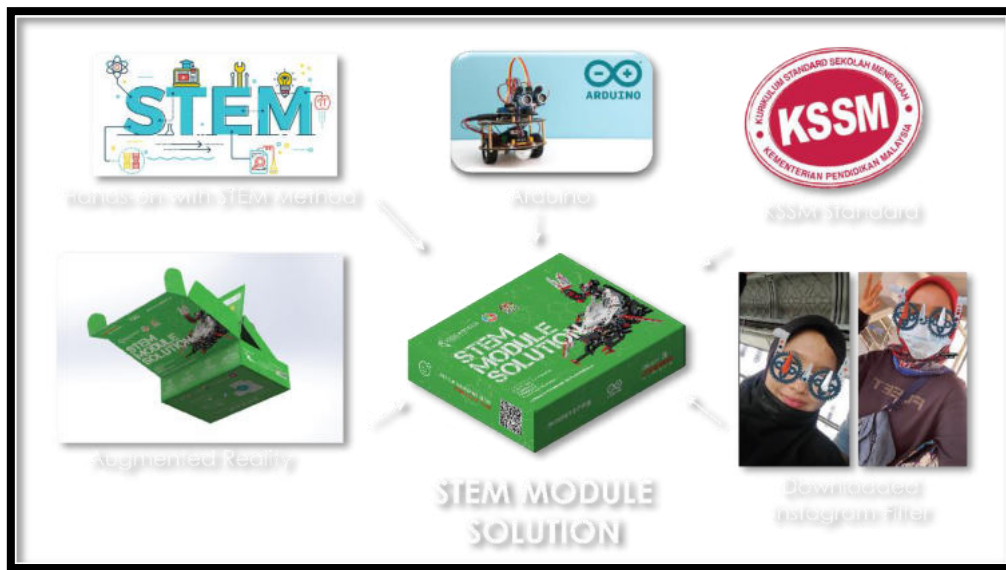


Figure 3: STEM Module Solution Innovation



Figure 4: STEM Module Solution AR Target and QR Code for Instagram Filter

COMMERCIAL POTENTIAL

Commercialization moves technology or innovative concepts from the idea stage to the marketplace. In other words, technology commercialization is commonly defined as creating a product suitable for a particular market at an affordable price that fulfills the market's demand. When we talk about marketing in the education sector, we must look at this from various angles because education involves many parties, including students, parents, teachers, lecturers, the ministry of education, and other educational institutions. To solve some problems in education, one needs to go through several things, starting with identifying the problem, validation with various parties up to the stage of construction of a product or solution with clear and simple objectives. The demand for teaching aids is always high when education is also constantly moving towards technology as researchers in the field of r & d need to be sensitive to the current circulation of technology. To sell these teaching aids, we need to identify the market to market

this product, and this can be done when the number of students in secondary and primary schools has 4.9 million students. We only target 5% of that number by bringing 100 thousand users in the early stages of construction and marketing as shown in figure 5.



Figure 5: Target Market for Commercial

CONCLUSION

At the end of the education and learning process, teachers can also achieve the expected learning goals in every subject. In a study by Jasmi et al. (2011), kit aid enhances teachers' efficiency of student-centered learning. In their study, teachers participated only 25% in the classroom. The abstract content can also be explained by using the learning kit. This facilitates students' understanding of the subject (Mohsin & Hassan, 2011). Indirectly, using right and multi-faceted learning kits can achieve students' passive behavior because they can stimulate their interest in continually participating and motivating and wanting to learn about education (Nurhanim Saadah et al., 2013). Therefore, learning is no longer dependent on traditional equipment as a medium for education, like chalk, blackboard, and textbooks (Ahmad Zanzali & Daud, 2010; Haizum Hanim Ab. Halim & Lai, 2011). Learning kits, therefore, play an essential part in enabling students to understand a concept easily in their teaching and education and attract them. The utilization of teaching kits in education and learning is an alternative to teaching and learning success. The role of teachers is essential to make the classroom creative.

A quality educational kit starts with attractive packaging and has its distinctive appeal. This research has clearly shown a good impact on consumers, especially its use in education. Printing quality and design are the most critical aspects of producing a quality printing box. It is a sector that has no limits when it comes to education, but the aspect of delivery in education is the most emphasized. We need to take various suggestions and views as a starting point to something greater and quality. Building a brand in education should also emphasize the quality aspect for use by students. We must take the initiative in always trying to convey something useful. The effectiveness of this Stem Module Box surely can be a recommendation for future research depending on how it will impact learning in the classroom.

ACKNOWLEDGEMENT

The research is under Malaysia Social Innovation Accelerator Program (MySIAP) Development Grant under Yayasan Inovasi Malaysia (YIM) and Ministry of Science, Technology and innovation (MOSTI). Part of this work was supported by Universiti Teknologi MARA (UiTM) and Innovation and Technology Managers Association Malaysia (ITMA).

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Stable and Reliable Synthesis of High Yield Graphene Oxide (GO) Nanostructures via the Modified Hummers Method

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ABSTRACT

Graphene oxide (GO) has certain unique properties for different applications. In the chemical sense, GO is the oxidation form of graphene. It is produced chemically by oxidizing graphite. GO is structured differently with graphite and graphene, where the GO's plane is attached to oxygen functional groups. Currently, the modified Hummers method was the most widely used approach for preparing GO. This study aims to optimize the GO synthesis using a modified Hummers' method. Scanning electron microscopy (SEM), UV-visible (UV-Vis), energy-dispersive X-ray (EDX) and X-ray diffraction spectroscopy (XRD), are used to characterize the synthesized GO samples. A high yield of GO was synthesized with simple and safe protocols (not releasing toxic gases), quick reaction time, and low production cost. This GO sample can be employed as a fundamental material for future applications, such as gas sensors.

Keywords: Graphene oxide; modified Hummers method; oxidation; yield

INTRODUCTION

Graphene is a substance that has received a lot of interest recently because of its unusual characteristics and numerous applications [1]. Graphene has been studied extensively in the recent decade in materials science and engineering, biology, physics, and chemistry. Graphene materials have sparked a lot of excitement since they were first mass-produced in the lab and used in various innovative applications [2].

The oxide form of graphene called graphene oxide (GO) has excellent dispersion properties in water and other polar fluids because of the high density of oxygen functional groups [3], hence making it easily exfoliate in aqueous media. The main oxygen-containing functional groups distributing on GO nanosheets structure (see Figure 1) are rich with carbonyl (C=O), carboxylic (-COOH), phenolic hydroxyl (-OH), and epoxides (C-O-C) groups, hence, dramatically affecting the material's properties, opening the door to new scientific and technological possibilities [4]. Its carbon atoms are slightly sp^3 -hybridized, thus they can move above or below the graphene plane [5]. Oxidation levels and the proposed synthetic route have an impact on the ability of GO conduction. Graphene-like sheets are formed by reducing GO, which removes the oxygen functional groups while retaining the π -conjugated network, GO's most intriguing characteristic [6].

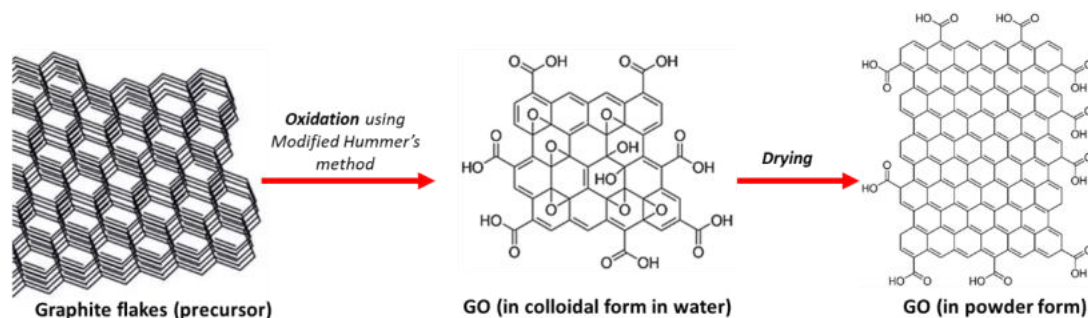


Figure 1: Graphite and its transformation to GO structure in suspension with water (colloidal form) and powder form.

The manufacture of GO has recently gained a great deal of interest as a viable intermediary for the mass manufacturing of graphene [7]. The most common approach to words graphite exfoliation is strong oxidizing agents to obtain GO [5]. GO's industrial-scale production is a major advantage [8]. Because of their high yields and ease of control, a chemical method like the Hummers method are the most often used method for producing graphene [9]. Also, because of its great efficiency and excellent reaction safety, the Hummers method has received the most attention for GO synthesis [10]. Another method that changes or improvises upon the Hummers synthesis route initially proposed is considered a "modified Hummers method" [11]. For more than a century, GO has been used to increase the yield of graphite exfoliation by reacting graphite powder with a strong oxidizing agent such as potassium permanganate (KMnO_4) in concentrated sulfuric acid (H_2SO_4) [12].

However, current GO production methods through reported Hummer's method have a limitation, such as the release of toxic gases such as nitrogen dioxide (NO_2) and dinitrogen tetroxide (N_2O_4) during the oxidation process [13], time-consuming in which up to several days of synthesized reaction [3], [14], [15], high-temperature annealing [3] and cost production is very high [16]. Aiming to improve the GO synthesis method utilizing the modified Hummer's method, the motivation of this innovation is to assess the reliability of the synthesis procedure and the simplicity of the setup, taking into an assessment of the most promising approaches in terms of the simplest concepts possible, time-consuming, production cost, and environmental impact of the process.

This study used a modification of Hummer's method to synthesize high-quality GO, which only takes a few hours to complete (see Figure 1). The oxidation process can be completed within three hours of starting the synthesis process. An added benefit of unemploying sodium nitrate (NaNO_3) (compared to conventional methods) is the reaction free of harmful gasses by-products like NO_2 and N_2O_4 produced throughout the experiment. Furthermore, it has a high-water solubility, is simple to functionalize, and is easy to manufacture, making it a common precursor to graphene. On top of that, a low-cost experimental setup with a simple setup and readily available instrumental equipment makes for a more affordable experiment. Moreover, our GO products can be delivered either in suspension in water (colloidal form) or powder form depending on the next application of this material, hence can be suit in many advanced applications especially in biomedical (e.g., drug delivery, cell imaging, biosensing), gas and microelectronic devices and electrochemical sensing, energy storage material (solar cell, battery) or in water treatment application, etc.

INNOVATION DEVELOPMENT

Synthesis of GO

Figure 2 illustrates the entire process of synthesising GO from pure graphite powder using a modified Hummers method. Firstly, H_2SO_4 and placed into the conical flask which was set up in an ice bath on a hot plate stirrer. After that, graphite powder was added to the conical flask containing H_2SO_4 . Next, KMnO_4 was added very slowly, the temperature was kept below 20°C , and the solution was left to stir for 3 hours. After finishing stirring for 3 hours, the ice bath set-up was removed. Next step, 50 mL of ultra-pure water was added very slowly, and the temperature was kept below 50°C throughout this oxidation process. Later, 100 mL of ultra-pure water was added to complete the oxidizing process of the remaining graphite. Next, H_2O_2 was added to complete the reaction and at the same time to remove the excessive amount of KMnO_4 . The mixture was left to cool at room temperature and remain undisturbed overnight.

Following the process, the mixture was washed three times with 5% v/v of HCl and repeatedly centrifuged for 10 minutes at 6000 rpm for each washing process and finally rinsed with distilled water 6 times by repeatedly centrifuged for 10 minutes at 6000 rpm; respectively [4]. A drying process using a universal oven is then carried out to produce GO powder. It was an enhancement in the washing and drying processes that resulted in the GO synthesis process's innovation.

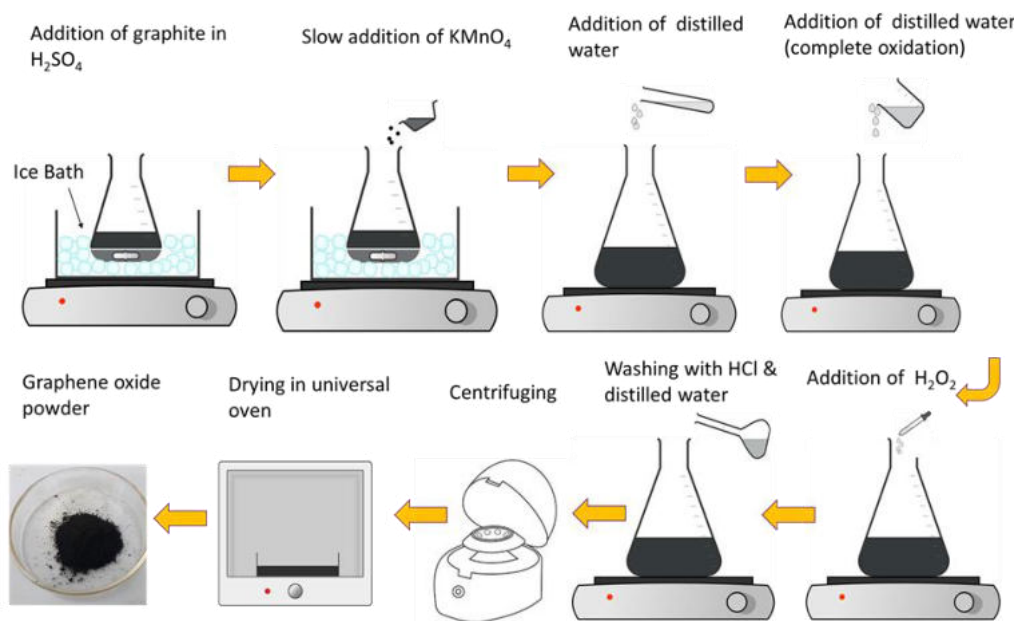


Figure 2: Flow Chart of innovation on GO synthesis showing the synthesis steps to produce GO in powder form

Several testings were performed to evaluate the behaviour and properties of synthesized GO, hence confirming its high quality. The morphologies and elemental composition of the GO surfaces were analysed by Scanning electron microscopy (SEM) and energy-dispersive X-ray (EDX) analysis. The crystalline structure and d-spacing of the sample were analysed using X-ray diffraction spectroscopy (XRD). UV-visible spectroscopy was used to characterize the optical characteristics of the GO samples.

Quality of synthesized GO

Structure and purity

The SEM images show the morphology of GO with different degrees of geometric wrinkling and rippling observed, as shown in Table 1. The rippled and crumpled structure revealed that the graphite had been fully exfoliated due to deformation during the exfoliation and restacking process as in agreement with [12], [17]. The carbon (C) and oxygen (O) atomic percentages (at.%) in the synthesized GO sample was examined using EDX analysis as shown in Table 1. Here, GO contains approximately 71.83 at.% and 24.70 at.% of carbon and oxygen contents, respectively. 3.47 at.% of sulphur is present in the GO, however, it does not affect the quality of GO. The atomic ratio of carbon to oxygen (C:O) indicates the degree of graphene oxidation. It evaluates the nature of oxygen functionalities as well-oxidized graphene into GO has an atomic ratio of C:O ranging from 2.1 to 2.9 [18]. From the EDX result, our synthesized GO has the atomic ratio of C:O at 2.91, indicating that the graphite powder was fully transformed into GO structure which is in line with this study's findings.

Table 1: EDX elemental analysis of synthesized GO with the SEM image

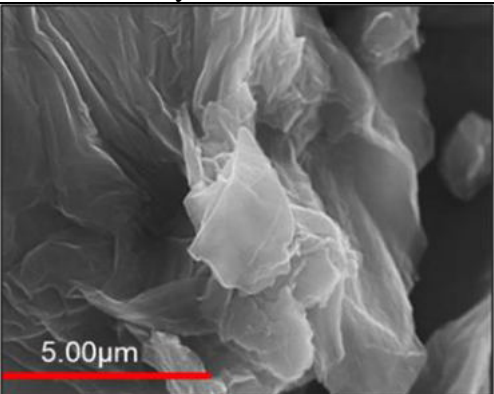
Element	Atomic weight percent (at. %)	SEM image of synthesized GO
Carbon; C	71.83	
Oxygen; O	24.70	
Sulphur; S	3.47	
Manganese; Mn	0.00	
Kalium; K	0.00	
Atomic ratio of C:O	2.91	

Figure 3 (a) shows the XRD patterns of the synthesized GO sample and graphite precursor (raw material to synthesis GO). It shows that 2θ at 10° (see blue line in Figure 3, a) is the maximum diffraction due to graphite oxidation, which indicates the GO crystalline structure is perfectly formed. The red line in Figure 3 (a) shows the strongly ordered layer structure in pure graphite with a strong diffraction peak at 26° . Complete oxidation of the substance has been demonstrated by the absence of a peak at 26° and a presence of one at 10° [4].

Optical performance

To quantify the optical properties of synthesized GO, UV-Vis spectroscopy was used as shown in Figure 3 (b) showing the light intensity (absorbance) proportional to the wavelength in scan range of 200 nm to 800 nm. As shown by the results, the absorption peak at 235 nm corresponds to the π - π^* transition of aromatic carbon-carbon (C-C) bonds indicating that the graphite gets oxidized during the electrochemical exfoliation.

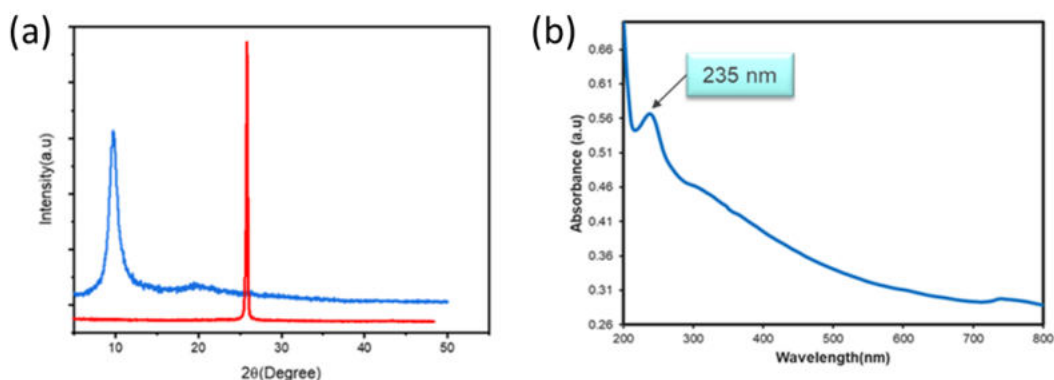


Figure 3: (a) XRD patterns of graphite and GO. (b) UV-Visible spectra of synthesized GO.

In accordance with these findings, the synthesis process produces high-quality GO, which has been confirmed by studies of the structural, morphological and physicochemical properties of the product using SEM analysis, EDX analysis, UV-Visible spectra analysis, and crystal structure, which has been determined using XRD analysis.

GO yield

With some modifications from Frankberg et al. [16], the yield of the synthesized GO was determined. Initially, placed a glass petri dish on the analytical balance. After that, the GO solution was transferred to the petri dish and the exact weight was recorded. Next, the petri dish containing GO solution was heated at 60°C in a universal oven for 12 hours. After the cooling process, the petri dish with the dried GO which was observed in flakes form was a weight and the final weight was recorded. To turn GO flakes into GO powder, a mortar is needed. Up to 76% (1.76 g) of GO can be produced by utilizing a graphite powder (1.0 g) as a precursor as shown in Figure 4. On this basis, our optimized synthesis method used to produce GO has a high yield (76%) and good quality, as demonstrated by the characterization results obtained in this study.

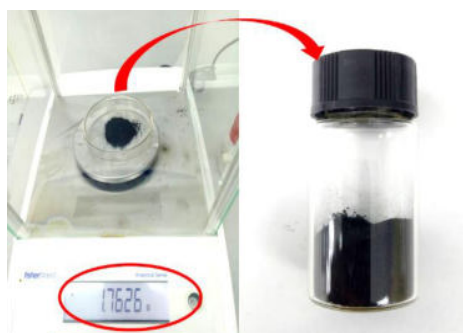


Figure 4: Pictograph image of final product; GO in the form of powder.

COMMERCIAL POTENTIAL

As a result, the current study of GO synthesis produced a high yield (amount) of GO as an increment of up to 76% from the amount of graphite precursor using a precise technique and proper preparation, as demonstrated by the GO yield measurement. The discovery of a new recipe preparation of GO, which is advantageous due to its high yield, high quality of GO,

environmental friendliness, less time consuming, and simplified purifying method, has made it possible to take a significant step forward in the manufacturing of GO on an industrial scale.

The demand for GO is closely related to the production of graphene. In recent years, there has been an increase in demand for lightweight, flexible materials that are also renewable and have a long lifespan. This has helped to sustain the growing demand for graphene, which has, in turn, helped to propel the GO market worldwide. However, practical manufacturing limitations and high equipment costs are limiting the market's growth. Additionally, increased GO research and development are expected to benefit the global market in the future. Quantity produced and degree of purification influence the price of GO.

Table 2 compares the market prices for GO which is dominantly led by the international supplier and most items are between RM 500.6375-RM 8,163.60 per one gram of GO powder. The actual cost may be higher if it gets supplied from those international suppliers as the shipping cost and tax may be applied which may end up of additional cost around 30% to 50% to the current selling price. Long courier time due to logistics may also become another big issue for the local user. Hence, our in-house synthesized GO can be the solution to the local demand to which our GO can be sold at the price of RM 330.00 for 1 gram, which is the cheapest price found on the present market. The profit margin with the mentioned selling price is around 30%. Moreover, due to the local supply, the supply-demand can be faster and most important save the cost.

Table 2: Market pricing comparisons for GO

Company	Origin	Description	Quantity (g)	Price (RM)	Price (RM)/g
Sigma-Aldrich	US/UK	Powder, 15-20 sheets, 4-10% edge-oxidized(796034-1G)	1	736.00	736.00
Digi-Key Electronics	US	Dry Graphene Oxide Paste (200 mg) (1767-1016-ND)	0.2	656.25	3,281.25
Fisher Scientific	US	Graphene Oxide, TCI America™ (100 mg) (G0443100MG)	0.1	816.36	8,163.60
MSE Supplies	US	Monolayer Graphene Oxide Powder (PO0705)	1	500.63	500.63
Our GO	Malaysia	Powder GO	1	330.00	330.00

GO has a wide range of potential applications. The imaginary prose of nanomaterials has more promise in their applications, such as electrochemical devices, field-effect transistors, sensors, biomedical applications, energy storage, cell imaging and drug delivery, supercapacitor electrodes, and energy storage material[6]. One of our ongoing research works is the fabrication of a rapid gas sensor using fibre-optic configuration as a sensing platform, which the initial result showing that the presence of GO as a sensing material onto the fibre optic platform can differentiate different gasses [19], hence indicating its huge potential in fabricating highly sensitive sensors. Optical fibre has already proven to be a good technology

for sensing purposes because of its nontoxicity, biocompatibility, high sensitivity, and immunity to electromagnetic interferences [20].

CONCLUSION

The new formulation of our GO synthesized using modified Hummer's method demonstrates the ease and convenience of synthesis in this work. Maximum absorption at 235 nm is attributable to the π - π^* transition in the UV-Vis spectra. XRD patterns confirmed the presence of oxygen-containing functional groups. Carbon and oxygen atomic percentages in the synthesized GO samples were analysed by EDX analysis and SEM images also show that graphene sheets have been exfoliated. The characterization results obtained in this work show that the synthesis process employed to produce GO has a high yield, low cost and good quality. It has been found that a high yield of GO was created with simple protocols, short reaction time, not releasing toxic gases and low production cost. Thus, the synthesized GO has a wide range of fascinating and distinctive features that can be used in various advanced applications.

ACKNOWLEDGEMENT

This work is financially supported by the fundamental research grant scheme; FRGS grant 600-IRMI/FRGS 5/3 (341/2019), Ministry of Higher Education Malaysia. The authors would like to thank all support from Prof. Ir. Dr Muhammad Azmi Ayub, Prof. Ts. Dr Nor Hayati Saad and technical staff from School of Mechanical Engineering, College of Engineering, UiTM Shah Alam, Malaysia for their kind help and support.

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Calmiva

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ABSTRACT

A person who has a mental illness is more prone to get panic attacks compared to a normal person and will tend to commit self-harming without their intention. To curb this problem, researchers found out that ice could help with panic attacks as it provides instant relief from high cortisol levels. Ice will divert all the attention and focus on the ice. Calmiva helps people who are having a panic attack focus on two things: their touch and smell senses, which they can use anywhere. This instant cold pack comes with scent, and it is nowhere to be found in the market. Therefore, the main objective is to provide instant relief for panic attacks. Calmiva consists of ammonium nitrate and water. When the pack is squeezed, water is mixed with the reactor and an endothermic reaction occurs and causes the pack to cool down rapidly. The pack has scented gel that can be accessed by peeling a sticker. Other than helping with panic attacks, it can also be used for minor injuries such as cramps. This product will contribute to the reduction of self-harm and suicide cases in our country.

Keywords: Panic attacks; mental illness; cortisol level; self-harming; aromatherapy scent

INTRODUCTION

Anxiety disorders are a form of mental illness that shows an excessive amount of fear or dread over certain things or situations. Anxiety is usually beneficial in helping humans to be more attentive and alert to protect themselves. Nonetheless, being worried and highly anxious most of the time may be the symptoms of an anxiety disorder [6]. Patients with anxiety disorder often overreact to things that provoke their emotions, and they cannot control their responses to these situations [7]. As a result, they tend to avoid any situations that could trigger anxiety. There are several types of anxiety disorders such as generalised anxiety disorder (GAD), panic disorder, phobias, and separation anxiety.

Panic disorder is diagnosed in patients that often get sudden panic attacks. A panic attack is characterised by a sudden onset of extreme fear or discomfort that lasts only a few minutes

[11]. Fear is a normal human emotional reaction that arises with something that is perceived as dangerous; however, panic attacks happen out of the blue even when there are no actual threats or dangers. When a person experiences panic attacks, they often dissociate from the real world. In this case, some might self-harm, to divert the attention and bring back themselves to reality. Self-harm is an act of injuring one's own body by leaving scars or causing tissue damage [8]. Self-harm comes in many forms such as cutting, burning, picking at skin, hair-pulling and any other act that causes harm.

There are more than 7 million Malaysians that suffers from a type of anxiety disorder. The global prevalence of anxiety disorders among adults is estimated to be 24.9% and the prevalence of panic disorder is 1.4% - 2.9% [6].

A panic attack will feel as if a person is having a heart attack and over time, it can develop a panic disorder due to worrying about the next recurring attack. A person who suffers from a panic attack will sweat excessively and have trouble breathing. They will start to lose control of their emotions and lose touch with reality. They are more inclined to self-harm because it provides them with temporary reprieve from the intense emotion and misery they are feeling. Researchers discovered that ice can aid with panic attacks because it provides immediate relief from high cortisol levels. All attention and focus will be diverted to the ice. Since ice is not always available, this initiative created a quick cold pack with a scent, Calmiva, to help people suffering from panic attacks focus on two things: their touch and smell sensory. It can be used anywhere. This quick cold pack has a unique aroma that have not found anywhere else.

Calmiva's main objective is to help people suffering from panic attacks. When panic attacks occur, the brain will be overwhelmed with emotions. A person with panic attacks barely has control over their thoughts thus making it hard for them to properly help themselves. Calmiva's cooling properties help to make them focus on the coldness on their skin. This helps to divert all of the attention on the product instead of letting their emotions spiral out of control. The cold is also an alternative way of self-harming as it provides the same sensation of pain without leaving any scars or serious injury. The contrast of colours on the packaging will make it pleasing to look at and the scent will help calm their thoughts.

Calmiva can be found useful in other situations such as treating minor injuries such as cramps, minor bumps, and bruises.

Calmiva is a cold pack with scent. There are two main substances of Calmiva and that is ammonium nitrate and water. Clear and feasible instructions on how to use Calmiva are printed on its packages to help the users. To use Calmiva, simply break the water bag and the water will dissolve the ammonium granules. When these two substances are mixed, an endothermic reaction will occur as it absorbs the heat from the surroundings and cool Calmiva down until 0 degrees Celsius.

Unlike a normal cold pack, Calmiva has a scented sticker. Each scent has calming properties that help for relaxation and soothe racing thoughts. Peeling the scent sticker will release the desired scent. Calmiva uses aromatherapy as one of its key features to help with anxiety. Aromatherapy is a type of complementary medicine in which the volatile oil of plants is used to promote the level of physical, spiritual, and physiological health [1]. A study done by Sahebalzamani et al. shows that aromatherapy, in the form of inhaling a combination of rose and lavender essences, was found to be useful in relieving students' anxiety [2].

Calmiva can be of use to everyone especially those who suffer with any type of anxiety disorders and other mental illnesses. It is especially essential to those with panic disorder and at risk of multiple panic attacks.

INNOVATION DEVELOPMENT

The traditional instant ice pack is often used to treat sport sprain injury and found in first aid kits. With the combination of ammonium nitrate with water, it will create an endothermic reaction and the temperature of the cold pack will instantly go down as low as 0 degree Celsius. For Calmiva, the innovative features are aid in panic attacks, added with aromatherapy scent and colour of the packaging.

i. Aid in Decreasing the Intensity of Panic Attacks

In Calmiva, we modify a regular instant cold pack into a product that could aid in decreasing panic attacks intensity. Low temperature is proven can help to provides instant relief from high cortisol levels and calm a person down. High cortisol levels will make someone constantly feel threatened, your fight-or-flight response is activated [15]. Other than that, ice could help the brain to divert all the attention to focus and sense the coldness without causing any harm.

ii. Aromatherapy Scent

Furthermore, in Calmiva, we added a sticker aromatherapy scent. We have upgraded various choices of scent to suit the consumer needs. Our Calmiva originally innovated with lavender scent which has been proven that it helps in stabilizing a human's mood. The ubiquitous lavender has to be included since it is beneficial to persons who suffer from mood swings and sensations of emotional instability, such as hysteria and manic depression. It also aids in the reduction of worry and the attainment of a decent night's sleep. [3]

Other type of scent we included in Calmiva is bergamot, clary sage and geranium. Bergamot was chosen because its bright, fresh, citrus scent is pleasant to the mind and can help one get out of a funk. It has the ability to excite or sedate the nervous system depending on the demands of the individual, reducing anxiety and reducing worries [3]. Next scent is clary sage. Although clary sage is sometimes described as euphoric, it does not always elicit such heightened sentiments. However, it does have a deeply calming effect, making it useful in the treatment of muscular stress and tension. It was also incorporated in the treatment of mood problems caused by hormones [3]. Lastly, Geranium, like clary sage, was chosen because of its propensity for women's ailments. It has a great regulating influence on the body, especially the nervous system. It's both relaxing and energising. The perfume of rose has a strong psychological effect on emotions. It's also an antidepressant and light sedative, making it ideal for emotional shock, mourning, and grieving. [3]

iii. Colour of the Product

The last innovative feature in Calmiva is the multi-coloured packaging. One of the proven methods to treat anxiety attacks is to focus on visual things, therefore the two coloured packages will help a person to focus on the Calmiva's packaging. The contrast between the two colours triggers the brain to maintain focus and distract from the overwhelming emotions. The colours for Calmiva's packaging are specifically chosen to maximise the trigger to focus.

The colour pink and blue have the same calming effect. The colour blue brings to mind emotions of peace or tranquillity. It is frequently described as quiet, serene, secure, and orderly [17]. Blue also helps to lower blood pressure. The softness of the colour pink radiates kindness and is typically associated with feelings of love and affection. Based on the analysis study of the pink prison experiment (Schauss, 1979), inmates became less hostile when they were placed in cells that were painted a bright pink colour [21].

The colours orange and green fit together as a contrast since, in Asia, orange is a positive, spiritually enlightened, and life-affirming colour as stated by De Bortoli and Maroto (2001). Green provides a sensation of refreshment, harmony, and balance [21]. The colour red is very bright thus it is good to grab people's attention. The striking colour is toned down by the colour yellow. Yellow is the colour of sunshine and is frequently connected with joyful remarks [21]. Lastly, the colour yellow is also paired with the colour purple. The colour purple calms the body and gives peace to the mind.



Figure 1: Prototype of Calmiva

COMMERCIAL POTENTIAL

Calmiva contributes to new knowledge of anxiety and panic attacks, as society is still stigmatised about people with mental health disorder. Calmiva will help to break the stigma and spread awareness. By marketing the benefits and the usage of the product, mental health disorders will be publicised. Thereby, mental health disorders will be more known and face less discrimination from society. Next, when dealing with people suffering from panic and anxiety attacks, people often are clueless on how to provide comfort. Calmiva helps loved ones to assist and be there for the person experiencing panic attacks.

The importance of these technical features is important in establishing a technology's economic viability. [11] Technical attributes, perceived convenience and perceived credibility both positively affect perceived usefulness, and perceived usefulness influences adoption intention. [19]. To perceive the convenience, this product will be a common size which is 10cm for both length and wide which is suitable to place in a pocket or a handbag. For credibility, this product will achieve it with the significance of the combination to prevent panic attack or

reduce the panic disorder. This product also focuses on giving distraction by the cold sensation and also gives relaxation with the gel scent that is sealed properly to keep fresh. At the same time, the cold sensation can be used for other needs.

Calmiva is environment friendly. This product use rigid LDPE, plastic #4, that can be recycled and with a small size, recycler machinery can handle it without problems. [12] The more rigid form of LDPE is easier to recycle and it can often be collected and recycled by curbside recycling programs. [13] Recycling is important for disposable products. This product is applicable for recycling systems and prevents the contribution of plastic pollution. This is important because our earth is high in plastic waste at the landfills. Malaysia, at 16.78kg per person, outperforms far larger countries such as China, Indonesia, the Philippines, Thailand, and Vietnam in terms of overall garbage generation. [20] For prevention, we also put recycle logos on packages.

From the result of survey that participated by almost 10 000 english speaking respondent, 22.7% for isolated panic without agoraphobia (PA-only), 0.8% for PA with agoraphobia without PD (PA-AG), 3.7% for PD without AG (PD-only), and 1.1% for PD with AG (PD-AG) or we can estimate 28.3% of the community have panic attack or panic disorder. [18] It will be a problem in society because panic attacks will lead to other acts of distraction, especially acts of injuring, and acts of endangering. Panic disorder patients cannot think properly when they have a panic attack and they will do others for distraction.

As further planning, Calmiva is envisioned to collaborate with local pharmacy companies such Royce Pharma Manufacturing Sdn Bhd, Ain Medicare Sdn Bhd, Duopharma (M) Sdn Bhd to produce and distribute to pharmacies in the neighbourhood. By doing this Calmiva can be marketed and easy to access by anyone. Besides, Calmiva is designed to be placed into first kit aid of each home to make it accessible by anyone. The first aid kit should be located in a place that everyone in the household has access to. Panic attacks are sudden and unexpected therefore, always having Calmiva beforehand would be a good precaution step.

CONCLUSION

With all the innovative features implemented on Calmiva, this product will be useful in providing relief for anxiety attacks. The combination of the coldness, scent and multiple colours will create a great distraction for the mind. The brain will focus all of its attention onto the product. In the future, it is hoped that more scents can be used in Calmiva. Calmiva will be constantly improved as more feedback are gained from the consumers.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our project supervisor, Siti Rudhziah Binti Che Balian, a lecturer from Centre of Foundation Studies, Universiti Teknologi MARA for supervising and advising us with this project.

Next, we would like to thank Centre of Foundation Studies, Universiti Teknologi MARA for organising this 'Creation de UiTM: International Mega Innovation Carnival 2022' programme. Throughout this programme, we are able to explore and discover further about our innovation project.

Lastly, we would like to appreciate our institutions, Universiti Sains Malaysia and Universiti Teknologi MARA for giving us this chance to participate and unleash our creativity.

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Saving Salon

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ABSTRACT

The widespread of COVID-19 pandemic has had a negative impact on the national economy particularly in beauty services. In Malaysia, the customer needs and wants could not be fulfilled throughout the COVID-19 pandemic while the Movement Control Command (PKP) is enforced. It had affected the industrial sector of the economy especially for the provision of salon services as well as affected the economy of marketers as a result of insufficient income to support daily living. The customers are increasingly concerned about health and the teenagers are interested in beauty, cosmetics and medicine. The main purpose for creations this innovation is to produce an innovation of 'Saving Salon' which it is an innovation of beauty salon services that are carried out at the customer's home through online booking on the application provided. The main objectives of this innovation is to innovate from existing salon services to home salon services and identify consumer perceptions of this 'Saving Salon'. Innovation development are involved the service quality (reliability, assurance, tangibles, empathy and responsiveness) and the design of the services (logo, application and vehicles). This project innovation surely can be a commercial potential to the beauty industry based on the study research that showed customer perceptions was positive and accepting the existence of 'Saving Salon'. This innovative project for the 'Saving Salon' provides many benefits to customers, future researchers, marketers and also the national economy.

Keywords: SERVQUAL; customer needs; COVID-19

INTRODUCTION

In early 2020, the world has been rocked by a new virus namely Coronavirus or known as COVID-19. The widespread of COVID-19 pandemic has had a negative impact on the national economy particularly in beauty services [11]. As the business economy declines, the entrepreneurs and marketers need to use new methods to attract customers as well as make it easier for customers to purchase the products and services offered especially during the COVID-19 pandemic [10]. In Malaysia, the customer needs and wants could not be fulfilled throughout the COVID-19 pandemic while the Movement Control Command (PKP) is enforced. The COVID-19 pandemic has altered customer needs, shopping behaviours, purchasing behaviours as well as their post-purchase satisfaction levels. For examples, since the start of the pandemic, customers are avoiding publically consumed products and have increased their virtual shopping and online purchasing behaviours [8]. The majority of customers who go to the salons or barbershops are young people aged 17 to 20 years old (43%) and 21 to 30 years old (52%) with a student profession [7].

Self-appearance and personality are very important to take care of as it is a symbolizes of good and quality self-images to everybody. Everyone cares about their appearance from their hair to their legs [12]. Commercial beauty salons are becoming increasingly popular in Myanmar when customer's interest in beauty and health increases. Therefore, beauty salons are

used by customers who are committed to treating their hair and skin [3]. Usually, they will go to salon and spa centres to get treatment on the desired appearance care either facial, manicure, body treatments and hair treatments. However, as long as the PKP is implemented, the salon and spa centres are not allowed to operate due to reducing the movement of the community to go out from their house [9]. As the country is currently facing the COVID-19 pandemic, it has affected the industrial sector of the economy especially for the provision of salon services as well as affected the economy of marketers as a result of insufficient income to support daily living. Italy places a “Shelter in Place” order shutting down all non-essential services [4].

Commercial beauty supplier companies are one of the groups that play an important role in financial and social development. This is because the customers are increasingly concerned about health and the teenagers are interested in beauty, cosmetics and medicine [6]. The main purpose for creations this innovation is to produce an innovation of ‘Saving Salon’ which it is an innovation of beauty salon services that are carried out at the customer’s home through online booking on the application provided. The application was to make easier for customers to order salon services and receive the services at home only. The objectives of this innovation is to innovate from existing salon services to home salon services and identify customer perceptions of this ‘Saving Salon’. Researchers chose salon services because nowadays men and women are very concerned about their appearance. Especially a woman is very concerned about her appearance, starting from the hair to the ends of the legs. The marketing elements involved in the production of this ‘Saving Salon’ service are service quality. Innovation design such as logo, application and vehicles that be used in this innovation is also an important element to be seen because they are the elements to be modified in this innovation.

The customer needs are not fulfilled [14]. Customer needs are a key aspect that need to be emphasized by marketers as it is something that is needed to continue their life. The past researcher stated that he himself needed personal needs where he had to cut his hair when he wanted to go to a party but the weather did not allow him to get out of the house. From there, he felt that he wanted to call a barber to come to the house where it could save time, energy and low costs. Second, the customers are facing time constraints to go to the salon centres [14]. Most customers, especially working women, lack of time to take care of their appearance because they are too busy with work. This problem is taken seriously because successful person was supposed to highlight a more attractive and pleasing self-appearance. If this problem persists, the career of a customer will be affected as a result of those who do not take care of their appearance. It is also related to a person who has a career, especially an entrepreneur, salesperson, service provider and similar like that because it is closely related to psychographic-based segmentation that is lifestyle or pattern of life. A person who cares about beauty and health will not mind to spend their income on beauty salon services.

The customers cannot choose the beautician according to their desired skills and level of experience [14]. The average customer has their own preferences and mostly prefer to choose the beautician who has a level of experience and proficiency in the assigned field. For example, a customer wants a beautician who is skilled in the field of facial and body care only or a beautician who is skilled in each field of treatment provided. Therefore, with the ‘Saving Salon’ mobile application, it can facilitate the selection of beauty experts desired by customers and in turn be able to fulfil the changing needs of customers. The beauticians cannot give commitments to work outside of hours because they also have their own time [14]. During the service at the salon centres, the beautician will set a suitable time for the user to come to the centres. This is because, the beauticians have their own time and do not want to sit long in the centres of the salon. Beauticians also won’t have much work if customers rarely come to the

salon centres. For some customers, some prefer to receive services on their own time and some even follow the time of a beautician. Through this 'Saving Salon' application, customers can choose the appropriate time according to their wishes.

INNOVATION DEVELOPMENT

The innovation development involves the most important marketing elements that is service quality, pricing and innovation design. The service quality that be involved in this service is SERVQUAL model which it is has five dimension that is reliability, assurance, tangibles, empathy and responsiveness [1]. Meanwhile, the most important part to be seen in this innovation creation is the design of the innovation which is in terms of logo, application and the vehicles.

Reliability means the ability to perform the promised services accurately [13]. Reliability in the service quality dimension refers to that 'Saving Salon' provides services that can fulfil the needs of customers in personal appearance care. As a person who is knowledgeable and courteous as well as able to place trust and confidence in the customer. Assurance refers to mastering the knowledge, courtesy of employees and the ability of employees to cultivate trust, a sense of security, and communication for customers to the company [5]. Assurance refers to that 'Saving Salon' has staff who are courteous to customers. 'Saving Salon' also has staff who are always efficient in performing services. Assurance has a positive effect on customer satisfaction [2].

Tangibility means the physical elements that will strengthen the quality of services provided. It covers the state of the environment and the physical facilities available during the service process provided by the service provider to the customer such as premises, furniture, equipment, fittings and environment [13]. Provision of appropriate modern facilities and equipment and other attractive physical facilities. Tangibles refers to that 'Saving Salon' provides adequate equipment for each type of treatment given. 'Saving Salon' puts a logo on each equipment so that the equipment used can be recognized by the customer. 'Saving Salon' also provides uniforms for all staff to create a uniform appearance.

The attitude of empathy among service providers indicates that customer problems or complaints are understood and given serious attention by service providers [13]. Empathy refers to the fact that 'Saving Salon' staff understand the problems of customer who are less skilled in self-appearance care. 'Saving Salon' also has staff who are accepting customer opinions. The response dimension refers to the desire and willingness of staff in assisting and providing needed services to customers at an immediate rate. Delays and delays in providing services to consumers will cause dissatisfaction among them and in turn affect their perception of the quality of service received [13]. Responsive shows that the staff of 'Saving Salon' always adopts the attitude of helping customers in solving problems at an immediate rate. 'Saving Salon' staff handles customer complaints quickly. 'Saving Salon' staff always perform services efficiently and safely.

The design focused in this project involves logos, applications and vehicles modified in this innovation project. Below show the images for the design of the 'Saving Salon' service innovation:



Figure 1: Logo

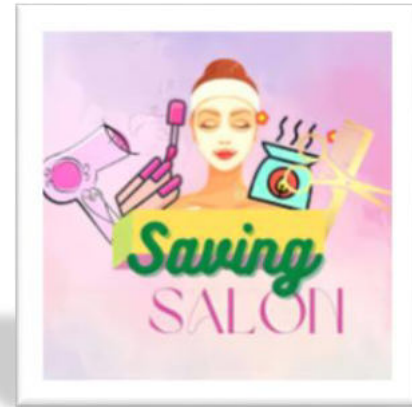


Figure 2: Application



Figure 3: Vehicle



Figure 4: Space in the Vehicle

COMMERCIAL POTENTIAL

The innovation of 'Saving Salon' can give more implications to society, economy, technology and new knowledge for customers or marketers. With the existence of these new innovations, customer needs can be fulfilled at any time according to the appropriate time. Customers also can get new experiences such as they will like feeling their home as a salon and spa. Other than that, customers can get their own privacy when they determine for themselves the appropriate space to carry out the treatment in their home. When the customers make order through the application provided, indirectly they can figure out how to place an order online to anyone who is less proficient in the use of mobile applications.

Through that, the use of technology will grow and expand in daily life. This is because technology can help us to get something we want easily. From this innovation, customers can easily access further information on 'Saving Salon' services through the application provided. Customers also will be confident to the services offered when looked at the testimonials and related photos to the treatment given. Indirectly, when more customers using this service national economy will be increasingly. Customers and marketers also have to be well relationships from this service innovation. The most important in this service innovation is can save time, cost and personality or appearance of customers in fulfil their needs and wants.

The researchers also conducted a survey study by distributing questionnaires to the respondents to see customer perceptions of this innovation project. The questionnaires are in terms of service quality (SERVQUAL) which involved five dimensions that is reliability, assurance, tangibles, empathy and responsiveness. Other than that, it is involved about service design which in term of logo, application and vehicles that we use to this 'Saving Salon'. The results of the study showed that reliability element obtained the highest mean and was followed by tangibles, assurance, responsiveness and the lowest mean is empathy. Through the questionnaire conducted show that the 'Saving Salon' services can fulfil the needs and desires of customers in the care of personal appearance, following the Standard Operating Procedures (SOP) and deliver the correct service based on customer orders in the application.

In terms of tangibles, 'Saving Salon' be able to provide adequate equipment for each type of treatment that given to customers and all staff are wearing uniforms while performing services. In terms of assurance as well, showed that 'Saving Salon' have a courteous staff, efficient in performing services, extensive knowledge in the field assigned and skilled in communication. In terms of responsiveness, 'Saving Salon' have staffs who is assist customers promptly, handle complaints quickly, perform service efficiently and securely plus handle payment transactions quickly. Apart from the service quality, the design of the services also included in the questionnaire.

The results of the study regarding service design showed that the logo element obtained the highest mean and was followed by vehicles and applications. In terms of logo, 'Saving Salon' can impress customers with logo colours and creative logo writing. In terms of vehicles, 'Saving Salon' use large and suitable vehicles to carry the necessary equipment and be able to influence the customer's purchasing decision with the appeal of the colour of the vehicles used. Lastly, in terms of application 'Saving Salon' can make easier for customers to communicate with the staff, the application can tell the distance and time taken and make it easier for customers to find out more about the services offered. The study showed that customers perceptions are positive and significant with their satisfaction.

CONCLUSION

In summary, this innovation project is a thoughtful idea derived from the researcher's own findings. This innovative project for the 'Saving Salon' provides many benefits to consumers, future researchers, marketers and also the national economy. The main purpose of this innovation project is to produce an innovation of 'Saving Salon' which it is an innovation of beauty salon services that are carried out at the customer's home through online booking on the application provided.

Therefore, this innovation project has limitations faced by researchers to realize this service runs smoothly. One of the main limitations is in terms of cost, which is the cost of producing the actual application and service of 'Saving Salon' has a high risk. Due to that, the researcher drew an animated video to illustrate how the 'Saving Salon' service is run. Not only that, the researcher has also described the logo, applications and vehicles used during the implementation of this service.

This innovation project also uses an appropriate and simple methodological method to analysis the data obtained from the questionnaire. The researcher only made a descriptive analysis by using SPSS version 25.0 to analysis all the data collected. The results of the innovation project show that each response from the respondents is positive and accepting

the existence of this services innovation. This shows that service quality and service design play an important role on customer perceptions of this ‘Saving Salon’.

ACKNOWLEDGEMENT

The authors would like to express my sincere gratitude to my sponsor, Ipoh Vocational College for sponsoring us to participate in this competition. The authors also would like to thanks to our lecturers Ms. Norlaili for providing her invaluable guidance, comments and suggestions throughout the course of the project. We also honoured to thank the organizers for giving students the opportunity to develop creative and innovative ideas.

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Disabled Person Drive Thru Application

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ABSTRACT

People with disabilities are a group known to many for their limited lives. Each year an increase in the number of disabled people registered under JKM is recorded. In Malaysia, the services applied to people with disabilities are still not in line with the development of the country which is increasingly developed. Facilities for the disabled were also not upgraded. because of such barriers, the lives of the disabled are increasingly limited. The unfriendly use of OKU -friendly drivers causes the desire of the disabled to use the service to also be an obstacle. Different communications also make it difficult for PWDs to communicate with customer service. The main purpose of the 'Disabled drive thru application' innovation is to facilitate the handling of the disabled while using the drive thru. The main objective of this innovation is to identify public perceptions of drive -thru services. The development of innovation involves the quality of service, namely responsiveness, assurance and empathy. This innovation has the potential to be done because the service uses a drive -by -pass application and is disabled -friendly.

Keywords: Disabled person; service quality; drive thru

INTRODUCTION

The disabled (OKU) are part of society [1]. Therefore, they have equal rights and opportunities to live life like other members of society. This is so because all individuals regardless of their abilities and disabilities, gender, social, economic, cultural, ethnic or religious background have an equal right to a good quality of life. Rights-based approaches and protection should be used to ensure the interests and well-being of the disabled. According to [1] in his study one of the mediums towards obtaining a good quality of life is through the production of facilities that facilitate the lives of the disabled. Therefore, the opinion of the disabled should be taken into account and given due attention, especially at the driving facility level. This is important to help the disabled get services like other normal human beings. According to [2] based on a study conducted on the importance of a service system implemented where it can provide access and facilities that are friendly to the disabled and can be used not only for the typical group but also the disabled.

Nowadays, the number of PWDs is increasing every year [3]. Through statistics released by the Social Welfare Department (JKM) in 2020, a total of 45,236 disabled people are registered under JKM compared to the previous year which was 44,000 people. Through these statistics, it clearly shows the increase in the number of disabled people in the country. Therefore, this increase should be in line with the provision of facilities for the disabled, especially in public areas such as police stations, schools and so on so that these groups can live life like normal people [3]. If this facility cannot be provided, it will definitely make it difficult for the disabled to deal with [4].

However, there are various obstacles and challenges that need to be faced by the disabled in almost every place they visit. Among the obstacles faced by the disabled are obstacles in terms of physical environment, namely the process of ordering food, limited communication, lack of civics and low level of awareness among employees and management in providing disabled -friendly facilities in fast food restaurants [5].

These barriers can indirectly affect a customer's emotions, behaviours and attitudes when everything is limited and service is unsatisfactory. People with physical and sensory disabilities to face great challenges and obstacles in higher education institutions result in impaired their ability to pursue the desires they wish to do [6]. This statement is further strengthened [7] where it states that the experience of people with disabilities in a place shows that they often face obstacles when wanting something or doing something because of their limited nature.

The project carried out by the researcher is related to the innovation project Disabled Person Drive Thru Application. This study is about the facilities provided for the disabled (OKU) in their daily lives. The researcher chose the drive-by service to be innovated because the drive-by service is currently not suitable for the disabled who have problems in communication and hearing. The innovation brought by the researcher in the innovation of this service system is to upgrade the drive system by communication to order through the system of 'scan, pickup and go' using the Disabled Person Drive Thru Application.

In addition, the main reason why the researcher wanted to carry out this innovation project was that the researcher was inspired by one of the videos of TikTok users who are disabled. In the 3-minute video, he was disappointed with the treatment given by a fast food restaurant when he wanted to take food orders from customers who lacked the nature of being dumb. In the video, he also suggested upgrading the drive-through system for the disabled to make their affairs easier and to be able to live their daily lives like other typical groups.

In this project there are five problem statements among them the difficulties faced by these disabled people to go about their daily lives due to not having the facilities that they can use. Argued that facilities for the disabled are very important to be emphasized to enable them to be in a disabled-friendly environment and help them to live their daily lives in a comfortable environment [8]. The physical environment is a major factor that is an obstacle for students with disabilities. This is because without complete and OKU -friendly facilities this will limit the movement and activities of OKU students [9]. This is important so that they can independently continue to survive without relying on the sympathy and kindness of others [10].

In addition, society shows a negative attitude towards people with disabilities. Catch a video via social media about a security guard beating a disabled person. Such incidents continue to occur in our society [11]. Support that negative attitude towards PWDs still exist [1]. Negative myths and stereotypes about PWDs have given birth to hard-to-erode prejudices about PWDs and this situation will be seen in the form of negative attitudes and behaviours towards them in social, educational and career contexts. Negative attitudes towards the disabled were identified as an obstacle for them to participate fully in society [1].

Next, provide different treatment between the disabled and the typical group. There are a handful of people who view people with disabilities negatively. This perception makes it difficult for them to participate in society [1]. The attitude of not appreciating the disabled needs to be changed in line with the desire to become a developed country. In terms of community service to the disabled, we have not reached that level. The mentality of our society does not see the disabled as a group that needs to be respected, unlike in western countries. The

community in developed countries provides help and good treatment to the disabled due to high civic awareness [12].

In relation to that, the problem of people with disabilities (OKU) in ordering something through face-to-face communication. Mobility and social participation among people with disabilities were found to be severely limited by the disabilities of the outdoor environment, public buildings and homes [13]. The experience of food access (physical and economic) among people with disabilities is still poorly understood [14]. Access to food can be very difficult for them to interact, living in places that lack features and accessible shops.

Finally, emotions can also be a problem for people with disabilities because the facilities, attitudes, behaviours and services provided are less encouraging, thus affecting the emotions of these people with disabilities. The disabled will identify the negative attitude of society as one of the main sources of stress in their lives [1]. Negative attitudes towards PWDs have a relationship with social rejection behaviours and high social reach towards them. As long as there is a negative attitude towards the disabled, the community will still not be able to accept their presence and the integration of the disabled in society will be blocked.

The project also has three objectives used namely which is the first identify public perceptions of drive -thru services. Second is, identify the lack of facilities faced by the disabled (OKU) on the drive -thru service. Third is, identify the treatment given to the disabled (OKU) fair as the typical group.

In conclusion, the increase in disabled people in society has resulted in the existence of demand for the provision of disabled facilities inside and outside the building, especially in public buildings [15]. In addition, there are still gaps in terms of facilities provided because they are not friendly to the disabled and cause the disabled to feel excluded and useless. Therefore, fast food restaurants such as KFC, MCD and others must provide complete facilities for the disabled in line with its function as a place to buy fast food for the people in Malaysia.

Therefore, the researcher has decided to carry out the innovation project of FastFood Drive for People with Disabilities (OKU) Using 'Disabled Person Drive Thru' Application. This service system innovation project was chosen because the researcher sees from the basics of life as someone who belongs to a typical group where having no shortcomings is a bonus to us in interacting with others. In addition, this 'Disabled Person Drive Thru' innovation project is still missing and it is something different. This study on the innovation of the drive -by service system can not only benefit the disabled but it can also benefit the country in improving the economy. Overall, this service can be expanded throughout the country to meet the shortcomings and needs of the disabled. The researcher hopes that the study of this service system innovation can help in easing the burden of the disabled to interact with others.

INNOVATION DEVELOPMENT

The Innovation Project to be carried out using the Innovation Funnel Model presented by Benkenstein (1998). This Innovation Funnel model has 4 stages in the development of ideas. Among the 4 levels in this Innovation Funnel Model are Idea Generation, Conception, Product and Market Test, and Implementation. This model will be used as a reference by researchers throughout this innovation project is carried out in further developing ideas and concepts to ensure that this innovation can be carried out smoothly. The project will also use the SERVQUAL model adapted from the study of Parasuraman et. al, (1990).

According to Parasuraman et al. (1985, 1988) service quality refers to the difference between customers' expectations and customers' perception. This group of researchers tested 10 dimensions of service quality containing 45 items in a variety of situations. After going through a purification process, Parasuraman et al. (1990) have reduced the dimensions in the instrument to 5 dimensions because they argue that the five dimensions of services have been sufficient, adequate and appropriate to measure the quality of services in various service sectors as a whole. These dimensions are tangibles, physical facilities, equipment and staff appearance, reliability, the ability to complete the promised services accurately, and the rest are responsiveness, assurance and empathy.

Accordingly, the scope of the innovation project only focuses on the 3 dimensions of service quality adapted from the study of Parasuraman et. al, (1990). The service quality dimensions in this project consist of responsiveness, assurance and empathy. Responsive dimension is the desire to help customers and provide services quickly. Moreover, the assurance dimension refers to the knowledge and decency of staff as well as their ability to cultivate confidence and trust. Next, the empathy dimension is defined as concern in giving special attention to the client. The customer is treated as a unique and special person.



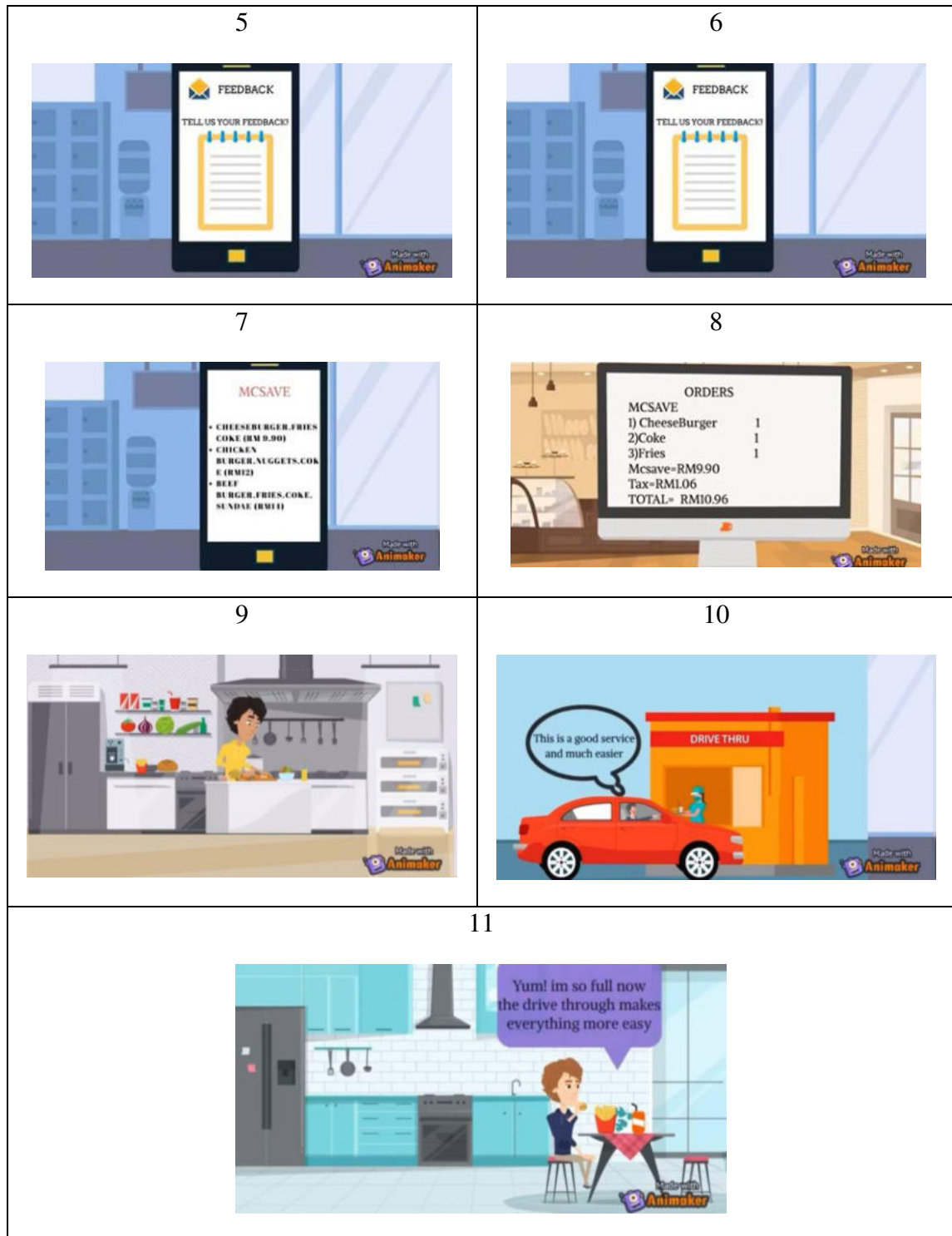


Figure 1: Disable Person Drive Thru Application Storyboard

COMMERCIAL POTENTIAL

The innovation of 'Disabled Person Drive Thru Application' has many implications for society, economy and technology. With this OKU -friendly facility, it can meet the needs of OKU who need facilities for daily life. Disabled customers can also live independently after this innovation without relying on others. In addition, disabled customers can save time and energy to use drive thru as there is no need to write or show pictures to customer service.

Moreover, with this innovation the problem of communication between people with disabilities and employees will not be affected.

The implication to society is that this innovation can not only be used by the disabled but it can also be used by the normal. In addition, the resulting application has the characteristics of the SERVQUAL model adapted from Parasuraman et. al, (1990). This model is used to measure the quality of services used in producing this innovation project. Further, the elements used in carrying out this innovation are responsiveness, reassurance and empathy. In the project carried out showed the responsive element was the highest element marked by the respondents. This is because the responsive element describes features that provide convenience to disabled customers.

Moreover, the implication for the national economy is that new services in the market can improve the national economy in terms of finance and national image. The finances of the country increase because of the payment of taxes prescribed upon the occurrence of the production of goods. When a country produces a different service system and gets response from other countries, the country will be looked up to and great.

Lastly, is technology in everyday life. This is because, the year 2022 is the age of human life with state -of -the -art technology. From this innovation, users with disabilities can use it easily as the main focus of this innovation is on the deaf and speech impaired. With the 'Disabled Person Drive Thru Application' customers with less effort can order food easily and quickly. The food ordered is also the same as that to be received as the order will continue to reach the counter. Next, the most important thing in this innovation is fast, save time and energy.

CONCLUSION

The researcher made this service innovation because in the previous study there was a gap in meeting and upgrading the facilities for the disabled in the drive -thru service. The drive -through service system was innovated from the vacancies that occurred in filling the facilities and facilitating the affairs of the disabled. Facilities are a priority in the management of the welfare of the disabled.

In addition, the main reason why the researcher wanted to carry out this innovation project was that the researcher was inspired by one of the videos of Tiktok users who are disabled. In the 3-minute video, he was disappointed with the treatment given by a fast-food restaurant when he wanted to take food orders from customers who lacked the nature of being dumb. In the video, he also suggested upgrading the drive -through system for the disabled to make their affairs easier and to be able to live their daily lives like other typical groups.

Further, in the production of this innovation, the researcher has used a quantitative methods questionnaire form. To give more understanding to the respondents to answer the questionnaire, the researcher produced an animated video that shows the journey of the application used by people with disabilities. In this way it can show to the society that this innovation is wearable and has many benefits.

Lastly, the study was conducted using a quantitative design using questionnaire and survey methods. The project population consisted of those aged 18-25 years, 26 to 33 years. 34 to 41 years and 42 years and above. A total of 63 respondents were sampled in this

innovation project. Data collected using a questionnaire were analyzed using SPSS software version 21.0.

ACKNOWLEDGEMENT

The author would like to thank our mentor teacher, Ms. Norlaily Binti Bajiru, for guiding us from the beginning to the end of the innovation project. Apart from that, we would also like to thank the Ipoh Vocational College for sponsoring us to participate in this competition. We are also pleased to thank the organizers for organizing this competition as it allows students to develop their ideas.

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Highly Blue-fluorescence Emission of Graphene Quantum Dots Nanoparticles (GQDs): A New Generation of Advanced Materials

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ABSTRACT

Graphene quantum dots (GQDs) is known as a new generation of graphene-based materials that exhibit excellent photoluminescence property, electro-optical properties, low toxicity and good biocompatibility, hence having numerous potential applications in biomedical and electronic fields. In this study, we have demonstrated a new formulation to synthesise stable and excellent photoluminescence behaviour of GQDs via the chemical reduction method. A novelty of this method includes its simple set-up, short reaction time (within 5 hours) and the possibility of large-scale production with low cost using graphene oxide (GO) as the precursor. GO was prior synthesised using the modified Hummers method from raw graphite flakes. Interestingly in our approach, unstable synthesised GDQs which strongly exhibit photodegradation effect was further corrected using neutralisation via evaporation and redispersed with ultra-pure water. The final pH was found at 4 with highly soluble in water. Our synthesised GQDs possess a high quantum yield of 77% showing highly luminescent blue emission under ultraviolet irradiation conditions (at $\lambda = 325$ nm) which maintain its photostability against photobleaching up to 90 days. The average particle size of GQDs has been confirmed at nanodots size of ~ 3 nm. The result obtained showed that this newly synthesised blue-emitting GQDs can be possibly utilised in biomedical applications biosensors, drug delivery, labelling agent and other bioengineering fields as rich with carboxyl (-COOH) functional group needed in conjugation with biomolecules; for example, in the immobilisation of cancer markers on the surface of GQDs. It has a significant economic value due to no local supply found. Moreover, its excellent photoluminescence behaviour is expected to open up enormous potentials in the optoelectronic applications of solar cells, light-emitting diodes, lasers and other advanced applications, which are significantly parallel to the era of Industrial Revolution IR 4.0.

Keywords: Graphene quantum dots; carbon nanomaterials; photoluminescence; biomedical; optoelectronic

INTRODUCTION

Carbon is known as one of the most abundant elements on earth. Placing itself as the 6th element in the periodic table, the nucleus of a carbon atom is surrounded by six electrons, four of which are valence electrons [1]. One of the most famous produced products coming from carbon is diamond [2], yet in terms of scientific purpose and many applications, graphene is emerging as characterised material with excellent electronic properties [3]. Graphene as a material having a unique honeycomb structure with atoms arranged in sp² hybridisation has been demonstrated to show photoluminescent properties ability as the bandgap can be tuned [4]. The bandgap can be tuned by developing edge defects or simply by tuning the shape, size and even layers of the material [5].

Although, as the advancement of graphene progress in time, graphene quantum dots (GQDs) is emerging as promising carbon material with a compliment of its luminescent property. It is known as a zero-dimensional (0D) which consist of one to multiple layers (3-5 layer) of graphene sheets with <10 nm lateral dimension. GQDs however still inherit the properties obtained prior from two-dimensional (2D) graphene yet are able to include the remarkable physicochemical characteristics of quantum dots (QDs).

QDs itself has demonstrated properties that include edge effects, non-zero bandgap and quantum confinement effects. These properties hold great possibility in energy, electronic and optical applications. Furthermore, QDs generally in colloid form has various potential applications for instance in solar cells, light-emitting diode (LED), electronic displays, bioimaging and other optoelectronic devices. This is due to their exceptional electro-optical properties which rely heavily on their size range. QDs itself has known for their diverse emission spectrum which varies according to their sizes. Although, QDs made from inorganic precursor has been expensive that would cost thousands of US dollars per gram which has caused a ripple effect to the market movement causing the use demand for industry purpose to be slowed and limited. Moreover, inorganic QDs has been known for their toxicity which makes their growth application development to be stunted.

Herein, carbon-based QDs such as carbon quantum dots (CDs) and GQDs emerges as promising yet low cost needed to produce them. Due to their advantages such as nontoxicity, good solubility, stable photoluminescence, and better surface grafting, thus make promising candidates for replacing inorganic QDs. Furthermore, carbon is known as a great renewable source that can be obtained from many sources such as coal that aiding in the endless possibility of its large-scale industrial production.

Compared to the traditional semiconductor of QDs for instance cadmium selenide (CdSe) [6], GQDs showed valuable properties such as stable fluorescence properties, low toxicity, good water solubility and high fluorescence emission [7]. The mechanics of GQDs by allowing two photons to be emitted in a single excitation event enabling it to produce coherent light is one of the superior properties which is great in the making of lasers [3]. Due to these valuable characteristics, GQDs is favourable in the applications of a sensor, conversion of light [8], photocatalysis [9], biomarker or cell imaging [10] and even in photovoltaics [11].

GQDs may be synthesised from two different routes which can be either “bottom-up” or “top-down” approaches. Firstly, the “bottom-up” strategy is known due to its ability to control the GQDs’ properties for example in terms of its lattice dimensions, size distribution and morphology. This method generally “grows” GQDs by involving the carbonisation of organic precursors through thermal treatment. On the other hand, the “top-down” method has several constrained in terms of low quantum yield, unpredictable product control, monotonous synthesis procedure and for some cases, it requires sophisticated and expensive equipment [3].

Furthermore, once stable GQDs have been obtained, they can be incorporated with other materials or mechanisms as an extension to the application that is not limited to fields such as sensors, optoelectronics and photovoltaics. As we discovered several works [12] related to the synthesis of GQDs, it has been revealed that the synthesis of GQDs mainly involves the use of advanced equipment such as bioreactor which is costly, synthesis with high heat conditions or high laser ablation [3].

Hence, the main objective of this innovation is to formulate a simple, low cost and quick method to synthesise the finest quality of GQDs which have high stability and high emission

of fluorescence signal. Hence, in this work, we demonstrated a refined method for the synthesis of GQDs with high quantum yield, high stability (up to 3 months) and high reproducibility with homogenous size and rich functional groups which are favourable in the biomedical field including in biosensing, imaging, drug delivery applications specifically for bioconjugation purposes. Moreover, our GQDs can also be used in other advanced applications such in optoelectronic applications such as solar cells, light-emitting diodes, lasers and other advanced applications due to their excellent PL behaviour.

INNOVATION DEVELOPMENT

We have demonstrated a simple synthesis method that requires a simple setup that requires only chemicals and very minimal cost for its setup. As shown in Figure 1 is the whole synthesis process of GQDs started from GO as the precursor material. According to several other works done in the synthesis of GQDs, a complicated setup is required such as in the use electron beam lithography method which is not widely used due to the equipment itself being expensive and required high-skill labour to perform the reaction. Furthermore, for a similar method as our work has shown that most of the required time to produce GQDs were mainly longer that could take up to days [3]. Due to the simplicity of the synthesis process, the in-house mass production of GQDs is possible hence giving significant economic value. The final pH was found at 4 with highly soluble in water, hence making this GQDs can be used in many biomedical applications.

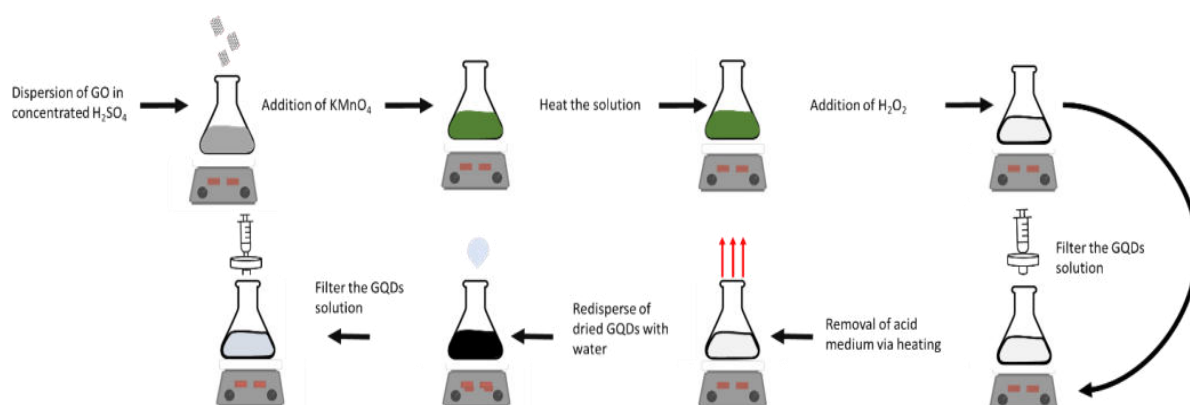


Figure 1: Synthesis flow of GQDs from precursor GO with minimal setup

Figure 2 (a) shows our synthesised GQDs in colloidal form, whereby the blue solution is GQDs under ultraviolet irradiation conditions (at $\lambda = 325$ nm) showing strong blue fluorescence emission (461 to 465 nm). From the absorption and emission peak, the quantum yield of the synthesised GQDs was determined at 77%, which is the highest reported compared to other world-leading companies as summarised in Table 1. Our synthesised GQDs also maintain their photostability against photobleaching with a highly crystalline structure for up to 90 days. The mechanism of GQDs formation is illustrated in Figure 2 (b) showing its final structure rich in carboxyl (-COOH) functional group which is needed in conjugation with biomolecules; for example, in the immobilisation of cancer markers on the surface of GQDs.

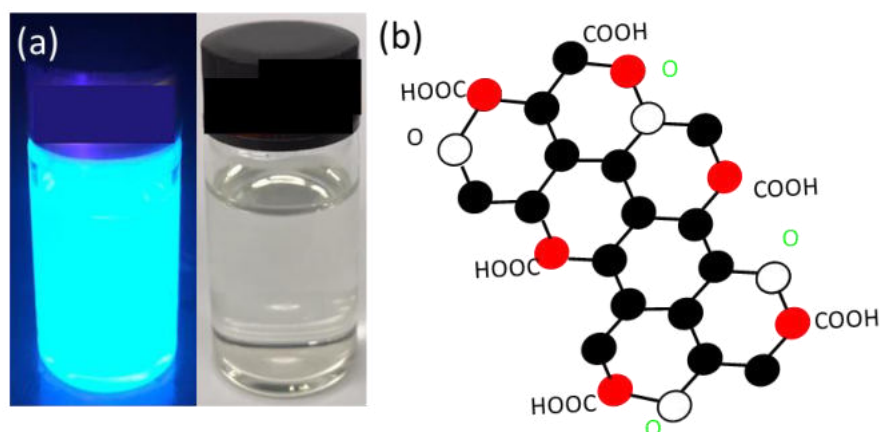


Figure 2: (a) Final product of GQDs in the colourless colloidal form under daylight and UV light (blue solution). (b) The chemical formulation of GQDs.

COMMERCIAL POTENTIAL

To date, there are no locally produced GQDs marketed in Malaysia which currently the user greatly demands from the outsource which is very time consuming and expensive. As for the price of GQDs itself for the application mentioned in many works related has been purchased from companies that came from overseas such as Advanced Chemicals Supplier (Canada), Sisco Research Laboratories, SRL (India), and Sigma-Aldrich (United States). The comparison price and their specifications are shown in Table 1.

Table 1: Price and specifications between companies selling blue-luminescent of GQDs compared with our produced GQDs

Companies	Origin Country	GQDs Price (RM)	Size (nm)	Appearance	Quantum yield, QY (%)
Sisco Research Laboratories	India	406.72	~15	Suspension, colourless	NA
Advanced Chemicals Supplier	Canada	578.98	<15		NA
Sigma-Aldrich	US	849.00	<5		>65%
Our GQDs	Malaysia	400.48	~3		>77%

Moreover, as seen in their specification for their product showed that our synthesised GQDs can be on par with all these companies. For example, in terms of our average size in the range of less than ~5 nm and quantum yield that able to reach up to 77%. Furthermore, GQDs is known as an emerging material to be used in many applications such as solar panels, batteries, sensing materials and many more as illustrated in Figure 3. This could open new doors in Malaysia researching scenes that related to it and even able to accelerate the process. Regardless, our current research, which is in the pursuit of fabricating fibre optic biosensors is using the GQDs produced and has shown great properties in terms of boosting signal in the optical fibre. This could be a steppingstone for our local research scene towards incorporating GQDs in their respected research applications. Due to its relatively new, such high demands is likely to happen.

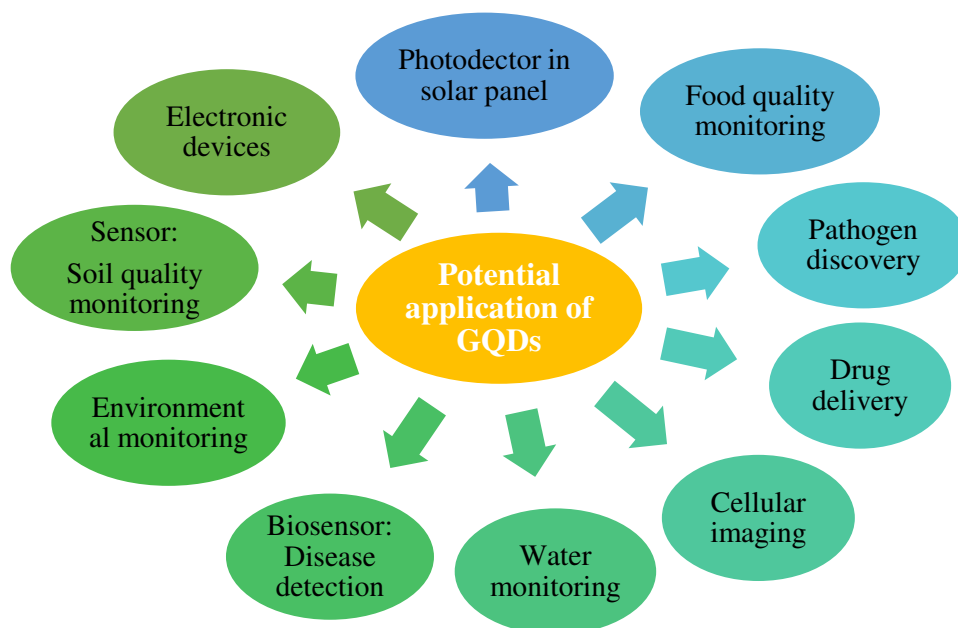


Figure 3: Potential GQDs application in sensors, biomedical and electronic applications

CONCLUSION

Based on our synthesised GQDs, it was found that the average size is at ~3 nm. By using a minimal and simple experimental setup, the produced GQDs exhibit behaviour that is on par and even better compared to the specifications of the companies such as Advanced Chemicals Supplier (Canada), Sisco Research Laboratories, SRL (India), and Sigma-Aldrich (United States). Our produced GQDs has shown a significant QY up to 77% which is higher than QY exhibited by GQDs product from Sigma-Aldrich (one of the world-leading company in chemical supply). As the research is still in progress, our GQDs has shown stable emission peak up to 90 days. The existence of functional groups such as carboxyl has strengthened the capability of the produced GQDs towards the extension of this work for fabricating a biosensor as this functional group aids in the bioconjugation process. The characterisation results obtained from our GQDs testing has shown that this proposed method in the synthesis of blue-emitting GQDs can be utilised further in optoelectronic or biotechnology applications such as biosensors and bioengineering; for example, in the immobilisation of cancer markers on the surface of GQDs.

ACKNOWLEDGEMENT

This research was funded by FRGS-Racer grant: 600-IRMI/FRGS-RACER5/3 (011/2019) and MTSF, TORAY Foundation Japan (100-TNCPI/PRI 16/6/2 (002/2021)). The authors would like to thank all technical staff from the College of Engineering and Photonics Research Lab Faculty of Applied Sciences, UiTM Shah Alam and Prof. Dr Khairunisak Abdul Razak and Mrs Nor Dyana Zakaria from NanoBRI@INFORMM, Universiti Sains Malaysia for their technical support.

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AquapHR V1: An Autonomous pH Regulator for Aquaponic Water System

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ABSTRACT

In planting plants using an aquaponic system, plants are very dependent on nutrients found in water and pH value. The pH value becomes one of the parameters that determine the yield. The pH value for aquaponic must be maintained in the range between 5.5 to 6.8. To maintain the pH of the environment, the water is treated with an acidic solution and the pH needs to be measured hourly. An automation system named AquapHR V1 is designed to keep the pH always at a predetermined range and has been set as the objective of this innovation. The product uses an Arduino wired up at a pH meter to detect the pH level of the hard water in the aquaponic system. When the pH meter reading is in the undesirable range, the product will trigger the motor to turn on the pump to add either the acid or base solution in the required amount into the water system so that the water pH reading will return to normal levels. The buzzer in AquapHR V1 will emit a loud and short beep sound if the water content is deficient in acid solution while it will sound loud and long beep if the base solution is deficient. It is believed that the presence of this automation system would be beneficial to the farmers in managing the water conditions in the aquaponic plant system in a simple and fastest way. In turn, they would produce quality and better yield, increasing productivity and revenue.

Keywords: Aquaponic; pH range; Arduino; AquapHR V1; pH regulator

INTRODUCTION

Aquaponic is the result of a merge between fish farming and hydroponic where aquaponics brings you the best of both worlds. Basically, aquaponic is a system where fish waste will be a useful nutrient to plant growth. the plant will get excess nitrogen, providing purified water which goes back into the tank. Aquaponic history dates to the time of Aztec civilization, 1000 years BC. At that time, they were doing similar activities such as aquaponics and known as “Chinampas”. They produce raft -like and island -shaped crops floating on

shallow lakes, and then turn them into special canals [1]. Aquaponics has continued to grow since the modern 20th century and become more sophisticated with modifications that provide more crop yields and aquatic life. In planting plants using an aquaponic system, plants are very dependent on nutrients found in water and pH value. The optimum pH range for fish depends on the type of fish being used for the aquaponic system. The range is between 5.5 to 7.5 for freshwater fish and saltwater fish [2]. If the pH is too high or too low, it will affect the fish by stressing them and tend to die. The compromise that is optimal to all three components of an aquaponics system; fish, plants, and nitrifying bacteria is a pH of 5.5 to 6.8, a bit acidic.

Problem Statements

The pH value becomes one of the parameters that determine the yield. The pH value for aquaponic must be maintained in the range between 5.5 to 6.8. In an aquaponic system, the water is treated with nutrients to stimulate plant growth which makes it hard water. This creates a basic environment for the plants and will hinder its yield and growth affecting the productivity of the farm. To maintain the pH of the environment, the water is treated with an acidic solution and the pH will be measured every hour. This is a time-consuming process to maintain the pH of the system. This time-consuming process would hinder the productivity of the farmers which would lead to a lower yield and affect the potential revenue to be made. The compromise that is optimal to all three components of an aquaponics system; fish, plants, and nitrifying bacteria is a pH of 5.5 to 6.8. However, maintaining pH within such a narrow window can be difficult and may lead to unnecessary adjusting and tweaking. It is important to measure pH every day because it normally declines daily in response to nitrification processes. If pH levels get too low, nitrification will slow down or stop, and ammonia will accumulate to levels that are toxic to the fish. When pH drops below 5.5, a base in the form of calcium hydroxide or potassium hydroxide should be added to the system to bring it back up to 6.8 [3-7].

Objectives

The objectives of this innovation are: -

- i. to keep water pH in the optimum state.
- ii. to alarm the aquaponic operator the low level of acid and base solution in the system.
- iii. to measure and monitor the pH level of the water every hour.

INNOVATION DEVELOPMENT

The product uses an Arduino wired up to a pH meter to detect the pH level of the hard water in the aquaponic system. When the pH meter is at a certain unwanted range, it will trigger the motor to turn the pump for a predetermined time which will add the solution in a required volume into the water system so that the pH of the water will come back to the required pH range. AquapHR V1 has two peristaltic pumps that will pump out the solution needed to keep the water pH between 5.5 and 6.8. Every hour, pH metre is used to measure the pH of the water. If the pH of the solution falls below the optimal level, a peristaltic pump will be used to increase it. The amount of base pumped out will be set at 0.1 mL, and a motor stirrer will be turned on for 3 minutes to homogenise the solution [7]. If the pH of the water exceeds the optimum value, 0.1mL of acid is pumped out to minimise the pH of the water, and the motor stirrer is kept on for 3 minutes. This is how the innovation works to make sure water will always be at optimum

values so that the plants have optimum conditions for maximum yields. The system also will be alerting the aquaponic operator about the low level of the solution used to maintain the pH level. The system will be alarming the operator for low level of acid solution by loud and short repeated beep, loud and long beep for low level of basic solution. The prototype operates automatically, less man hour to monitor the aquaponic system. The aquaponic operator only require adding on the solution once the prototype give an alarm.



Figure 1: Prototype of AquapHR V1

COMMERCIAL POTENTIAL

This product was designed specifically to assist all aquaponics enthusiasts in controlling the pH of their aquaponics. As a result, the product is designed specifically for those who work with aquaponics. This includes those who run aquaponics at home, those who supply aquaponics systems and tools, educational institutions with agricultural programmes for educational purposes, and aquaponics businesses. It is believed that the presence of this automation system would be beneficial to the operator in managing the water conditions in the aquaponic plant system in a simple and fastest way. In turn, they would produce quality and better yield, increasing productivity and revenue.

CONCLUSION

The AquapHR V1 was designed to simplify and lighten the workload of aquaponic operators. Many other factors, such as water temperature, nutrients required for plant growth, preserving growth, and others, must be considered when preserving and caring for this aquaponics. As a result, the development of this AquapHR V1 is extremely beneficial to all aquaponics operators in managing one of their aquaponic care routines. This product is also unavailable on the market. As a result, it will undoubtedly be a focus for aquaponics operators, particularly large aquaponics companies, because it has a significant impact on them. AquapHR V1 is designed to maintain the pH optimum value by measure and monitor the water every hour. This autonomous system also will be alarming the operator if the low level of acid and basic solution is happened.

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An Overview of Educational Games in Promoting Clean Water Awareness

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ABSTRACT

The platform that has raised exposure and insight on a particular issue such as the global water crisis has always been in the form of monotonous text such as articles, journals, and studies. Reading is an enjoyable and rewarding activity, yet it could also prove to be disengaging, especially when it lacks the visual aid. Therefore, a method to raise awareness on the global water crisis and the awareness of clean water issues correlating to it is by making gaming a versatile platform to do so. Thus, this project is conducted to promote issues regarding the global water crisis in the form of an engaging yet simple story game for adolescents between the ages of 12 and 15. There has always been a multitude of plot-driven games circulating around severe problems the world is dealing with and this project's game plot focuses on raising the significance of water sources and how it affects our daily lives. Incorporating a serious issue as the plot of a game could instil good character values within adolescents. Based on the findings, games leave more educational impact on the players due to their stimulating traits as engaging gameplay, compared to monotonous reading increases the motivation to learn and gain knowledge.

Keywords: Global water crisis; 2D games; educational gaming; clean water awareness; water sustainability

INTRODUCTION

The issue of water scarcity happens to be a global crisis that would have impacted for eight consecutive years, as it is ranked among the top five global risks by The World Economic Forum's Global Risk Report [1]. Contaminated water supply poses a serious threat to the environment and the organisms that live within it. Consequently, this matter also affects negatively trying to achieve Millennium Development Goals (MDGs). The issue of water availability is not only prevalent in rural areas but exists in the prospect of urban areas as well [2]. Hence, water is important in everyday lives. Throughout the globe, all activities relating to water were executed in line with people's cultural beliefs and customs. Bodies of water were sacred, protected by communities. This was brought to a drastic change with the introduction of new political governance where water became a taxed commodity and commercial fishing was introduced [3]. Therefore, the notion that water is often linked to life and spirituality has moulded itself into a staple in our everyday lives cements the relevancy on how water should stay abundant and clean for all. Additionally, as water happens to be a crucial natural resource, it has become a primordial factor contributing to economic growth and it differs from the rest due to how it is viewed as means to prosperous wealth [4]. It is a commodity we often take for granted. Even then, our natural supplies are polluted, and this affects the environment and living beings with diseases [5] when the quality of water is diminished through its treatment method [6]. However, the possibilities of the solution to this crisis must be sustainable and environmental-friendly, something that can be utilized by poor rural areas and urban areas alike

[7] Solutions such as solar-based water disinfection methods and 2D photothermal nanomaterials to produce clean water were brought upon and experimented on [8, 9]. Therefore, it is crucial that this issue ought to be brought more into the light through different platforms, not just through the news or journal articles.

For the topic to be taught and received well, it could be done in the form of educational gaming. Games could be utilised as an alternative to conventional instructional approaches to enhance the player's learning experience. Learning should not be a mundane experience that is limited to students only having to memorize and understand the concepts through repetition [10]. Living in the 21st century, it would also be wise to adapt and implement new technology as means of learning. Storytelling, education through entertainment, and collaborative interaction are all effective ideals to promote learning in impressionable minds [11]. Mainly, storytelling is a craft practiced through the millennia as means to create and communicate narrative structures of words, images, sounds, or performed actions to entertain, as well as act as cultural preservation and educate values and social cues [12]. With the rise of interactive multimedia technology, traditional methods in telling stories have evolved to interactive and digital and have increased their popularity among children [13]. In trying to find solutions to a crisis, it is better to grasp the situation beforehand and understand what factors were lacking. Games can enliven teaching topics and are particularly good for dealing with problem-solving and key concepts when used as pedagogical devices [14]. People ought to educate themselves about the issue of clean water awareness through engaging activities such as gaming. Gaming in education has many roles, which could be summarised in the Figure 1 below.

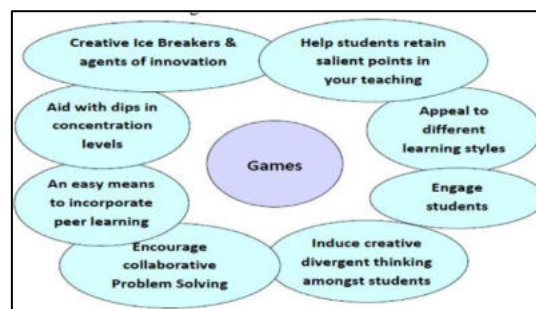


Figure 4: Roles of games in education

INNOVATION DEVELOPMENT

This section of the project focuses on the overall design development of the whole concept of the project. After establishing a concept from the chosen premise, its important to have references and a framework of inspirations interconnected with each other to really visualize the final look of the whole project.

Concept Process

After an idea is established, the process is developed even further into a few steps. This is to ensure that the workflow would be smooth and uncluttered, as well as having a basis to go back to so initial ideas do not clash with new additional abstractions.

Mood board

In Figure 2, mood boards were constructed and put together as a basis for the research concept.

Storyline

Hennig gets poisoned
by a water creature;
Neo seeks help from

They found the goddess
at the temple,
held in captive.

The goddess gave them
the cure and now it is up
to them how they

Act One
(set up)

Act Two
(confrontation)

Act Three
(resolution)

Concept Sketches

Once the plot is written, the characters are sketched according to their described traits and characteristics. A few concepts were drawn before finally choosing the final look. The Figure 4 above, example of the character's sketches of the main character in the game story, Neo. Also, another character named Naiad, a goddess character who plays an important part in the game's background lore. Then, Hennig, the main character's mentor and the steppingstone to the

game's story and lastly, Honghwan; a humble priest character who aids the heroine in her journey.

Storyboard

After a plot is written, the story is then visualized into a storyboard, as to make it transparent to the developer on what happens in a particular scene, what is the current setting, the current conversation the characters are sharing and even what the characters are currently doing

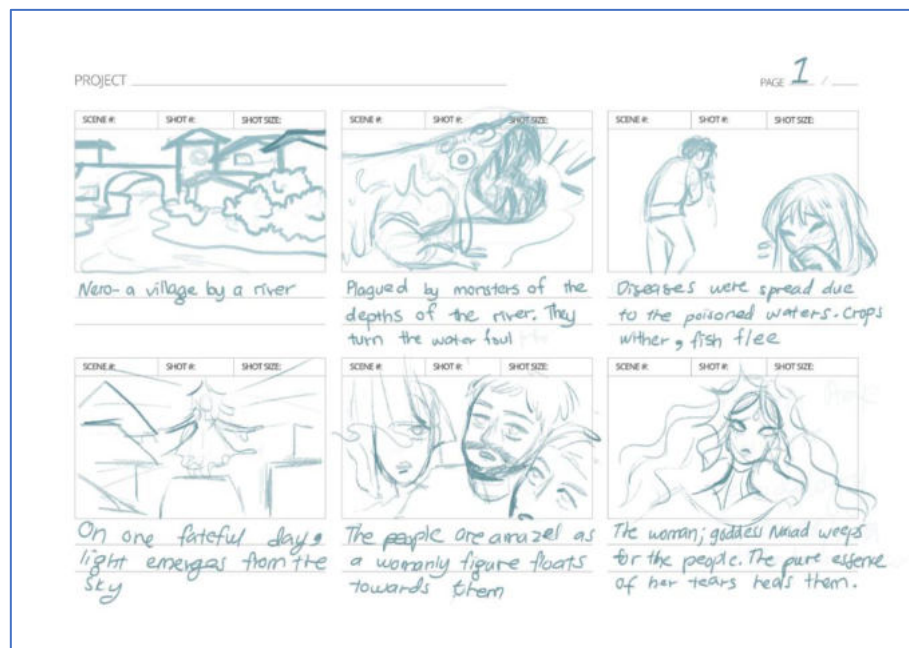


Figure 5: Sample of Storyboard

In-Game Maps (Environment)

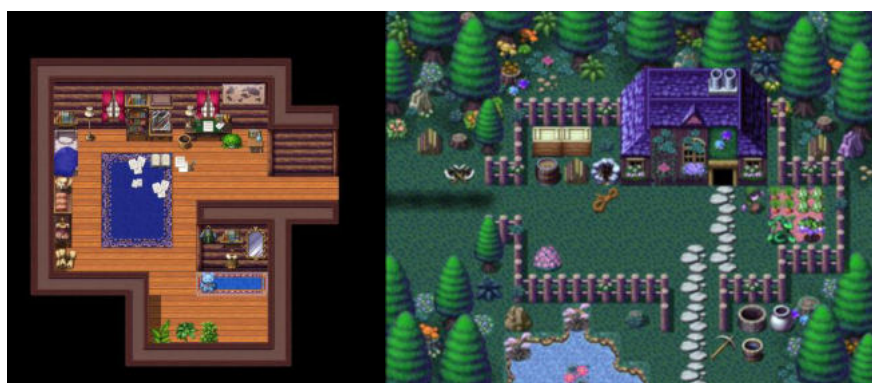


Figure 6: Game's environment

The game maps are created primarily in the RPGMaker game engine. It is suitable to simulate the story with taking the role as the game's character. Certain assets in the application are re-coloured and altered to fit the theme and colour palette of the characters. The creative inventive feature in creating the game is presenting the visual of the game concept. The artistic look of the game and the game story are part of the core elements in this project. The creation

of the game events for this game are done in RPGMaker MV, as seen in Figure 7 below. Game events would consist of interactions, cut-scenes, hints, puzzles to be solved, objects to pick up and non-playable characters to talk with.

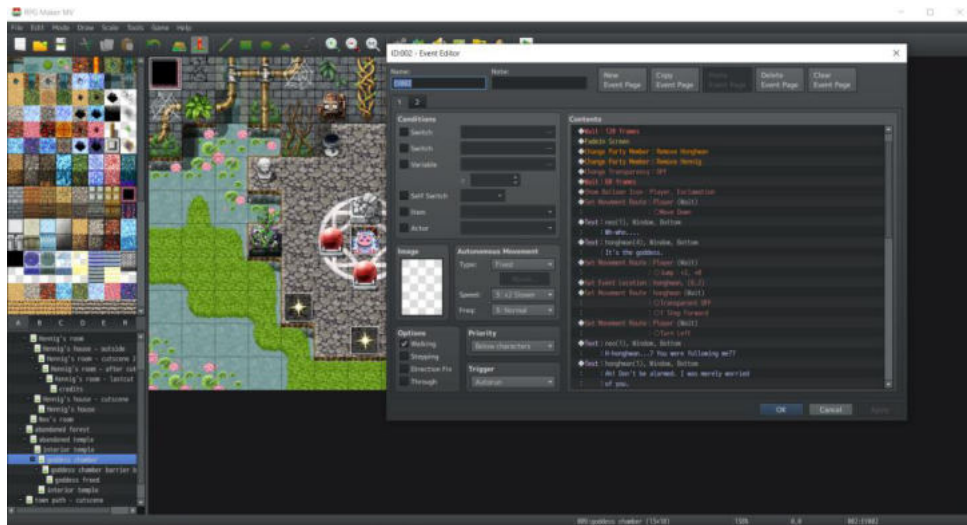


Figure 7: Game’s development

COMMERCIAL POTENTIAL

This project has the potential to be used as learning materials in informal setting. At the very young age, children are attracted with game more compared to reading materials. Thus, there is a potential that this game can be marketed as complimentary reading materials. It can be given freely once the parent, or the schoolteacher subscribe the topic online. The subscription can be suggested as follow:

Table 1: Plan A

Plan A : Register and Free Access for Selected Topic (2 Topics)	
Parent/Teacher/Guardian	Free
	After the free period, charge per topic RM2 per topic

Table 2: Plan B

Plan B : Register and Pay for Monthly/Yearly Subscription	
Parent/Teacher/Guardian	Monthly : 6 Topics RM10
	Yearly RM100

CONCLUSION

To conclude the proposed idea, the objectives were sought and identified in order to address the issue of water scarcity, that adheres to the Sustainable Development Goal 6. The concerns regarding water scarcity affects everyone; it is difficult to go a day without clean water because we have built our lives around it. Due to the shift and evolution of historical civilizations revolved around water, who are we to deny that access to it is a basic

human right? Hence, the project conducted has taken in consideration of the factors and impacts that led to a global water crisis such as water pollution into the storyline, in hopes that the game would be well received and beneficial for children's consumption. Instilling awareness regarding global issues may be a small step into solving it but it has to start somewhere. Children are the hopes for the future, after all. They will one day inherit the world from us. Which is why implementing and educating them regarding these values about sustainable methods by preserving and keeping the environment clean is particularly important.

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CATEGORY C
Foundation/Matriculation

A'per; The Two Life Paper

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ABSTRACT

A'Per: The Two Life Paper. This project is to introduce our recycled growing paper that may change the fate of our beloved green Earth. A'Per is created especially to serve the earthlings in order to nurture our beloved planet. This product is a paper which contains carrot skin, potato skin, egg shells and seedlings. It will reduce the amount of waste produced by humans as it had the paper recycled and planted the moment it is no longer used or better known as post-consumer waste. Our invention is one of a kind because we don't only turn papers into plants, but also make full use of carrot and potato skins and even more surprising; egg shells which have the worst management as people just throw it away after a single use. Realizing that these components hide mass advantages for growing plants, we decided to mix them together into our paper. As a result, our invention provides the 2 in 1 organic compost in order to nurture the freshness of the plant. The tree with organic compost usually produces better products than chemical compost. Besides, the yield from the plants has a better smell and taste compared to the plants which use chemical compost that bring numerous harmful effects. In addition, planting trees in a large quantity can change the microclimate in a place which means it can save the environment that is worsening day by day. As far as we all are concerned, recycling papers conserves natural resources, saves energy, reduces greenhouse gas emissions, and keeps landfill space free for other types of trash that can't be recycled. From our study, we proudly announce that recycling a ton of paper can save up to 17 trees, 7000 gallons of water, 380 gallons of oil, 3.3 cubic yards of landfill space and 4000 kilowatts of energy – enough to empower the average U.S. home for six months and reduce greenhouse gas emissions by a metric ton of carbon equivalent (MTCE) which bring countless benefits to human ourselves, environment, and animals. We only need to test up papers into small pieces and it will be ready to be planted. Animals will also serve by our invention when the fruits from the tree are produced as they can survive from the plants as they get adequate basic requirements. We will guarantee that for every tree sacrificed for paper manufacture, other plants will come to life.

Keywords: A'per; egg shells; carrot and potato skins; organic compost; reduces greenhouse gas emissions

INTRODUCTION

A'Per: the two-life paper is a new product that transforms our everyday paper into a brand new 2 in 1 plan table paper. This amazing paper consists of all recycled ingredients which are egg shells that can be found easily in your trash after cooking omelette for breakfast or having half boiled egg instead every morning.

Reuse, reduce and recycle. First thing first, this new 2 in 1 plan table paper can solve the real problem that we face nowadays which is excessive usage of papers every day that

leads to deforestation. This simple yet useful product can transform papers that had been used into new plants. Therefore, for every single tree that is being chopped down to make papers, a new plant will come to live. As lots of campaigns are held regarding recycling to enhance people's awareness toward the benefits of recycling, no further actions are able to replace the sacrificed trees.

In addition to this invention, we are using waste from vegetables which are carrot and potato skin. As we can see clearly around us, the skins have the worst management in this type of waste because we just throw it away right after using it. By our awareness, this problem can be reduced as they are added into our A'Per and the best of it is they benefit plantations. Besides that, egg shells which are also common wastes are finally being fully used. Secret ingredients contained in egg shells help the growth of plants as they act as great natural fertilizer.

First, let us think about waste. Wastes are created when people throw things away because they no longer need them. Study shows that the highest waste by humans are papers which is 40%. Based on our observation at school, paper waste is everywhere. It is because we use papers every day for notes, exam papers and even letter envelopes. As soon as a year passed, tons of exercise books, notes and assignments were left unattended. All of them ended up at a dump. We are sure this situation happens in all schools and not only in ours. Therefore, do recycling campaigns help to save all these papers? The answer is no. So, our plan table 2 in 1 paper is the solution as it can grow new paper naturally and independently.

Recycling campaign has been started for years yet global warming is still happening and worrying us. This simply tells us that the number of green plants is decreasing for every second past. A'Per will grow into new trees that benefit our environment which is the actual thing we need. Consequently, fruit plants will also benefit animals as they can eat the fruits to survive. In addition, planting trees in large quantities can change the microclimate in a place which means it can save the environment that is getting worse. This product is generally the right thing to do. It is a good project for all earthlings to live comfortably on the earth and to ensure the earthling will feel the same.

Problem Statement

Every invention and innovation must have problems that need to be solved. Based on our further reading and research, we are able to come up with three problem statements for this invention.

Firstly, we have to acknowledge that every single tree on Earth is being cut down every year consistently for paper making by the paper industries around the countries. Based on the statistics in 2011, about 28% of all wood cut in the U.S. is used for paper making. Less than 9% of the wood used to make paper is harvested from old growth forests, which are impossible to replace because of their maturity.

Further to this, we found out lots of used paper has been produced in every country in this world. Data has shown more than 199 tons of paper has already been produced. With all the paper we waste each year, it is possible that we can build a 12-foot-high wall of paper from New York to California.

Last but not least, organic waste that has been produced in every country everyday has exceeded the number of garbage dumps. This definitely will lead to another problem not only to humans but to the environment which is pollution.

Objectives

The main objective of the study is by producing this A'per in the paper industry, the paper can become one of an effective action to replant the trees. The specific objectives are:

1. To maximize the use of wasted materials. Waste management helps to reduce energy usage, reduce the consumption of fresh raw materials, reduce air and water pollution (from landfilling) by reducing the need for waste disposal and also reduces greenhouse gas emissions.
2. To nurture love towards nature. Our oceans and soils provide us with the food we eat, the air we breathe, the water we irrigate our crops with. We also rely on them for numerous other goods and services we depend on for our health, happiness and prosperity.
3. To make the world a greener place, especially in urban areas. Going green reduces air pollution and toxins that could affect our body's immune system, and that could expose us to diseases and fatal illnesses. Another advantage of going green is that it helps decrease the number of pollutants released to the environment.
4. To encourage and inspire the new generation to be creative. Creativity frees the mind in a way that enables a person to absorb knowledge more easily. It makes processing learning more efficient and enables alternative ways of thinking. Besides, It brings people together and can nurture skills in teamwork and cooperation.

INNOVATION DEVELOPMENT

This innovation was firstly inspired when the world is facing a pile of organic waste issues that are not being handled well until the piles are conquering the garbage dumps. This innovation is to introduce our recycled growing paper that may change the fate of our beloved green Earth which we are focusing on to decrease the amount of deforestation as well as organic waste that becomes a pest house.

Each year, there is a huge scale of paper making in every country with also plenty of paper that has been thrown away after a single use. Because of that, we would like to propose an initiation to reuse back the used paper to create a paper that can be used again. Instead of a recycling method that requires big machines to handle, this innovation also can be made in our backyard only by grinding the used paper with water and letting it dry for two days. Our first trial of making this reuse paper did not end well as the structure was not strong enough to act as a normal paper. Because of this problem, we have come up with a way to overcome this problem by mixing it with carrot and potato skin that is always being dumped from the domestic sector. These skins might look useless as we did not eat it, but fortunately these skins work well in producing a good structure of a paper as it gives a better quality in strength since it is a starch that has a strong bond biologically. As far as we all are concerned, recycling papers conserves natural resources, saves energy, reduces greenhouse gas emissions, and keeps landfill space free for other types of trash that can't be recycled

Things would end the same if we only produce a new paper from waste that will end up increasing the amount of paper wasted since this recycled paper is not encouraged to be recycled back as the structure would not be as good as it is before. Because of that, we would like to spice up this innovation by varying the usefulness of this innovation, not only focusing on

producing recycled paper only, with a method of mixing this recycled paper with eggshells that contain calcium carbonate which help to neutralize the soil. This element has upgraded A'per to become a fertilizer after being used for writing. This kind of fertilizer was better than chemical compost which can have a negative impact on other things. Besides, the yield from the plants has a better smell and taste compared to the plants which use chemical compost that bring numerous harmful effects.

Lastly, we also add chilli seeds in A'per so that it can work as seedlings as well. We only need to tear up papers into small pieces and it will be ready to be planted. On top of that, we can also benefit from the fertilizer element in A'per while planting the new chilli plant without spending more money to buy another fertilizer. Planters will also serve by our invention when the yields are produced healthy and easily. We will guarantee that for every tree sacrificed for paper manufacture, other plants will come to live.



Figure 1: Innovation prototype

NOVELTY AND USEFULNESS

A'Per: The Two Life Paper was created specially to serve the earthlings in order to nurture our beloved planet. This product is a paper which contains carrot and potato skin, egg shells and seedlings. It will reduce the amount of waste produced by humans. It is because the paper can be planted to make a new tree when it is no longer being used.

Novelty

1. A'per is a product made from organic waste which is carrot, potato skin and eggshell.
2. Eggshells lower soil acidity. The calcium carbonate in eggshells lowers soil pH levels, making the soil more alkaline than acidic. Meanwhile, carrot and potato skin contains

potassium that is important for plant's growth. Wash out of the soil over time requiring soil enrichment with fertilizer to restore the balance and help plants obtain their best growth potential.

3. Economically low in cost whereby we reuse and recycle organic waste which we don't acquire to add new substances in creating this product. Organic wastes are composted to stabilize organic matter, reduce the moisture content, increase the concentrations of plant nutrients, eliminate pathogens and weed seeds, develop disease suppressiveness, and reduce greenhouse gas emissions.
4. A'per is very eco-friendly since it helps decrease deforestation and no smoke from the factory will be released. Eco-friendly products and green buildings contribute to saving the environment by not using materials that are harmful. Their production and construction are also by the aim of preventing pollution. They avoid the use of fossil energy. They also help in diminishing the levels of carbon dioxide to the atmosphere, hence prevention of climate change.

Usefulness

1. A'per is used as a paper which reduces the new production of paper from the industries. Recycling 1 ton of paper saves around 682.5 gallons of oil, 26500 litres of water and 17 trees. Every tree produces enough oxygen for 3 people to breathe. Paper accounts for 25% of landfill waste and 33% of municipal waste.
2. It works as fertilizer for the farming and planting industry. In this case, the eggshells which work as calcium carbonate neutralise the soil and help the growth of plants. Egg shells will add small amounts of calcium, potassium, a bit of sodium, but not enough to harm the plants, phosphorus and magnesium.
3. Since A'per contains chilli seed, it can act as seed for plant growth whenever this product is being thrown away after it is no longer available to be used. These seeds start to germinate after a few days as soon as you plant them in soil. Of course, these seeds need a humid, warm climate as it is important for their growth.

COMMERCIAL POTENTIAL

The mission of A'Per is to give our customers the most effective manner of using paper to save trees from being cut down. According to a recent study, the pulp and paper industry has thrived and will continue to do so until 2022. As a result, the level of competition between companies has risen due to technological advancements that have aided in the establishment of a global market of consumers worldwide who are committed to sustainability, prompting producers to seek out biodegradable and environmentally friendly alternatives to their products. The first-hand example is our own idea, A'Per, which certifies environmental protection. Not to mention it's guaranteed to be easy to make, convenient and consumers' favourite thing to hear, inexpensive as all the needed items consist of our everyday things that we did not realize its importance.

As we can see, every single tree on the planet is being taken down for paper production by the paper businesses in every country on a constant basis, year after year. As a result, it adds to the increase in paper output, resulting in an abundance of waste paper. Apart from that, the amount of organic waste that is created in every country on a daily basis has outstripped the

number of garbage dumps, owing to the fact that people tend to forget that they can turn that waste into a more valuable product. In addition to making important contributions to the growth of technology and knowledge, the breakthrough of A'Per has also made substantial contributions to the advancement of society and the environment. This innovative technology is being implemented in the horticulture area in order to maximise the use of the product to the fullest extent possible. The field of botany gets knowledge on the best ways to turn organic waste into seedlings to the greatest extent possible, and society will no longer be concerned about wasting paper because our product, as previously stated, will develop into a brand-new plant. Last but not least, A'Per provides the chilli seeds with the opportunity to develop and grow into a new plant, aided by the organic waste contained within the paper. It is strongly anticipated that this product will be able to achieve high market levels as a result of its ability to provide people with greater ease in their lives through this project.

Selling Price

Table 1: The cost of A'Per estimated in a month

Item	Cost (RM)
Marketing	15
Paper production (150 bundle)	1500

The estimated cost for a bundle is RM 10.10. The selling price for a bundle that we all agreed is RM 16.00 with RM 5.90 profit per bundle.

Profit Margin

$$\begin{aligned}
 \text{Profit Margin} &= \frac{\text{Selling Price} - \text{Cost}}{\text{Selling Price}} \times 100\% \\
 &= \frac{\text{RM } 16 - \text{RM } 10.10}{\text{RM } 16} \times 100\% \quad (1) \\
 &= 36.88\% \quad (2)
 \end{aligned}$$

CONCLUSION

All in all, by now, nearly everyone knows that we are depleting the natural resources of the only home that we have at a rate that is well past sustainable. To some extent, we have become inured to alarming reports and ominous warnings about our wasteful ways. Media outlets yammer away about Global Warming and Deforestation and these reports either fatigue or motivate us to make necessary changes in our lives.

Occasionally, a development comes along that provides some optimism about our prospects for making positive changes in our living habits and that is when A'Per comes to the rescue. We are really confident that our product is not only safer to be used, it also is not hazardous or jeopardizing the other Earthlings in order to enhance a better quality of life. Our project is a sign for the human nation to move on from where we are now to a better stage of life. Paper, carrot and potato skin, and seedlings are here to preserve and nurture our Earth more than ever.

This noble mission is not only for us, it is credited to our ancestors who had shared the same round moon and the bright sun with us and our future grandchildren to make sure our Earth will be going through the same circumstance even though technology is leading us nowadays. Last but not least, we hope our eco-friendly project 12 would help the environment to upgrade the recent situation into a new better world and our project could be received well by all the Earthlings.

ACKNOWLEDGEMENT

We wholeheartedly would like to bid thanks to all of the parties that have been involved in making this project a success. We also would like to express our heartfelt gratitude for giving us the opportunity to participate in CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2022.

First and foremost, an abundance of gratitude to The Centre of Foundation Studies, for putting your trust in us to bring this project. We are eternally grateful and will strive hard to maintain this momentum of ours.

We also would like to give our sincerest thanks to each of the previous team members, Nurfadzlin Samiha binti Mohd Fadzli, Aini Anisa binti Hashim, Aina Irdina binti Sallehuddin, Nur Batrisyia binti Amaluddin that have won awards for being truly supportive and dedicated throughout our process in making the A'Per a real invention as it is now. We are truly grateful for having great team members that give us hope and continuous support, guidance and a lot of encouragement.

Last but not least, millions of thanks to our beloved parents, precious mentors, members and friends from The Centre of Foundation Studies. A big gratitude for all of the support, help and trust you put in us for making A'Per a success.

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Buttermilk Gel

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ABSTRACT

Cockroaches are pest vectors that can spread diseases such as skin diseases, diarrhoea, and many other diseases. This is due to the habitat's location in an area with extremely poor hygiene standards. Bacteria can easily attach to its fine hairy legs, contaminating the surrounding area and food exposed to the Penang Matriculation College cafeteria environment. As a result, college students have experienced discomfort due to this issue. The goal of this innovation is to find a suitable method to solve the cockroach problem and design a Buttermilk Gel cockroach trap prototype for use at Penang Matriculation College. This method of implementing innovation employs the PDCA model, which consists of four phases: Plan, Do, Check, and Action. Buttermilk Gel is an effective alternative for cockroach controlling tool that also results in a cleaner, higher-quality college environment. After being replicated with the Penang Matriculation College, Buttermilk Gel has the potential to be marketed and can be indirectly expanded for use in educational institutions or for domestic use.

Keywords: Cockroaches; hygiene; prototype; innovation

INTRODUCTION

Our innovation is Buttermilk gel is a pest controlling tool that we created specially to prevent the overbreeding of cockroaches in Penang Matriculation College. This product also designed to be eco-friendly, biodegradable and contains no harmful chemicals. Hence, we could prevent overpopulated pest without harm the nature with detrimental substances [Wilson, 2020]. In other word, we aim that our college environment will result a cleaner, pest free and higher-quality standard college environment. This innovation also easy to use, cheap and durable. No doubt that this creation can effectively become the best and safest alternative of a cockroaches or pest trap. Finally, our innovation also has a huge potential to be commercialised and indirectly expanded for use in educational institution or for further domestic use.

For schools, universities, and educational facilities, especially our college, Penang Matriculation College, pest problems pose a major danger to the health of students and staff. Food that contaminated by cockroaches or pest will give food poisoning among students, lecturers or even the college's staff [The World Health Organization, 2020].

Far from scaring pests away, the large number of individuals gathered in a school area can significantly increase the chances for pests to find their way into a safe and comfortable nesting area and tis is result in making full pest removal difficult even for experienced school administrators.

The main issue is schools provide just about everything a pest needs to start a successful nest, including available food and water left behind by students to hiding places in dormitories and utility rooms where colonies of pests can hide relatively undisturbed. That makes schools a target for not just the usual suspects, but a wide range of pests looking to settle in somewhere [Changlu Wang, Gary W. Bennett].

As a solution, we need a pest controlling tool that easy to use, cheap, effective and safe to the environment to prevent cockroaches or other pest from continuously spread diseases in our college.

This innovation aims to reduce the presence of pest vectors such as cockroaches (*Periplaneta americana*) in the surrounding area particularly in cafeterias, restrooms, and hostels of the Penang Matriculation College. Thus, a cockroach trap called Buttermilk Gel was created. Apart from that, the idea of Buttermilk Gel was also triggered due to the use of pesticides seen to endanger the health of college students and pollute the environment [Jacob L. Heller, MD, MHA, Emergency Medicine, Emeritus, Virginia Mason Medical Center, Seattle, WA., David Zieve, MD, MHA, Medical Director, Brenda Conaway, Editorial Director, and the A.D.A.M. Editorial team, 2019]

The goal of this project's innovation is to identify appropriate methods to solve cockroach problems and design cockroach trap prototypes to have a positive impact on creating a conducive learning environment at Penang Matriculation College (PMC). A clean and healthy environment can boost the effectiveness of teaching and learning. As a result, it can help students improve their intellectual power as well as their rational, creative, critical, and constructive thinking, which is in line with the college's goals. In fact, this innovation is an alternative to dealing with cockroaches, living a healthier life, and avoiding disease as a result of a healthier and cleaner workplace environment.

In the meantime, this innovation also complements the national agenda proclaimed in the PPPM (2013-2015) which emphasizes the integration of Science, Technology, Engineering and Mathematics (STEM). Similarly, the TN50 policy which emphasizes the ability to trigger people's aspirations in the transformation of the environment. Malaysia will have the status of a developed country by 2050, so society needs to be a creator of technology, not just a user of technology [Ministry of Foreign Affairs, 2017]

Moreover, through IR 4.0, this innovation contributes to the national economy by ensuring that the next generation has STEM skills. Thus, the Science, Technology, and Innovation Policy (DSTIN), which is responsible for driving the country towards a more competitive and efficient direction based on Science, Technology, and Innovation, is achieved [MITI, 2018]. Implicitly, Malaysia, which has always cultivated hygiene practices, will also achieve the National Hygiene Policy.

INNOVATION DEVELOPMENT

Buttermilk Gel consist of a recycled box and made up of several ingredients. It's made with butter, used cooking oil, and condensed milk. Its function is simple to carry out and it is also portable. No chemicals are involved in creating this, hence all of the components used are both user-friendly and environmentally friendly, which means they have no harmful effect on the environment.

The production of this Buttermilk Gel is low-cost, which can indirectly minimize the continuous use of pesticides and save maintenance costs by the department. Buttermilk Gel is regarded as a promising project with the potential to be commercialized in educational institutions, other departments, and for commercial use.

The PDCA (Plan, Do, Check, Action) model, which is a methodology used by organizations as a system of continuous improvement, will be used to implement this Buttermilk Gel innovation.

Table 1: Buttermilk Gel Implementation Method Using PDCA Model

Strategy	Date	Plan	Do	Check	Action
Period	1 Nov 2021-3 Jan 2022	15 Jan 2022-10 Feb 2022	14 Feb 2022-28 Feb 2022	2 Mar 2022-30 Mar 2022	2 Mar 2022-30 Mar 2022
Activities	Provide equipment specifications - Measurement - Price/unit estimation	Process of setting up the tool Phase 1 Purchase of materials - Recycled box - Condensed milk - Butter - Cooking oil Phase 2 - Adjustment of recycled box - Mixing the ingredients How does the Buttermilk Gel work? - Buttermilk Gel will be placed in risky areas such as kitchens in cafeterias, toilets in student dormitories and in	Findings - The recycled container/box is too small and does not fit the quantity of cockroaches trapped inside the container Improvements - Replace the recycled box/containers that are slightly larger in size than the original Customer Input - Through a questionnaire Do the costs involved make the project viable? - Budget issued within	- Setting up of product at targeted location - Standardization on the instructions of management	- Other long-term uses: - ant reducing tool

		<p>dormitory rooms.</p> <ul style="list-style-type: none"> - Buttermilk Gel will be placed monthly from January to December 2022 at the venue. - The members will monitor the effectiveness of Buttermilk Gel. - After every month, Buttermilk Gel is taken from the place at risk. - Buttermilk Gel containers will be cleaned and put back at places at risk the following month. 	<p>the capacity of the department</p> <p>Ensure this Buttermilk Gel is safe and efficient to use</p> <p>Features of sophistication:</p> <ul style="list-style-type: none"> - Practical - Easy to be cleaned - Portable <p>Benefits</p> <ul style="list-style-type: none"> - Ensuring a healthy environmental ecosystem - Allows PdP to run smoothly 		
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Methods of Operation

Buttermilk Gel is a cockroach trap that is not only environmentally friendly but also user friendly. This product is also 100% biodegradable and safe for the environment because it contains no harmful chemicals.

Figure 1 below shows four simple steps of operating this Buttermilk Gel. The absence of harmful elements such as the use of pesticides makes this Buttermilk Gel suitable for use by various ages.



Figure 1: Steps in operating the Buttermilk Gel

The first step in the use of Buttermilk Gel is open the cover of Buttermilk Gel. After that, place Buttermilk Gel in strategic place such as under the stove. Then leave Buttermilk Gel in that place overnight. The next day, take the Buttermilk Gel out from the spot in the morning.

Operating Diagram

Figure 2 below shows sketches of the side and top views of the Buttermilk Gel.

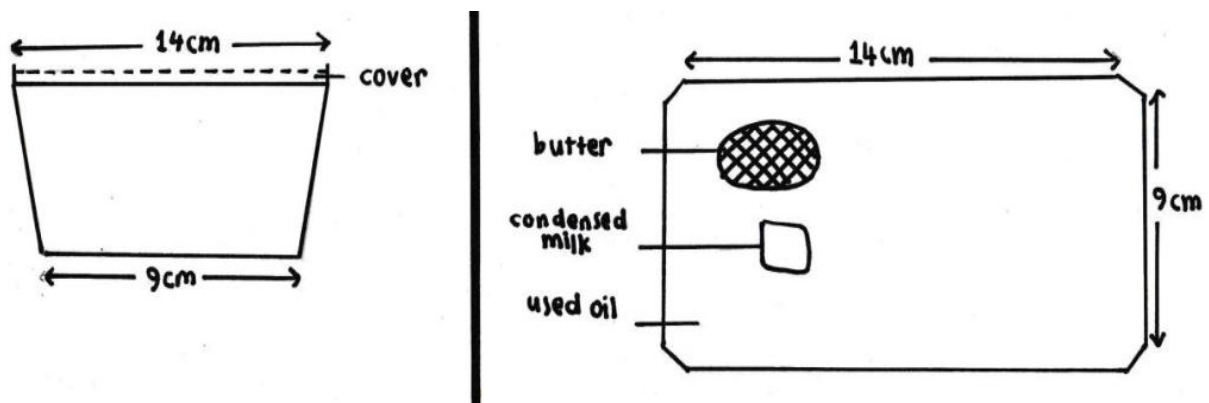


Figure 2: Sketches of the side and top view of Buttermilk Gel

COMMERCIAL POTENTIAL

This innovative Buttermilk Gel is both environmentally and user-friendly because it does not pollute the environment by using toxic chemical pesticides. It is capable of trapping big numbers of cockroaches (*Periplaneta americana*). According to a team of experts from Purdue University in the United States who conducted a cockroach investigation. Their research discovered that cockroaches have developed resistance to a variety of pesticides, making chemical treatment of these pests nearly impossible and useless. Meanwhile, the current ecosystem will be harmed because of the usage of chemical pesticides, resulting in high costs to protect the damaged environment. Because active chemical components in pesticides, such as imiprothrin and cypermethrin, poison parasites rapidly but can have negative side effects, their use can have an impact on ecosystems and the environment.

After five months of using Buttermilk Gel, the observation findings revealed that the cockroach problem (*Periplaneta americana*) in the region around the cafeteria and residential

college had been successfully reduced. Figure 3 shows a graph that supports this conclusion. According to the findings, the number of cockroaches detected in student dorms and cafeterias using Buttermilk Gel has increased since it was initially installed in November 2021. Furthermore, between Jan and Feb 2022, the number of cockroaches caught using Buttermilk Gel decreased. In these at-risk areas, cockroach populations are likely to be dropping. Indirectly, this can help boost the productivity of lecturers, employees, and even students by reducing the risk of harmful diseases in a clean and healthy atmosphere. The fluid secreted by cockroaches, for example, increases the risk of allergies (*Periplaneta americana*). As a result, using Buttermilk Gel can help to prevent food contamination caused by bacteria transferred by cockroach vectors (*Periplaneta americana*).

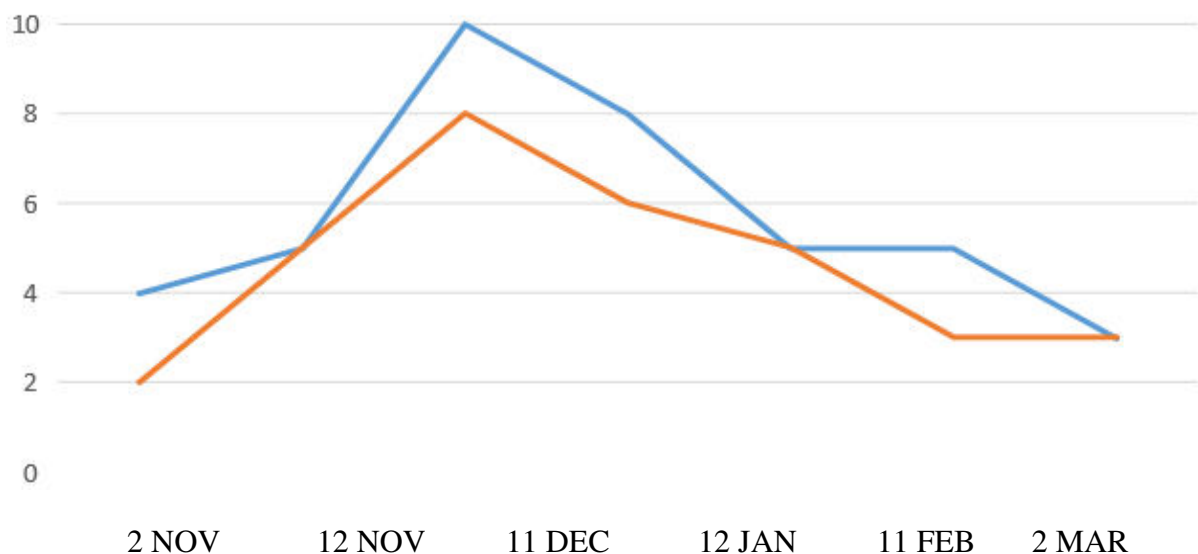


Figure 3: The number of cockroaches detected in cafeterias and residential college

Furthermore, the manufacturing of Buttermilk Gel inventions can produce competitive, creative, and inventive persons in the long run. Buttermilk Gel is also an 'avant-garde' innovation that opens up commercialization options, making it ideal for commercialization by spreading its use to educational centres and other departments, as well as for residential use. As a result, collaboration with external organisations may improve.

According to the results of the poll, respondents believe that using Buttermilk Gel can save them time, as demonstrated by the mean value of 4.24 and the high mean score. Buttermilk Gel can also lower the danger of food contamination caused by cockroach vectors, according to respondents, as evidenced by a high mean score of 3.75. Meanwhile, respondents stated that using Buttermilk Gel can help to reduce chemical pollution in the environment. The findings of a high mean score of mean = 3.86 support this conclusion. According to the responders, Buttermilk Gel can minimise the quantity of cockroaches in the cafeteria and hostel area, as demonstrated by a high mean score a 4.00 value Buttermilk Gel is also straightforward to maintain, according to the responders, as indicated by a mean value of 3.75. Meanwhile, respondents acknowledged that this Buttermilk Gel is long-lasting and user-friendly, as evidenced by a mean score of 4.00.

Table 2: Poll Results

Element	SD	DA	A	SVA	Min	SD	
1. Buttermilk Gel save on the use of chemicals			0	22	33	4.24	1.136
2. Reducing ecosystem pollution from chemicals			0	31	24	3.75	1.192
3. Buttermilk Gel could reduce the			0	38	17	3.86	1.174
4. Buttermilk Gel is easy to bring			0	34	21	4.00	1.155
5. Buttermilk Gel is user-friendly			0	26	23	3.85	1.033
6. Buttermilk Gel is easy to bring			0	26	29	3.76	1.122
7. Buttermilk Gel is user-friendly			0	34	21	4.00	1.155
8. Buttermilk Gel is easy to bring			0	31	24	3.75	1.192
9. Buttermilk Gel is user-friendly			0	22	33	4.00	1.155

Buttermilk Gel is thought to save money because it eliminates the usage of pesticides like Ridsect, which costs RM 10.50 for a large bottle size on the market. That example, depending on the frequency of use, a bottle is normally purchased twice a month. As a result, the cost of two bottles of ridsect for a month's use has risen to RM 21.00. However, Buttermilk Gel's total construction cost is only RM6.65. The cost of manufacturing this item is likewise quite low, and it is compact and light in size. The overall cost of making a Buttermilk Gel is shown in Table 3.

Table 3: Total Cost of Making Buttermilk Gel

The total cost of making Buttermilk Gel

Bil	MATERIAL	QUANTITY	PRICE PER/unit (RM)	TOTAL
1	Used oil	1	0.00	0.00
2	Recycled box	1	2.00	2.00
3	Butter	1	6.00	2.00
4	Condensed milk	1	2.65	2.65
SUBTOTAL				6.65

CONCLUSION

We came to an idea which is this prototype has a different smell, which is an improvement. More specialised culinary aromas, such as desserts, main courses, traditional foods, and so on, can be emitted by the box (Marcin,2020). This is because cockroaches are easily attracted to strong food odours. Furthermore, the box we use absorbs odours quickly. The odour is then easily disseminated throughout the air.

At the same time, our team will continue to undertake additional research into the Buttermilk Gel model's innovation. Discussing improved prototypes with students and

instructors from various science subjects is one of them. The prototype will then be tested, and certification from experts will be acquired, allowing the prototype to be tested and placed throughout the college grounds. The collected data will be examined to increase the effectiveness of its application. Hopefully, this Buttermilk Gel project will have a beneficial impact on the next generation and provide students and professors with new ideas for contributing to the greatest project possible.

ACKNOWLEDGEMENT

Buttermilk Gel is a cockroach trap with a unique design and model that can handle cockroach difficulties. This innovative project would not have been able to complete in full detail and perfection without the participation, assistance and encouragement provided by the necessary parties especially our lecturer who provide us guidance thoroughly, as well as fellow members. All of the members' contributions are genuinely appreciated and gratefully acknowledged. Thank you.

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Flood Alert System

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ABSTRACT

Floods are defined as the most frequent type of natural disaster and occur when an overflow of water submerges land that is usually dry. Floods are often caused by heavy rainfall, rapid snowmelt or a storm surge from a tropical cyclone or tsunami in coastal areas (World Health Organization website). Floods can impact people's properties and lives resulting in the need for an alert system. Flood Alert System is a personal built system that can send warnings via SMS to the users. Otherwise, flood alert system consists of cheap hardware components that can be sold at reasonable price. Flood Alert System is developed using Arduino Uno as the microcontroller motherboard, HC-SR04 ultrasonic sensor, light-emitting diode (LED) and GSM SIM900A module. Ultrasonic sensor plays an important function as an input to detect water level in this project while LCD, LEDs and GSM module are the output to inform users about the flood. Flood alert system also have many benefits like easy to handle, use less consumption electricity energy and very efficient to send the flood alert for personal usage

Keywords: Flood alert system; floods; Arduino; GSM SIM900A Module; ultrasonic sensor

INTRODUCTION

Flood is one of the serious issues that happen in certain nations on the planet including Malaysia. Since 1971, Malaysia has been impacted by flood debacles in numerous areas. Flooding is a cataclysmic event that is brought about by environmental factors like precipitation, temperature, wind, and development of normal circumstances on the planet. Flood catastrophes have gotten 40 to 50 percent of a wide range of debacles that caused deaths on the planet.

When individuals, particularly inhabitants in flood-prone areas and the authorities are all unprepared to handle a flash flood, a high rate of property loss occurs, many people die and high repair financing. Residents in flood-prone areas should be informed of the current condition of the flood water level when heavy rains or increasing flood water levels occur, in order to avoid a high proportion of human property destruction. They should also be alerted ahead of time about the present flood water level in their dwelling area, so that they can evacuate the area as soon as possible. These concerns may help to limit the number of people killed and the amount of property destroyed as a result of flash floods.

Therefore, a Flood Alert System based on GSM Technology has been developed for citizens living in flood-prone areas to help them stay informed about the flood water level throughout the monsoon season. This system will be able to notify the user when the flood water level has risen to a dangerous level and will send precise warning messages to the user via Short Message Service (SMS). The system measures the flood water level in real-time in

floodplain zones and the user can monitor the flood water level for monitoring purposes. Moreover, when floodwaters are fast rising, the user will receive a real-time warning message.

This paper deliberates the implementation of a flood alarm system that may send a warning message to the user, as well as the assessment of the produced system using Arduino Uno, Ultrasonic sensor, GSM module, LEDs, and LCD based on functionality and network performance tests, are discussed in this paper.

INNOVATION DEVELOPMENT

Flood alert systems are developed by some electronics components including Arduino Uno, Ultrasonic sensor, GSM module, LEDs, and LCD. From these components, we assemble a circuit like shown in Figure 1. After that, we upload the codes to the motherboard, Arduino Uno, to complete the function.

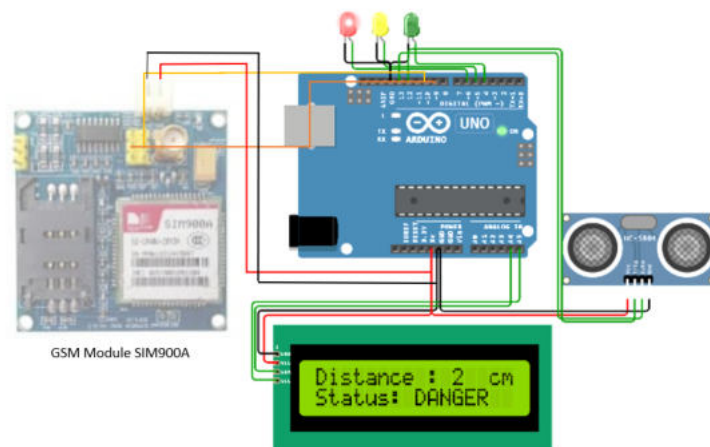


Figure 1: Schematic diagram

The inventive feature of this product comes from the use of GSM Module. GSM, which stands for Global System for Mobile Communication, allows the microcontroller to transmit mobile data to the users. In this flood alert system, the model used is SIM900A and the Arduino Uno can receive and send the message to the users through GSM Module. As the output and functionality of the product, the hardware components like LEDs, and LCD can give the result according to the water level detected. Below is the functionality table of the flood alert system.

Table 1: Table of functionality

Water level (cm)	Output		
	LCD display (status)	LED	GSM receive / send message
1-4	Normal	Green	-
5-9	Warning	Yellow	Users
Above 10	Danger	Red	Users

Hence, as the sensor detects the water at 'Warning' and danger level, the users will get a message like in Figure 3 that was sent by the GSM module.

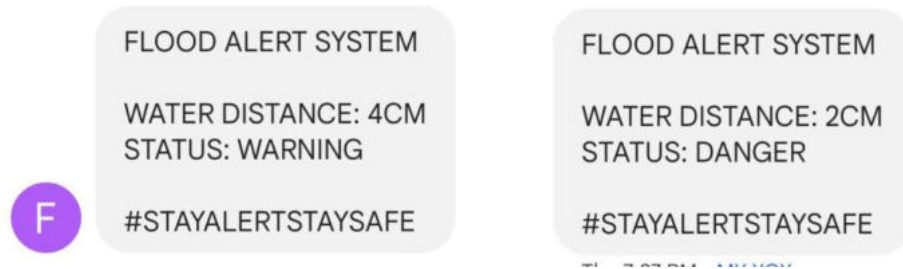


Figure 3: Alert messages that users will receive

Therefore, from all the functionalities of the product, we can ensure that the users will get many benefits. Flood alert system comes with novelties that are special and easy to maintain, low cost of budget and less consumption of energy to connect power supply.

COMMERCIAL POTENTIAL

Flood alarm system is a tool that very easy to maintain because this product is sold at reasonable and affordable price. With such a low price, this product is affordable to people from all walks of life. It appears that there is a body of literature on the current risk of flooding, the measures taken by the Environment Agency to manage flood risk, investments attributed to flood risk reduction and the construction of new defenses, and some reports and evaluations from the insurance industry in Malaysia as a whole.

However, there is a paucity of literature on the subject of the value of commercial assets and floods. Some methodological research on damage estimates were collected from foreign sources such as the United States, Japan, Australia, Germany, and the United Kingdom. The information acquired from the literature on the state of flood risk in the UK, including insurance, models and variables impacting commercial property value, and models used for flood damage estimates in other regions of the globe, is summarized in this paper. With reference to the impact of floods on commercial assets, attempts are made to gain insights into the potential and hindrances in establishing value models for them. This will contribute to ongoing studies on the effect of floods on the value of commercial assets in the United Kingdom.

Those stakeholders who are directly or indirectly associated with the commercial property sector that is under danger of flooding can benefit from the research in the larger context. Property owners or owners, property purchasers or leaseholders, local government, insurance firms, investors, occupiers, consumers, suppliers, workers, and emergency service providers are among the stakeholders. The scientific community will be the second set of benefactors, since they will have access to hitherto understudied research areas.

CONCLUSION

This innovation could help to decrease the number of deaths and property disasters during floods on a big scale. The system has been programmed to send messages to the user and rescue department when the water reaches danger level. It triggers the buzzer sound to

warn the people that the place is in a dangerous state so that they can make early preparations in order to leave the place.

Future researchers are strongly encouraged to include a working GPS sensor for finding the flood-plain region and informing the Fire and Rescue Department when the flood water level exceeds unsafe levels. This is due to the fact that the currently created project does not include a GPS sensor to determine the system's location.

Future researchers can potentially create a simple smartphone application that allows users to simply check real-time flood water levels. When the flood water level rises, the mobile application can display a graph of ultrasonic sensor readings and record the date and time of the event. Lastly, we hope that this project will be held on a bigger scale in the future.

ACKNOWLEDGEMENT

First and foremost, we would like to express our thankfulness to our one God, Allah SWT for giving us fantastic health and enough time to fulfil this project.

We also would like to thank our favourite lecturer, Madam Nurhilyana Binti Anuar, for her great aid and direction for us to finish this innovation. We also would like to appreciate Nik Adil Rifaie as a leader for his extraordinary efforts and outstanding patience from the beginning of this project when we were expected to offer the title of the invention to our supervisor lecturer. Next, we would like to appreciate other group's member comprises of Nur Alya Nabilah, Muhammad Rabbani Alimi and Muhammad Zaim for their fantastic hard work and their effort in finishing this project particularly this preceding paper.

Last but not least, we would like to applaud ourselves for successfully being able to overcome the unexplained stress and hectic schedule to accomplish our innovation and invention project.

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Magnetic Doorknob

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ABSTRACT

Children are purely innocent, naive and unaware of the dangers of playing near the door. They accidentally push the door stopper and cause fingers trapped. Normally, door stopper is used to prevent the door from closing and it was made by rubber which not lasting. Many fingers trapped case reported involved children happened at home, day care and kindergarten. The injury leaves long term effect on the children such as lifelong disfigurement and some of them undergo a surgery. Thus, magnetic doorknob is the innovation of door stopper. It is low cost, user friendly, easy to install and efficient. It consists of two magnets (magnet A and magnet B) with same magnetic poles which prevent the door from closing. Magnet A is placed at doorknob and magnet B at wall just beside the door is adjustable. If this magnets at same level, it will prevent the door from closing if a child accidentally pushes the door or the door is pushed by the wind. As a conclusion, magnetic doorknob is suitable for home, day care and kindergarten which will keep the children from fingers trapped on door.

Keywords: Children; finger trapped; magnet; doorknob

INTRODUCTION

Fingers trapped on door [1-2] are common cases can occur at all ages and anywhere in building that has a door such as in living room, toilet/bathroom, front door, bedroom etc. About 38% fingers trapped case reported involved children below 5 years old [3] and mostly it happened at home, day care and kindergarten. Most of them are purely innocent, naive, unaware of the dangers of playing near the door and fails to remove their hand quickly before the door is shut. Most doors installed in home, day care and kindergarten are a standard door which do not have safety features that allow the door to not close on its own when accidentally pushed by a child or wind. Around 50,000 children have their fingers trapped on doors and the injury leaves long term effect on the children such as lifelong disfigurement, crushed finger, lacerations, amputations and some of them undergo a surgery [4-6]. Soft hinges installation on door for the safety of children might help but the mild injury is still occurred and it is pricey. This is an important sign that children's safety should not be overlooked by parents and owners of day cares and kindergartens. Author in [7] study on redesigning the door to reduce the risk of finger injuries in children which utilize silicon rubber fins at the pinch points and a piano hinge running the entire door length to eliminate the space between the hinges. Basically, most people used door stopper that are made from rubber to prevent the door from closing. This rubber door stopper comes in many sizes, colourful but not lasting and loosen the grip in a few months. With just soft touch on the door, it will be closing. In conjunction with the statement, an innovation from door stopper were developed which is called magnetic doorknob. The objective of this innovation is to prevent and minimise the children from fingers trapped on door when they are at home, day care or kindergarten. Besides, this product is low cost, user

friendly, easy to install and efficient. With the installation of this product, door stopper can be kept forever and the safety of children while at home, day care and kindergarten are guaranteed from fingers trapped on door.

INNOVATION DEVELOPMENT

Based on the facts on children's injury, an innovation from door stopper were developed which is called magnetic doorknob. It can prevent and lesser the possibilities of fingers trapped among children while they are at home, day care or kindergarten. Magnetic doorknob is low cost, user friendly, easy to install and efficient. It comes with two bar magnet, two durable plastic holder, eight screw and two bracket. Magnet bar consists of two poles which are north (N) pole and south (S) pole as shown in Figure 1. One of the properties of magnet state that like poles repel one another and unlike poles attract one another [8]. Thus, this magnetic doorknob consists of two magnets where same magnetic poles will be placed side by side in this innovation product.

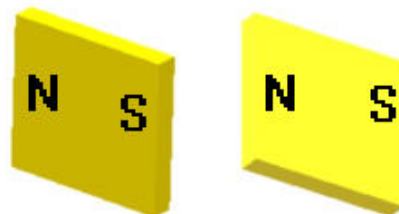


Figure 1: Magnetic bar

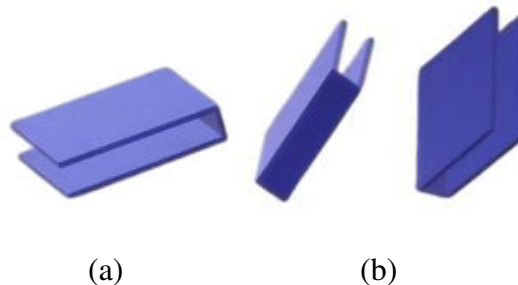


Figure 2 (a) & (b): Plastic holder with bracket

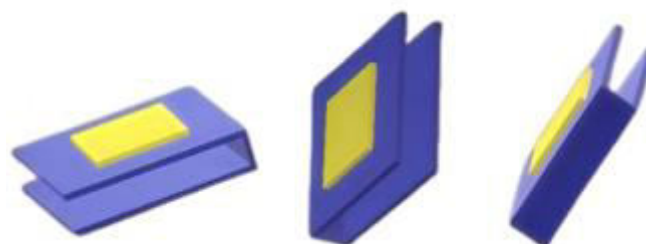


Figure 3: Magnet on the plastic holder with bracket

Figure 2(a) and (b) shows the premium quality plastic holder with bracket in a different view. Magnet bar will put on the top of the plastic holder with bracket as shown in Figure 3 and will be placed at doorknob (magnet A) and wall just beside the door (magnet B). North pole both magnets will be pointing to each other. The illustration of overall product is shown in Figure 4 when the door is closed where magnet A and magnet B is not at the same level. Magnet A can be adjusted to the desired level while magnet B is at fixed position.

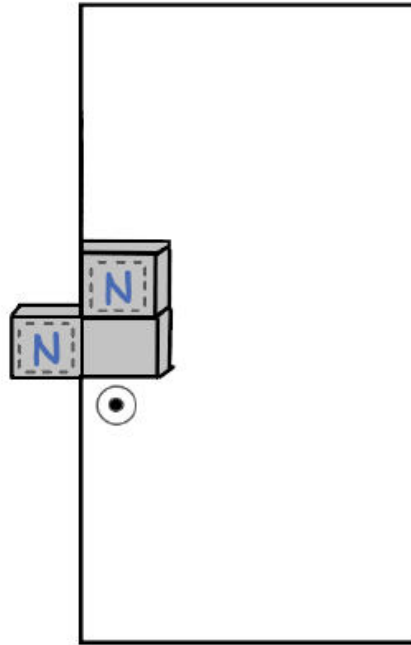


Figure 4: Illustration of closed door with magnetic doorknob

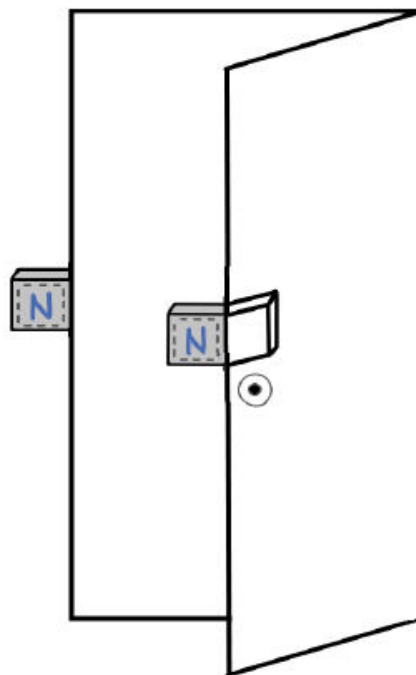


Figure 5: Illustration of open door with magnetic doorknob

When adjustable magnet A at the same level as magnet B as shown in Figure 5, the repelling energy from both magnets are increased and it will make the door harder to be closed if a child accidentally pushes the door or the door is pushed by the wind. As a result, it will minimise the possibility of finger trapped on door. Figure 6 shows the installation of magnetic doorknob prototype when both magnets are at same level.



Figure 6: Installation of magnetic doorknob prototype

COMMERCIAL POTENTIAL

Magnetic doorknob is an innovation product that provide solution to the user's need and can compete with rubber door stopper. Even though rubber stopper is way cheaper, but it is not last lasting and can create injury. User nowadays are demands for worth every penny product, long lasting, easy to install and user friendly. Therefore, it is not impossible that magnetic doorknobs have high marketability and society's high demand in future as it has many benefits. Table 1 described the specification for this innovation product in terms of type of magnet, strength of the magnet, weight, colour, size of screw and plastic holder.

Table 1: Product specification

Product's name	Magnetic doorknob
Colour available	Green, Blue, Brown
Strength of the magnets	$1 \times 10^{-4} T$
Type of magnet	Block magnet
Weight of product	500 g
Size of plastic magnet holder	$8 \times 2 \times 8 \text{ cm}$
Size of screw	$4 \times 25 \text{ mm}$

Table 2: Product costing analysis

Item	Quantity	Price for 1 unit (RM)	Total price (RM)
Bar magnet	2	4.15	8.30
Plastic magnet holder	2	2.07	4.14
Plastic bracket	2	1.05	2.10
Screw	8	0.15	1.20
Price for 1 unit			15.74

Table 2 shows product costing analysis for 1 unit of magnetic doorknob which is RM 15.74 and the proposed selling price for magnetic doorknob is RM 18. The expected profit margin is 14.4 % from selling price. The target market for this product are parents but day care owner, kindergarten owner and OKU premises too which most of the time dealing with the children. Not only that, this product also suitable to use at any door in the building

CONCLUSION

As a conclusion, low cost, user friendly, easy to install and efficient magnetic doorknob can prevent and lesser the possibilities from fingers trapped among children are present in this paper. In future, motion sensor and voice detector can be added into magnetic doorknob to double the children's safety.

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Torchlowscope

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ABSTRACT

‘Torchlowscope’ is an innovation which is related to Physics in the concept of total internal reflection and have three functions: as a bright flashlight, a long-range telescope as well as a glowstick. It was designed using recycled materials and apparatus with minimal used. Most of the current flashlight that available on the market have less brightness, short light range and low efficiency of ordinary magnifying lenses, blurred and unclear vision. Furthermore, the glow sticks are made of plastic, which is not an eco-friendly choice and also a one-time use item. Our objectives are to produce a versatile innovation th at uses recycled materials and apparatus with minimal use to help lessen pollution towards the environment, to produce a homemade flashlight that can illuminate brightly at a distance with an affordable price which can be considered as high value item. ‘Torchlowscope’ is a multipurpose item that can be used numerous times at high efficiency. Other than that, it is a homemade magnifying glass that can work more efficiently than ordinary telescopes. This innovative product is versatile and works according to its needs. We hope this product can go further for commercialization and collaborate with other faculties especially the Faculty of Electrical Engineering.

Keywords: Homemade; eco-friendly; torchlight; telescope; glowstick

INTRODUCTION

As we know, the normal torch light has been used widely nowadays. Although it helped us a lot, it still needs to be improved as it lacks some function such as the brightness is low, the light range is short and it will be expensive to buy a high-powered torch light that will produce brighter light. The high-powered torch light also consumes a lot of energy because it uses a high voltage battery. So, it will be a bit expensive to buy the battery compared to the other batteries that normal torch lights use. In order to overcome the problems, we came up with our idea to invent our innovation, the ‘Torchlowscope’. The objective of our innovation is to make a torch light with low cost but can produce a long ranged, high brightness light. So, it will help those people who need to use bright light during the nights for their own purpose for example, the security guard need to use brighter light for a better sight when patrolling. Besides the main function, our product also can be used as a telescope. The price of our innovation of course is lower than the normal telescope. This will help those who cannot afford to buy the normal telescope to see stars clearly. By applying the physics concept which is total internal reflection, we managed to make our innovation function as a glowstick. By using a plane face mirror with the help of fluorescent paper wrapped around inside the water bottle, then proceed to be shun and reflected by light rays from a torchlight. This eventually forms a glowstick. In short, we also created our innovation from used material which not only can reduce the cost, but also is light to carry.

INNOVATION DEVELOPMENT

Figure 1 is an illustration of the innovation plan while Figure 2 is a prototype illustration of our group project. The inventive feature about this product is that our group innovates several used materials into one product. This product has two main functions, which can be used as a torch light and also a mini telescope. This innovation uses used materials such as a pringles box, a 90mm wide magnifying glass, one large bottle of mineral water, two caps of mineral water bottles, 50mm magnifying glass, a regular torch light and a hot glue gun.

Procedure:

1. Cut the bottom of a large mineral water bottle by 2 cm.
2. Cut the top and bottom of the pringles box until it reaches a size that can fit in that large bottle of mineral water.
3. Combine a 90mm wide magnifying glass, a box of pringles and a bottle of mineral water as in the figure above.
4. Then, attach the cap of the mineral water bottle to the lens of a regular torch light using a hot glue gun.
5. Using a plasticine, form a shape of a hollow cylinder.
6. Attach the cylindrical plasticine to a circular plane face mirror.
7. Finally, attach another bottle cap of mineral water bottle to the small-sized magnifying glass by using a hot glue gun.
8. Now, the final product is finished. The user is free to decorate the product as they want.

Function guideline:

1. To use the telescope, attach the pringles can with the large magnifying glass into the large bottle of mineral water that has its bottom cut out and attach the bottle cap with the small magnifying glass. (Figure 1)
2. To use the torchlight, repeat step 1 by attaching the bottle cap with the torchlight glued on. (Figure 3)
3. To use the glow stick, attach the cylindrical plasticine with a face mirror into the large bottle of mineral water that has its bottom cut out and attach the bottle cap with the torchlight glued on. (Figure 5)

The function of this innovation as a mini telescope can be applied by closing the large mineral bottle using a bottle cap that has been glued with a small magnifying glass (Figure 1). A magnifying glass is a convex lens that serves to magnify the image of an object. Convex lenses are also known as concentrating lenses or positive lenses. The features of the formed image are virtual, upright and magnified. The combination of the two convex lenses can allow the user to see more distant objects. This concept can be interpreted through Figure 2.



Figure 1: Mini Telescope

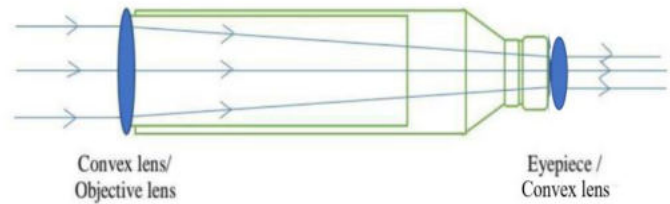


Figure 2: Telescope Conceptualisation

Meanwhile, the function of this hybrid torch light as a torch light that can emit light which is even brighter than regular torch light can be applied by closing the large mineral bottle using a bottle cap that has been glued with a regular torch light and attaching the pringles can with large magnifying glass glued on it (Figure 3). When the light that enters the convex lens serves to magnify the image of an object, when the light produced will be brighter and further. This concept can be interpreted through Figure 4.



Figure 3: Torch Light

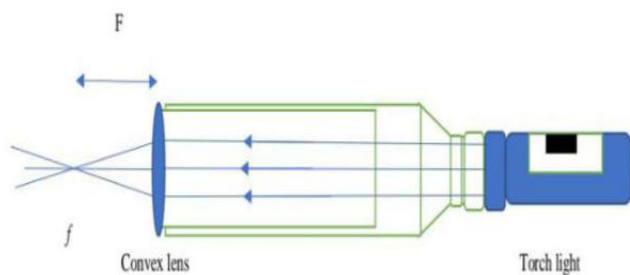


Figure 4: Torch light Conceptualisation

In addition, the glow stick works by wrapping fluorescent paper inside the bottle. At the base of the cut bottle, attached to it is a cylindrical plasticine with a circular face mirror in it (Figure 5). This causes the light to be reflected repetitively from the torchlight to the mirror and to the nature of the fluorescent paper which makes our glow stick glow brighter (Figure 6).



Figure 5: Glowstick

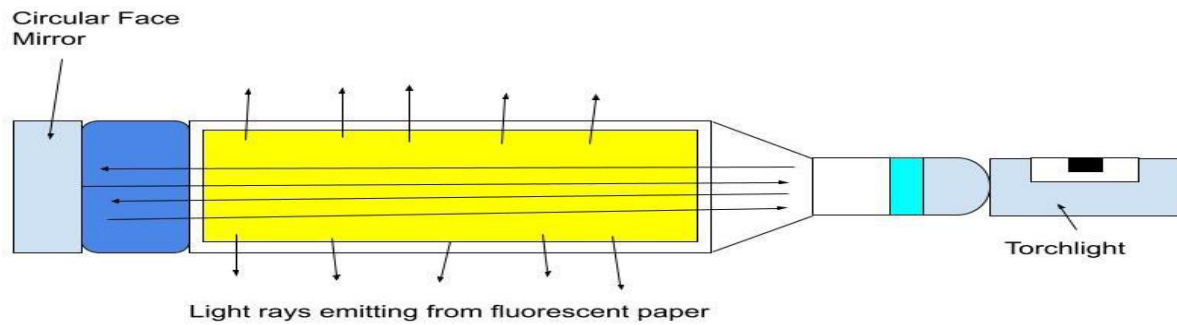


Figure 6: Glow stick Conceptualization

COMMERCIAL POTENTIAL

We have made an analysis based on past research on the internet and our own past experiences and we have found that the prices of most torchlights range between around RM10 to around RM200 but then we do not take account of the various size of the torchlight. The main factor that we take account are the brightness level of the torchlight. We found that the more powerful one the bulb is the more pricier it is. The reason behind of this are the use of bulb technology, battery and advance circuits. Even though with all the technology invested in making a torchlight even better, the torchlight is still lacking in various aspects such as low impact resistivity, not waterproof, ineffective heat dissipation and no adjustable lightning modes. Our Torchlowscope can overcome all of the problem stated above, can act as an glow stick, have affordable price, easy to use, comfortable to carry and also eco-friendly.

Our product has a great potential to be marketed. To make an example out of this, firstly we can advertise our product through competition on social media. This way we can attract a way larger marketing audience. Secondly, we can share an interesting poster on our product through email. Email is actually one of the fastest ways to share information, research also said that 82% of potential customers checked their email from time to time. Lastly, we can also advertise our product via sharing our customers' reviews. With great reviews we surely will buy ourselves a good reputation which will lessen our future customers' doubt and make it easier to buy our product.

Product Prices

Table 1: Prices of product

Quantity	Materials	Price (RM)
1	Hot Glue Gun	9.00
1	90mm Magnifying glass	2.00
1	50mm Magnifying glass	1.20
1	Torchlight	13.00
1	Pen Knife	6.00
1	Large Mineral Water Bottle	1.00

1	Pringles Can	6.00
1	Mirror	6.00
30	Fluorescent Paper	3.00
4	Tape	2.20
12	Glue Gun Rod	2.50
1	Plasticine	2.50

Total price = RM54.40

Selling price = 150% X RM54.40 = RM81.60

Profit

Profit = RM81.90 - RM54.40

= RM27.50

As shown from the selling price from above we are planning to sell our product with a 50% profit from the original total price of the materials which is equal to **RM27.50**. Even though the prices are shown as above, we have taken into consideration that some of the materials can be recycled and reused.

Table 2: Reusable materials

Quantity	Materials	Price (RM)
1	Hot Glue Gun	9.00
1	Pen Knife	6.00
30	Fluorescent Paper	3.00
4	Tape	2.20
12	Glue Gun Rod	2.50

Price of reusable materials = RM22.70

Money saved = RM54.40 - RM22.70

= RM31.70

As shown in the calculations above we can conclude that we are able to save **RM31.70** for the consequent sale after buying the materials for the first sale.

Based on the statement above, the profit will be different.

New Profit = RM81.90 - RM31.70

= RM50.20

We can conclude that the profits for our first sale are **RM27.50** and the profit for the consequent sale are **RM50.20**.

Scope of Potential Profitable Marketplaces

- Hardware Store
- Convenience Store
- Online sales

CONCLUSION

In conclusion, our inventive product which is 'Torchlowscope' is an innovative product that can accomplish our objective which is to produce a versatile innovation that uses recycled materials and apparatus with minimal use to help lessen pollution towards the environment. This versatile product can be used in dire situations such as power shortage and also during a car crash at night. It can also be used for jungle trekking and also camping. There are a few improvements that can be made to our product. Firstly, replace the water bottle with a stronger material such as alloy. Secondly, we can also wrap the product with a black plastic so that outer light will not disturb the function of the product which is as a telescope and also as a light source. Lastly, the magnifying glass can be replaced with a wider diameter or a higher lens power in order to further enhance the product's ability to see object distances that are further away.

ACKNOWLEDGEMENTS

First of all, we would like to thank God for letting us finish our innovation. We also have put all of our effort in order to complete this group project. Without our group members' cooperation, we cannot manage to complete this project within the given time. So, we would like to express our gratitude to all of our group members for all of their hard work. We would also like to say thank you to our teacher, Mrs Nurul Huda Binti Mohd Noor who helped us a lot to finish this group work. Lastly, we also like to give our special thanks to our parents for supporting us throughout our hard time during this project.

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Al-Wisadat Dhakia: The Alarm Pillow

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ABSTRACT

The main problems faced by insomnia people is lack of sleep at night end up very hard to wake up and get out from bed for every morning. Other than that, a problem that faced by hard of hearing and deaf people are they need assistance from light or Sun to wake up in the morning. Ordinary people such as heavy sleepers find difficulty to wake up on time and getting late for prayer, to class or workplace. Therefore, we create an innovation called Al-Wisadat Dhakia that acts as an alarm pillow to solve their problems. The objective of this innovation product is to wake up hard of hearing people, insomnia or heavy sleeper people from sleep. This product consists of arduino technology that can be attached together with the pillow. A vibrator is connected together with a buzzer that gently vibrates the pillow when the alarm sounds. This alarm pillow will remain vibrating until the user get up rather than alarm clock which can be snoozed every five minutes but the user still lying on the bed. It is expected to become high demand product as it becomes one important assistance device for these kinds of people. Although smart phone is a popular device that has been used as alarm clock, however, this alarm pillow is more effective, less radiation and less hazardous compared to smart phone itself. With this aid, hard of hearing people, insomnia or heavy sleeper people can live independent able to wake up on time without helping from others.

Keywords: Alarm; pillow; Arduino; vibrate

INTRODUCTION

Sleep is important in our lives because it allows body and mind to repair and recharge to be more energetic and productive for the next day. Usually, human needs to sleep about 6 to 8 hours per day. Lack of sleep can affect our health and for a long term it leads to critical medical problems, such as heart disease, high blood pressure and diabetes [1].

Most people that suffer from insomnia have difficulty to fall asleep or staying asleep. Some insomnia has difficulty of awaken once they sleep. This kind of sleep disorder people feel unsatisfied with their sleep usually results of decreasing performance in work [2]. On the other hand, the major problem experience by “hard of hearing” and deaf people when the hearing aid is taken out likely when they go to bed is to respond to the sound of telephone and alarm [3]. By focusing on these types of people, an innovation related to alarm device must be designed to solve the problems.

Ordinary people use alarm clocks to wake them up from their sleep or a short nap. There are many alarm clocks available such as traditional analogue alarm clock and digital alarm clock [4]. The most famous digital alarm clock has been used till nowadays is a smart phone. Even though smart phone brings lot of advantages to ease our lives, but they need to concerned

about the health issues caused by using smart phones especially related to radiation that are hazardous to health [5]. At the night time before sleep, they have set the alarm clock at the specific time. However, the problem still encounters because when the alarm is activated or ringing, they just switch it off without realising it. Besides, most of the alarm clock turns off automatically or can be snoozed after few minutes it's activated [6].

Focusing the effect of vibration within the brain, mechanism of vibration increases flow of cerebrospinal fluid and enhances the removal of metabolic waste [7]. An experiment had been done by neuroscientists from the University of Geneva (UNIGE) on the mice's brains whose forepaws perceive vibrations and neurons in the somatosensory cortex were discovered activated likely the same to those in the sound-reactive auditory cortex [8]. Nowadays, vibrating pillows are becoming a popular way to provide calming and arousing sensation. It also provides many therapeutic benefits for people of all ages [9]. Combining these demanding in markets lately which are alarm clock and vibrating pillow, the alarm pillow is going to be a demand in the future.

Based on the problem statement, the main objective of this innovation is to develop an alarm pillow to make sure people wake up from sleep on time. Even though, some smart pillow can be found in the market, but it is selling with high price thus not affordable for some people. This innovation was motivated by considering the financial level of all people because this pillow can be designed with low-cost materials.

INNOVATION DEVELOPMENT

The development of this innovation called Al-Wisadat Dhakia: The Alarm Pillow is divided into four parts. There are planning, coding, simulating and assembling. First, we planned the material needed to construct this alarm pillow. Low cost of materials had been chosen that consist of Arduino Uno, Piezo buzzer, vibrator, buttons, LCD and battery.

Arduino Uno is used as a microcontroller to receive and read the data. The main characters in the construction of this innovation are buzzer and vibrator. Buzzer will emit sound at the time that the alarm is set to buzz. At the same time the vibrator starts to vibrate just whenever it receives a signal. For this alarm pillow, the alarm can be set by pressing the push buttons. LCD display is used to show the setting time. Lastly, all these components are connected to the battery that acts as power supply for the microcontroller.

Arduino software (IDE) is used to write the coding of this alarm pillow and then it is uploaded to the board. Figure 1 shows a code programming of the innovation project.

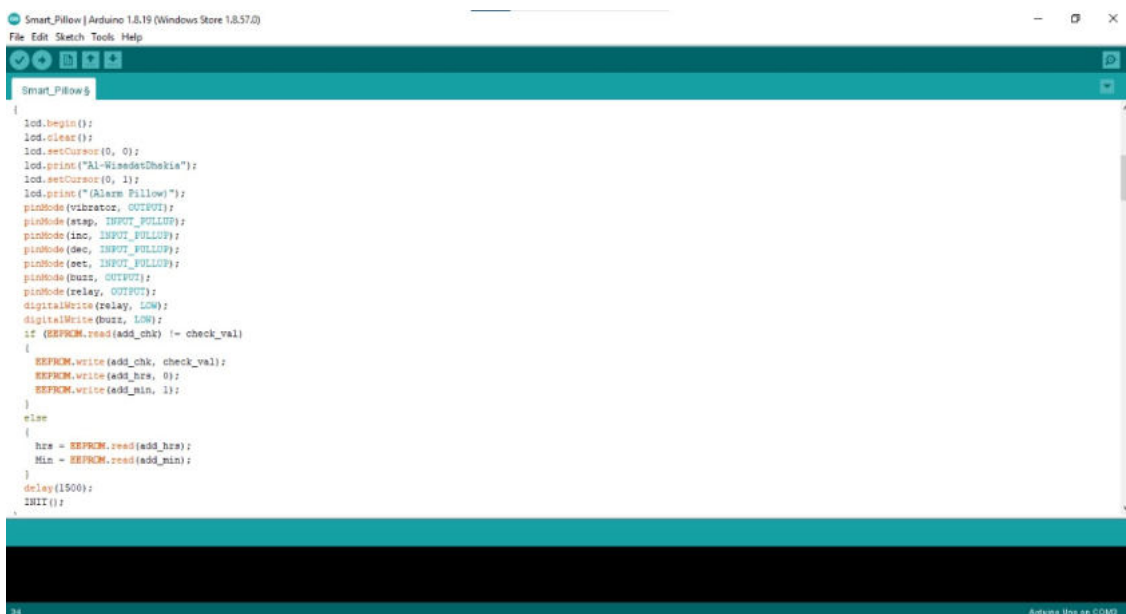
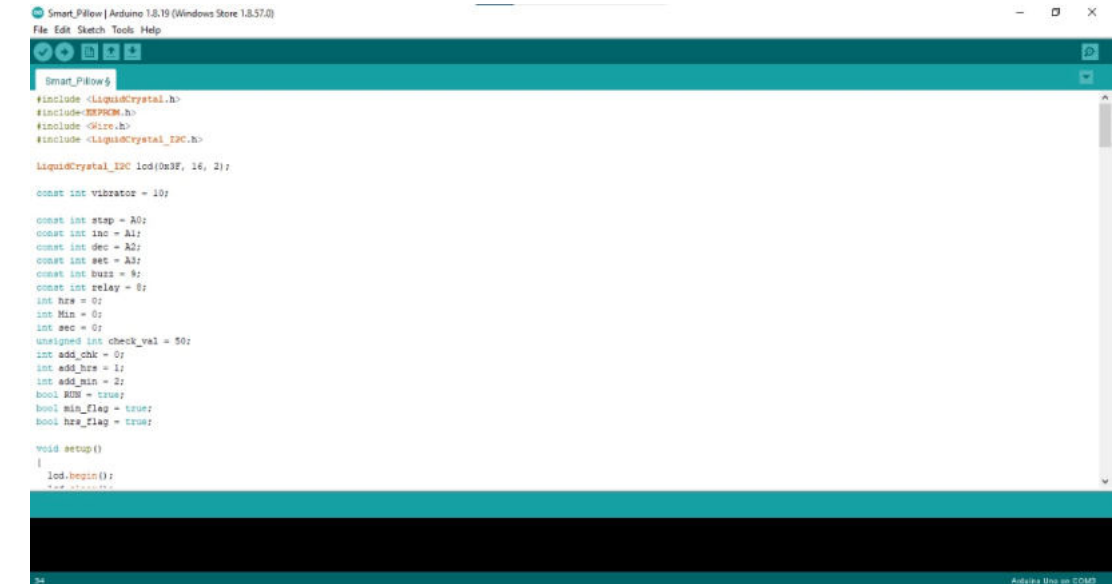


Figure 1: Code programming

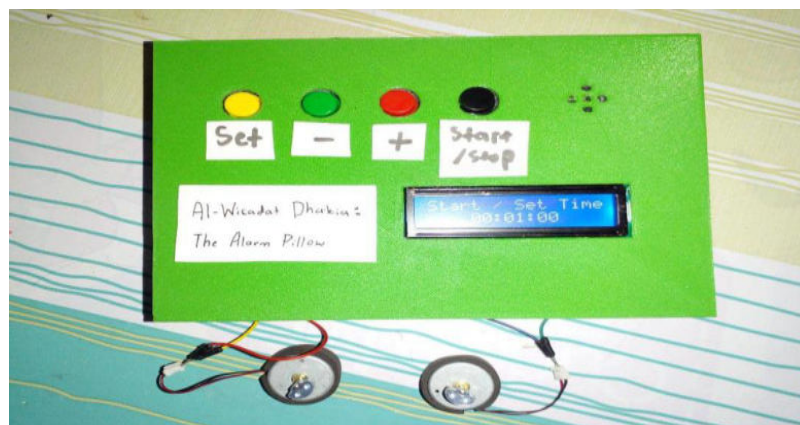


Figure 2: Prototype of the Al-Wisadat Dhakia: The Alarm Pillow

Figure 2 shows the prototype of the AI-Wisadat Dhakia. This prototype will be attached underneath the pillow. For early stage, this prototype has been tested on 10 people to check the effectiveness on people who have a major problem to wake up from sleep.

COMMERCIAL POTENTIAL

Table 1: Cost Estimation

No.	Components	Quantity	Total Price (RM)
1	Arduino uno board	1	25.00
2	Piezo buzzer	2	8.00
3	Vibrator	1	6.00
4	Lcd	1	10.00
5	Battery	1	5.00
6	Jumper wire	8	16.00
7	Breadboard	1	4.00
8	Button	4	6.00
		TOTAL	80.00

This product can be commercialized to many people including insomnia, hard of hearing people, heavy sleeper people, students or workers. It contributes a new technology that gives lot of advantages in helping these types of people to manage their daily activities. It has high potential to be marketed as it compliance the users need. Some smart pillow can be found in the market with higher price which not affordable for some people. Therefore, the proposed selling price for this product is in a range of RM100 as the cost to produce it is very small. Besides, the expected profit margin is about 20 percent. The product has not been marketed however the Intellectual Property Recognition (IPR) has been applied.

CONCLUSION

AI-Wisadat Dhakia is very useful to hard of hearing people, insomnia or heavy sleeper people in managing their routine of night sleep. It is very efficient in terms of function. It gives advantages as an aid and guidance indirectly can enhance the confidence level of these people to live alone. Lastly it is a low cost of device so these kinds of people are affordable to have it.

Further study should involve people with higher levels of hearing loss including deaf people to determine the effectiveness of this alarm pillow whether it is reliably awake this type of people from deep sleep. Other recommendation for further studies is to use vibrating bed instead of vibrating pillow so comparison can be made between these two devices.

ACKNOWLEDGEMENT

The authors would like to acknowledge the Centre of Foundation Studies, Universiti Teknologi Mara Cawangan Selangor Kampus Dengkil for the support and guidance.

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Corfee Paper

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ABSTRACT

Corn husks are waste that always leads to a problem in order to create free polluted surroundings. Therefore, this Corfee Paper project was invented to benefit from the existing waste. This innovation mainly uses corn husks to produce eco-friendly paper. The objectives of this innovation are to reduce the pollution that is made from these corn husks, to reduce the usage of trees that were used to make industrial paper, and to add the sentimental value of paper. To make this paper, the corn husks need to undergo some process until they can become a layer of paper with the presence of sodium hydroxide and polyvinyl acetate. The process continued by drying the moulds under the sunlight and after it dried, the paper is ready to be used. Additionally, coffee powder is added to give the paper sentimental value and vintage texture. All in all, Corfee Paper is inspired by the corn and coffee itself.

INTRODUCTION

Corfee Paper is invented by Cor=corn and fee=coffee. This innovation primarily makes use of maize husks to create environmentally friendly paper. Coffee powder is used to provide sentimental value and vintage touch to paper [1]. Corn is a starchy vegetable and cereal grain that has been eaten all over the world for centuries. It is rich in fiber, vitamins, and minerals. [2] The fibre in corn husks eventually will react with some chemical substances such as polyvinyl acetate that can lead to forming a paper. Lately, video of making paper with coffee stains is going viral on TikTok apps because of its vintage and authentic vibes [3]. As a result, the objective of this innovation inspires us to make an eco-friendly wonderful paper that captivates many interests.

The problem statements of our innovation are corn husks are always a waste to our surroundings. Other than that, many trees were used to make industrial paper. By using corn husks, instead of throwing it away, we decide to make papers from it. By doing that, the usage of trees can be reduced. As we know, Trees offer shade and protection, as well as lumber for building, fuel for cooking and heating, and fruit for sustenance. [4] The majority of paper is manufactured from forestry resources, often trees. Spruce and Pine are the most frequent trees from which paper is made [5].

Surprisingly, there are a lot of benefits of corn husks. Corn husks have a wide range of applications. Other applications include the creation of creative items such as maize husk dolls and puppets [6]. In our innovation, we use polyvinyl acetate to create adhesion between the fibre in the corn husks to make it able to form a piece of paper. Water-based adhesives, such as pastes and glues, include emulsified polyvinyl acetate. Bookbinding is one application using emulsified polyvinyl acetate [7]. Other than that, we also use table salt which is sodium chloride in the process of making Corfee Paper. Chlorine and caustic soda are made from salt. Caustic soda is used in paper manufacturing to digest wood fibres, and chlorine is used to bleach the

pulp. Sodium chlorate, which is likewise derived from salt, is replacing chlorine as the major chemical used in pulp bleaching [8].

INNOVATION DEVELOPMENT

Product design and details:

This product was inspired in its early stages when we examined environmental issues that result in natural catastrophes such as flash floods, landslides, and global warming. Unbeknownst to us, this natural calamity was caused by deforestation. Indirectly, paper production is the primary reason that trees must be chopped down. So, this is where the idea for the Corfee paper which is paper that is made by corn husks came from.

Novelty of this Corfee paper:

- Able to reduce the pollution that is made from these corn husks
- Able to save the trees
- Able to add the sentimental value of paper

Usefulness of this Corfee paper:

- Can be made as paper bag
- To make letters
- To make books
- To make bookmarks
- To make notes

Proofs of product authenticity:

After conducting research on the major buying and selling platforms, such as Shopee and Lazada, we discovered that items such as handmade paper produced from maize husks are not yet available.

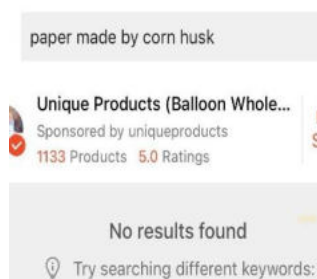


Figure 1: Research from Shopee

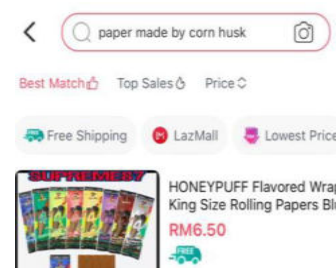


Figure 2: Research from Lazada

Corfee Paper production:

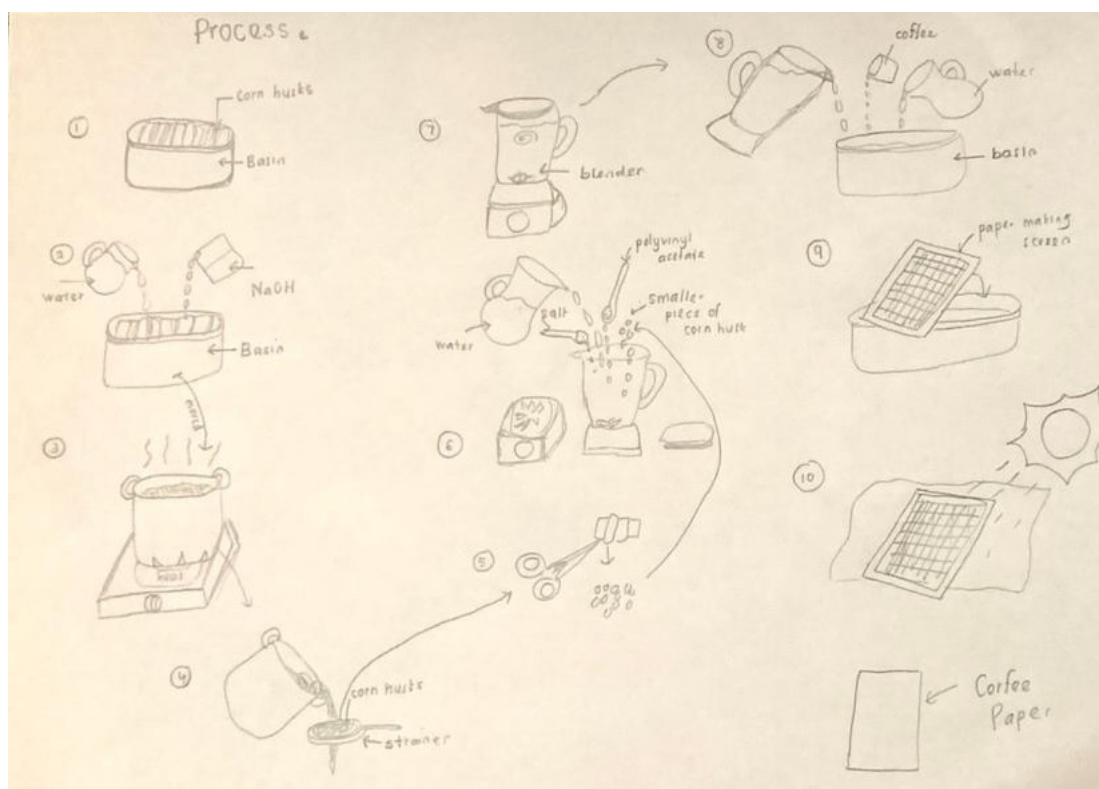


Figure 3: Sketch of the Corfee Paper Production

Methodology:

1. 8 washed corn husks are prepared and placed in a basin.
2. 1 liter of water was added into the basin and poured 100 grams of NaOH.
3. The mixture was moved into a steel pot and boiled for one hour.
4. After boiling, the corn husks were rinsed with water by using strainer.
5. The corn husks were cut into smaller pieces by using scissor and mixed with 5 spoonsful of polyvinyl acetate and 3 spoonsful of salt.
6. Half of the water was added and blended into the mixture using blender.
7. A basin was prepared with 1/3 of water in it and poured the blended mixture into the basin.
8. Coffee powder was added into the basin to create stain coffee on paper.
9. The filtrate was filtered using paper making screen to shape the pulp into a paper.
10. The screened paper was put onto a cloth and dried it.

Materials and apparatus:

Apparatus:

Blender, Basin, Stove, Steel pot, Scissors, Paper making screen, Strainer

Material:

8 Corn husk, Coffee powder, Sodium Hydroxide (NaOH), Polyvinyl acetate (PVAc), Salt, Water

Final product:



Figure 4: Corfee Paper

COMMERCIALIZATION POTENTIAL

As we know, our society often faces many problems regarding environmental hygiene. As well as the situation in the field of papermaking, there were also many problems that nature had been faced such as mass logging that happened to produce the daily traditional paper. Besides, the corn husk that were thrown away can be innovated to make a paper instead of being a source of pollution. That is why this paper is a desirable alternative paper instead of the traditional paper because it can give many benefits to society. This paper is very suitable for students to make study notes. Besides, many authors can use this Corfee Paper for a vintage vibe to make their writing materials such as journal or novel. From this paper innovation, society can know how important it is to keep our nature in a good handle for the future generation.

This Corfee Paper is suitable to be marketed to all ages. This is said to be so because of its reasonable and affordable price. This is due to its manufacture using natural materials which are corn husks that are being wasted. Furthermore, the items needed to make the Corfee paper, such as a blender, basin, and a stove, do not need to be purchased because they are present in every home. This helps to reduce the cost of producing the product but is still able to maintain the quality of the paper produced. Our products make it easier for the community to find the right thing to replace the use of paper that is made of trees. In addition, consumers can also enjoy the fragrance of coffee safely because of the absence of the use of harmful items, in fact, it is able to stabilize the emotions and soul of consumers. Our innovation also contributes to the health of the community because its use will not affect the environment. Therefore, we are confident that our innovation is able to last a long time in the market because it meets the main needs of universal human beings, which is to maintain our nature and the environment from being destroyed.

Price for paper made (10 pieces):

Table 1: A record of the items required to make the Corfee Paper, as well as the cost.

Items	Cost of the items
100g of Sodium Hydroxide (NaOH)	RM 2.00
Polyvinyl acetate (PVAc)	RM 0.50
Coffee powder	RM 0.30
8 corn husks	RM 0.00
Table salt	RM 0.30
Electric bill	RM 0.20
Total	RM 3.30

Profit margin:

Table 2: A record of the profit margin.

Total cost	RM 3.30
bonus	RM 0.30
Profit	25%
Selling price	RM 4.50

CONCLUSION

In conclusion, this innovative product is successful as the Corfee Paper was created to reuse the waste of corn husks, thus, reducing the usage of trees to make paper, and able to create sentimental value to the paper.

For future development, this Corfee Paper should be able to produce as many as it can because the whole process to create this paper takes time. This is because the corn husks need to undergo many processes before they turn into pulp to form papers. Some recommendations that can be considered are, using an enormous making paper screen and being able to produce two or three pieces of paper. Other than that, the paper should be made into a thin layer so it will reduce the time to dry it. Lastly, this paper should be made

in a bunch at a time, so that the time will be spared from making the whole process over again.

ACKNOWLEDGEMENT

First and foremost, we would like to express our gratitude to our advisor, Madam Malissa Mohamed for the guidance and encouragement in finishing this innovation project.

We also thank our group members, Farrah Nurfariesya Ahmad Kassim (2021812304), Mahani Maliki (2021860694), and Nurhikmah Julia An'nisa Hazman (2021611174) for their cooperation in this project.

Finally, we would like to express our gratitude to our institution, Pusat Asasi UiTM Dengkil for giving us a chance to participate in this International Mega Innovation Carnival 2022.

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SCENTED BANANA BIOPLASTIC BAG

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ABSTRACT

Nowadays, the earth has been polluted by various chemicals danger. At the same time, the amount of plastic litter increased (i). So, the idea of bioplastic popped up to create a scented bag bioplastic product that would be easily decomposed in a short period of time and reduce the petroleum usage as it is a non-renewable source. (ii). The ingredients needed to make this plastic is banana skin, glycerol, gelatine, essential oil, and food colouring. So, the plastic bag is eco-friendly as there is made from food waste which is banana skin and no chemical used. Our market potential is to attract people to use the safest plastic that are organic which is eco-friendly, fragrance and pretty that can contribute to a better environment for our next generation. Our invention is improvised from Mary Lempres Video Clip. We improvised the idea by adding the banana peel which is a food waste and fragrance to make it nicer (iii). The plastic bag is sold at RM 0.70, so, the profit that we gain is RM 0.25 and the profit margin is 35.7% (iv). In the conclusion, the bioplastic produced is eco-friendly and can reduce the amount of plastic litter (v).

Keywords: Amount of plastic litter increased; bioplastic; eco-friendly

INTRODUCTION

In this era of globalization, the earth has been polluted by various chemicals danger. This makes the environment worse day by day. At the same time, our earth is increasingly damaged by human greed that becomes rich by creating machines and products that polluted the environment. For example, the creation of plastic bags. The plastic bags were invented in 1950 and it have become an integral part of our life because almost every local store owner provides the products in it for carrying items every day. The industrial revolution caused human able to create products using chemicals and not caring adverse effects of the product on the environment. We created a scented banana bioplastic bag product that made of bananas peel which is an organic and eco-friendly material compared to the plastic bags that has adverse effects on nature which are increasing the amount of plastic litter and reducing the petroleum resources

Firstly, the harmful effect of a plastic bags on nature is an increase in the pile of plastic bags in our environment. Plastic bags can last for hundreds of years, and they are difficult to decompose naturally in a short time. This is because plastic bags are produced from high density polyethylene (HDPE). It has straight molecule chains that branch very little and stay in linear from beginning to end [1]. Due to that, burning of plastic bags needs to be done to reduce it. Through this combustion, toxic substances will be released into the air and cause ambient of air pollution [2].

Other than that, the percentage of petroleum usage will increase due to the production of plastic bags. It is because plastic bags made from petroleum and about 8% to 10% of our total oil supply are used to making plastic bags [3]. Petroleum is very difficult to find and it takes long time to produce it. The minimum is about 50 million years and it was formed between 60 million and 250 million years ago [4]. Petroleum is very important in our life especially for vehicles. Therefore, we need to use it sparingly and wisely without wastage.

The objective of our invention study was to create a scented bioplastic bag product that would be easily decomposed in a short period of time and to reduce the petroleum usage as the petroleum is a non-renewable source. This means that our products can be used to prevent environmental pollution. Therefore, our product will be an eco-friendly product.

INNOVATION DEVELOPMENT

Scented banana bioplastic bag is made of banana peel that makes the plastic bag more organic and safer for our environment system. The usage of banana peel is to reduce the food waste and make our environment cleaner. The innovation that we made is improvised from Mary Lempress video of bioplastic bag. The innovation of this product is the addition of food waste which is banana peel, and the addition of some drops of essential oil to give the scent or fragrance to the bioplastic bag.

How to make the banana scent bioplastic bag:

1. Mash the banana skin with mortar and pestle.
2. Pour 400 ml of water into a pot.
3. Pour 1 tablespoon of glycerol into the pot and stir it using a ladle.
4. Heat the glycerol solution with medium heat on the stove.
5. Add 3 teaspoon of gelatine and 3 teaspoons of mashed banana skin into the pot.
6. Stir the mixture solution continuously for 15 minutes and close the heat source.
7. Stir the solution while adding 2 teaspoon of green food colouring and a few drops of green tea essential oil.
8. Pour the solution into a tray and place it at a dry place for 3 days.
9. Peel of the dried solution from the tray.
10. Cut the dried solution into the preferred shape of plastic bag and glue it with the complementary size.
11. Repeat the step 1 to 10 by using pink food colouring and rose essential oil.

Inventive Features of the Product

1. Eco-friendly

The scented banana bioplastic bag produced by using food waste, which is banana skin instead of petroleum. So, the plastic bag is non-toxic as there is no chemical or toxins used to produce the plastic bag.

2. Have a pleasant smell

The using of essential oil in the making process of plastic bag will give a good fragrance.

3. Less amount of plastic litter

Bioplastic is a biodegradable and compostable. So, by using bioplastic alternatives, it can break down naturally by composting or biodegrading rather than petroleum-based plastic. Hence, the amount of plastic litter can be reduced.

4. Shape and size

The shape of this bioplastic bag is different with other plastic that have been produced before. The size of the scented banana bioplastic bag is made in two sizes which is medium size and small size. The small size plastic bag can carry small thing while the medium size can be used to carry more things.

COMMERCIAL POTENTIAL

Our scented banana bioplastic bag is a biodegradable plastic which makes our environment much cleaner as it is easier to dispose compared to regular plastic bag. Furthermore, our plastic bag is made of banana peel that makes the plastic bag more organic and safer for the users and our environment system. As we all know, petroleum is one of the sources that are non-renewable resource. Therefore, we used gelatine and glycerol as a replacement of petroleum to make our own plastic. Then we add banana peel and fragrance essential oil into the mixture to give it more interesting and commercial. We used banana peel is to reduce the food waste and make our environment clean. In the future, we can try to use other fruit peels such as apple, grape, kiwi and many more.

In the recent 5 years, our world invention industry has become much popular and recognize around the worlds. The market needs for all these years is people need to change to an eco-friendly environment product. They preferred an eco-friendly product as they have the knowledge about the advantages of eco-friendly product for our environment system.

Our market potential is to attract people to use the safest plastic that are organic which is eco-friendly, fragrance and pretty that can contribute to a better environment for our next generation. We expected that our profit margin is more than 30% as it is a high demand product for this generation. Our invention is improvised from Mary Lempres Video Clip. We improvised the idea by adding the banana peel which is a food waste and fragrance to make it nicer. In addition, we improvised the pattern shape of plastic bag that are quite different with a regular pattern shape of plastic bag. This is because, it can fit many things and is easier to carry and plus the items will not fall off from the plastic.



Figure 1: Innovation prototype
(Scented Banana Bioplastic Bag)



Figure 2: Innovation Prototype with Users

Table 1: Total Cost and Market Price for 200 pieces of plastic

Material (200 pieces of plastic)	Price
Glycerol	RM 14.00
Gelatine	RM 7.60
Essential oil (rose and green tea)	RM 2.80
Food colouring (green and pink)	RM 5.40
Banana / Food waste	RM 2.00
TOTAL COST	RM 31.80

MARKET PRICE FOR 200 PIECES OF PLASTIC: RM 45.00

Table 2: Total Cost and Market Price for 1 piece of plastic

Material Price (1 piece of plastic)	Price
Glycerol	RM 0.15
Gelatine	RM 0.30
Essential oil (rose and green tea)	RM 0.05
Food colouring (green and pink)	RM 0.05
Banana	RM 0.10
TOTAL COST	RM 0.55

MARKET PRICE FOR 1 PIECE OF PLASTIC: RM 0.70

TOTAL PROFIT = RM 0.70- RM 0.55

= RM 0.25

PROFIT MARGIN: RM 0.25 / RM 0.70 = 0.357

= 0.357 X 100

= 35.7%

CONCLUSION

In a nutshell, this bioplastic bag that produced by using banana skin is safety and eco-friendly. It is because banana is an organic material and do not have toxic or chemical to produce this bioplastic bag. Therefore, it will easily decompose naturally in a short period of time. It also comfortable for user due to essential oil which is produced good fragrance.

An improvement that can be done on these biodegradable plastic bags is to use another food waste which is the skins of other fruits such as apples, oranges and mangoes. This can reduce the excess food waste in our environment. In addition, we can also use fine sand to produce interesting patterns and textures for users. This is because fine sand has a less coarse grain texture and will not scratch the user's skin when touched the bioplastic bags.

ACKNOWLEDGEMENT

Firstly, we would like to thank our group members, Nur Amani Izzati Mohd Esham, Nur Fatin Maisarah Bt. Fairul Hisyam, Nureen Husna Izzatie Bt. Mohd Shahid, Nur Nadia Bt. Zalrizal and Malissa Bt. Mohamed for their cooperation and hard work in this innovation project which is 'Scented Banana Bioplastic Bag' and bring this product to a success.

We would also like to thank our lecturer of Biology, Madam Malissa Bt. Mohamed for all the guidance and encouragements given to us in finishing this project and we would like to express our gratitude to our family and friends for the support and willingness to spend some time with us to explain about what they understand about the topic of our product in general.

Last but not least, all of us would like to say thank you to Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil for giving us support and opportunity for us to join Creation de UiTM 2022

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Solar Cooker

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ABSTRACT

As we know, the earth's temperature increases surprisingly each year as the consumption of electricity is mainly generated by primary energy sources. This will emit a lot of carbon dioxide gas which contributes to global warming thus leading to some natural disasters. Hence, we think about the use of solar energy to reduce combustion of fossil fuels as it does not cause any pollution. In order to encourage people to use solar products, we decided to make an innovation on solar cookers. We use a hydraulic concept so that the height of the stage can be adjusted to receive more sunlight. Besides, we made use of the fresnel lens instead of the convex lens as fresnel lenses converge more light efficiently. The position of the lens can be adjusted to adapt to different positions of the sun and the light intensity. It can be used in underdeveloped regions as it still can be used to heat the food thus killing the harmful microorganisms on it, so the food can be consumed safely.

Keywords: Combustion of fossil fuels; carbon dioxide; solar energy; solar cooker

INTRODUCTION

Solar cooker is a device which uses the energy of direct sunlight to heat, cook or pasteurise drinks or food. It does concentrate or reflect sunlight on the cooking area and it needs to be able to trap heat in order to reduce heat loss [1]. Therefore, we modified the solar cooker which has the ability to achieve a higher temperature in a shorter time and is user-friendly. Hence, we can promote people to use solar products to address the problem which is the increasing temperature of the Earth due to the use of primary energy sources such as fossil fuels since solar energy is a renewable energy source and it does not cause any pollution [2,3]. The solar cooker we modified is user-friendly and it can reduce air pollution.

INNOVATION DEVELOPMENT

In order to operate the solar cooker more easily, we apply Pascal's Principle to adjust the height of the stage. We use two syringes and a tube to make a 'hydraulic jack'. They are filled with water. When the users push the syringe outside the cooker, the pressure will be transferred through water thus pushing the syringe and lifting the stage. It is easier to use compared with the common type of solar cooker which is difficult to operate as it needs to find brick or rock to elevate the cooking pan to desired height to reach the focal length.

Firstly, the selection of the standard selected components that are used in the solar cooker have been discussed below.

Fresnel Lens

Fresnel lens is preferred as it is lightweight, good light refractor and allows more light passing through the lens.

Aluminium Foils

Aluminium foils are selected because it is lower cost and a good light reflector and has a higher melting point.

Wingnut 8mm

Wingnuts 8mm are used to adjust the position of the Fresnel lens because they are compatible with the thickness of wood (1 cm), easier to tighten and loosen and adequately secure when in place

Dark Colour Polycarbonate

Dark-coloured polycarbonate is used as a stage of the solar cooker. It provides support to the food containers. It is preferred as it is a good heat absorber, lightweight and possesses thermal and chemical resistance.

Woods

We use wood to make the body of the solar cooker because they are relatively good heat insulator, strong and able to reduce heat loss

PVC Tube

A PVC tube is used to support the stage. Inside it consists of a syringe and there is a hole so the syringe can be connected to the outside of the syringe through a plastic tube. It is chosen because it is easy to cut and has high tensile

Syringe

We made use of 2 different volumes (10ml and 20ml) of syringes to apply Pascal's Principle. We put the 10ml syringe outside of the solar cooker while the 20ml syringe is put inside the PVC tube as the support to the stage. We choose a 10ml syringe because it has a smaller area, therefore only a smaller force is required to elevate the stage and it can retain fluid. The 20ml syringe is selected as it has a bigger area, able to support more weight and can produce bigger force on the stage.

Stainless Steel Butt Hinge

We attach the cover of the solar cooker with its body. Stainless steel butt hinge is chosen as it allows the cover of the solar panel to rotate approximately 180 degree, to maximize the amount of light entering the box and fresnel lens and to open its cover easily.

Plastic Tube

Plastic tube is used to connect both syringes. It is selected because it is able to retain liquid and is flexible.

4mm and 8mm Screws

There are certain reasons why we choose 4mm screws which are compatible with the thickness of the wood (1cm) and able to hold the wood in place securely. The 8mm screws are chosen because they are compatible with the 8mm wingnuts.

Water

We use water to fill the plastic tube. It is selected as it is cheap, high heat capacity and able to transmit pressure efficiently.



Figure 1: The top view of the solar cooker

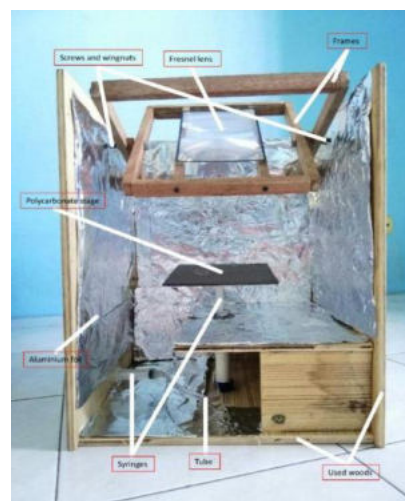


Figure 2: The front view of the solar cooker

COMMERCIAL POTENTIAL

The solar cooker is very convenient as users do not need to change the position of the entire solar cooker to make sure the cooker receives a higher intensity of sunlight thus gaining more heat energy. The design helps to save material costs because the overall size of the solar cooker is reduced and becomes portable. The mass of the solar cooker is smaller as we use

fresnel lenses which are lighter. Its width is only within millimetres compared to a convex lens which has a thicker centre and the same focal length and it can concentrate the light into a relatively narrow beam. Furthermore, we attach aluminium foils to reflect sunlight on the surface of the inner of the solar cooker so it can maximise sunlight for cooking or pasteurisation. Unlike parabolic reflectors, aluminium foils are lighter and cheaper. The use of aluminium foils does not make the overall size and the volume of the solar cooker too big. Together with the fresnel lens and aluminium foils, the solar cooker is able to achieve a better performance by cooking in a shorter period.

This solar cooker is suitable to be promoted in certain underdeveloped countries such as India. It can help thousands or more underprivileged families to save money instead of buying charcoal to cook or pay more for electricity bills and those who lack adequate fuel for cooking their food as solar energy is free. In the process of generating heat energy, carbon dioxide gas is not released at all. The solar cooker can ensure drinks are safe to consume after they undergo pasteurization, thus preventing water-borne diseases from spreading.

In addition, the overall cost of this project is only RM15.40. It is cheaper than the selling price of natural gas in Malaysia which is RM35.00/MMBtu for 1 October to 31 December 2021. We ask a factory to give us the remnant of the wood frame and wood pieces for our project while for other materials, we reuse them to reduce the cost and waste. Table 2 shows the unit price of materials used for the making of the solar cooker. The proposed selling price would be RM20.00. The maximum profit gained by selling a solar panel is RM3.60.

Table 1: Unit prices for materials

No.	Material	Quantity	Price 1 set (RM)	Total
1	Aluminium foil	1	5.40	5.40
2	Fresnel lens	1	6.50	6.50
3	Wingnut (8mm)	2	1.00	2.00
4	Syringe (10ml)	1	0.60	0.60
5	Syringe (20ml)	1	0.90	0.90
Total				15.40

Table 2: The result of the temperature of 300ml of water for different time intervals

Time interval / minute	Temperature / degree Celsius
0	30.5
2	36.9
4	39.7
6	44.4

The table above shows the result of an experiment to investigate the effectiveness of the solar cooker by heating 300ml of water using the solar cooker as shown in Figure 3. We measured the temperature of the raw focal point temperature which gives us 297 degree Celsius as shown in Figure 4. The temperature of the water is continuously rising from 30.5 to 44.4 degree Celsius after 6 minutes. The change in temperature for the first, second and third time intervals are 6.4, 2.8 and 4.7 degrees respectively. This is caused by the decreasing light intensity when it is cloudy. When the weather becomes rather sunny, the light intensity increases, therefore there is a bigger increment of temperature after the second minutes. It shows that the light intensity, depending on the condition of the weather, will affect the increment of the temperature of food or drinks. Overall, the solar cooker shows good effectiveness and can heat up drinks or food whether it is a sunny or cloudy day.



Figure 3: 300ml of water is put into a steel bowl and its initial temperature



Figure 4: The temperature of the raw focal point

CONCLUSION

Different components are chosen to make the solar cooker so that it has the ability to achieve a higher temperature in a shorter time and is user friendly. Next, the effectiveness of the solar cooker is tested by heating 300ml of water using the solar cooker for every 2 minutes intervals three times. The result of the experiment shows that the solar cooker can function well under sunny or cloudy conditions. Moreover, this solar cooker is cheap thus making it affordable for every walk of life. It can be used to cook food or pasteurize drinks and does not pollute the environment.

ACKNOWLEDGEMENT

We appreciate the Kim Chua Foundary for giving us wood materials so that we can carry out our project. We would like to thank the cooperation of all team members and our teacher to guide us so our project is successful.

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Delta City: Flood Management System

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ABSTRACT

Floods in Malaysia are one of the most regular natural disasters affecting the country, the most recent flood on December 17, 2021, had caused heavy downpour in Klang Valley which had never been affected before. From the research, the ‘Delta City’ concept was inspired by Low Impact Development (LID). This city contributes two solutions for the flood crisis: permeable pavement systems (PPS) and water harvesting system (WHS) which consists of Permeable pavement, Water Harvesting System or water catchment system, a technology that collects and stores water for human use and Water Harvesting System range from simple rain barrels to more elaborate structures like pumps and tanks; but instead of implementing that concept, a simple long continuous layers can be constructed and the most important impact that it can provide protection to all the lives of affected people equally. This ‘Delta City’ is mainly able to reduce the percentage of items damaged by ensuring there is a low possibility of water overflowing into houses and buildings. Newly modified road infrastructure will slow down the runoff, spreading it out over the road space, and slowly soaking it into the ground. Then, the absorbed water will be used for domestic uses, and in our cases, it can be used in areas with cut down water supply when dealing with overflow dam water and it allows the affected people more time to gather their belongings and evacuate safely.

Keywords: Flood; low impact development; permeable pavement systems; water harvesting system

INTRODUCTION

Floods in Malaysia are one of the most regular natural disasters affecting the country, which occurs nearly every year especially during the monsoon season. The level of water reached concerned levels, some reaching up the roof of houses in six hours according to the Malaysian Meteorological Department. On top of it all, the recorded number of death cases was more than 48 lives, the most number of lost lives caused by the flood in Malaysia. The poor flood management in cities and rural areas would be a consistent problem, especially since floods easily and fastly occur due to clogged up drains.

In addition to the flood crisis, other water related problems in Malaysia are the infamous water shortage issues we have every now and then. Whether it’s due to the flood, the drought or fixing pipes and water treatment plants, the citizens would have to endure days without water, causing disruption to their daily tasks. A separate document by Fomca also shows that Malaysia went through many water shortages and lack of clean water (water contamination) for the past decade.

Hence, with all the issues that continue to taunt our country, our team has come up with an easy, simplified and thoroughly-thought innovation that could prevent the effects of flood overall. We have also ensured that other regions that are not affected by flood, but affected by water shortage for days, will receive an immediate solution. Our main objective is to provide a concept package to reduce the effects of flood while making use of the water resources on-site to its full potential for our residents.

INNOVATION DEVELOPMENT

Delta City 2.0 is a city built mainly based on the LID (Low Impact Development) concept. Our interest is to manage floods in Malaysia's high flood risk places aligned with the goal of the LID concept which is sustaining the site's predevelopment hydrologic regime by using techniques that infiltrate, filter, store, and evaporate stormwater runoff close to its source. We also found some ways of harnessing and benefiting water on-site, treating it like the resource it truly is. We have also received critics and comments from our previous showcase by PIITRAM 2022 judges, hence our updated project is named Delta City 2.0.

For our project we have created a virtual city to show the overview of our Delta City 2.0 using Minecraft Education and also built a real functional prototype of Delta City 2.0 with.

Our Delta City comprises 3 important parts, firstly is Permeable Pavement System, secondly stormwater filtration method, lastly Bufferblock usage to store water and distribution to the water treatment plant.

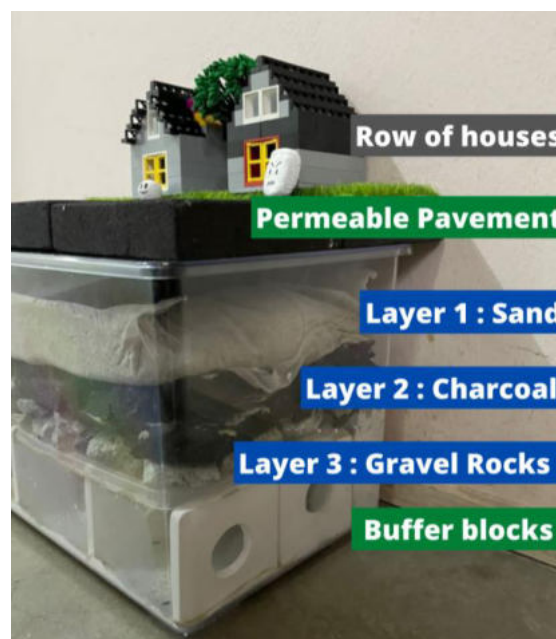


Figure 1: Our prototype, a combination of LID concept and SIS (water filtration)

Based on the labelled picture above, the first part is the Permeable Pavement System. For this prototype we have used the NanoTech aquarium filter media to show the function of hydropave asphalt pavement which can infiltrate water through it into the subsurface storage zone. Our purpose of using this permeable (hydropave asphalt) pavement is to substitute the traditional impervious asphalt and concrete pavement (tar used for road).

Secondly we have shown the Stormwater Infiltration System. For the prototype, we have used sand, charcoal (active carbon) and gravel rocks. Our purpose of including this process is to filter stormwater naturally before it is stored as stormwater runoff before it is purified by water treatment plants for domestic usage. Since the water filtration is composed entirely out of earth's resources, it is an environmentally friendly approach to this system.

Thirdly, the usage of Bufferblock. For the prototype, we used Plaster of Paris to make a replica of Buffer Blocks. The purpose of these Buffer Blocks is storing The Stormwater that enters through a permeable road pavement in the cavities of the Buffer Blocks. This is a great way of recycling stormwater which

Unlike other previous flood solutions and even the current solutions, our innovation has managed to ensure that flood does not occur at all. As we all know, flood waters only occur when water has managed to overflow on our pavements, roads, etc. When taken into consideration, other flood solutions only work when the flood already happens. A flood alarm system only works when water starts to overflow to calf level. Water blocks can only hold off the flood water to a certain limited height. Instead, our innovation avoids the occurrence of flood overflow overall. Hence, with our permeable pavement, a one-of-a-kind road layer that ensures water cannot collect over the surface, the possibility of flood is little to none at all.

COMMERCIAL POTENTIAL

Permeable pavement

Firstly, the Permeable Pavement System allows for water to infiltrate into a subsurface storage zone during rainfall events. As our rainwater data (mm/hour) during monsoon season especially are exceptionally higher than normal rainy days, the designs of permeable pavements that have high amounts of air voids allow excessive runoff to drain off from the pavement surface. Based on the official web of public infobanjir, the highest rainfall intensity at Taman Sri Muda was 161.0 mm/hr on 18th December 2021, which caused the worst flood in the history of Malaysia. This permeable pavement also known as hydro paver allows water to infiltrate into a subsurface storage zone during rainfall events with 3000 mm/hr. As you can note, the difference in rainwater data capacity proves the efficiency of our Permeable Pavement System.

Stormwater Infiltration System

Delta City's next concept is the water harvesting system. This system consists of three layers composed entirely out of earth's natural resources. The layers will be right under the permeable pavement mentioned earlier. As for the first layer we have sand, followed by active carbon or charcoal and finally gravel rocks. This system, composed of earth's natural resources, with no usage of plastic, is an environmentally friendly approach to our product.

Bufferblock

The usage of Buffer block underground is for stormwater to enter through a permeable road pavement in the cavities of the Buffer Blocks. The Buffer Blocks are made of concrete and are strong enough to withstand heavy traffic loads. The Buffer Blocks have a water storage capacity of 266 to 532 litres per square meter. Because of the high strength of the Buffer Blocks, a much thinner layer of ground coverage is needed than plastic infiltration crates. Therefore the Bufferblocks have more water storage capacity in less height than other stormwater drainage systems. Because of the hollow spaces, the blocks are relatively lightweight (approx. 950 kg/m³)

and are therefore suitable as lightweight fill material in areas with settlement problems because of weak/ compressible soils.

Basically, our focus is to resist flood by avoiding stormwater runoff to be stagnant on the surface of the road as the poorly maintained drainage system is clogged with litter. Hence, through our Delta City project concept, an alternative solution is discovered where we can overcome stormwater overflowing in drainage which causes floods to happen. As the stormwater will simultaneously infiltrate into the hydropave at that moment. This will eventually reduce the amount of polluted stormwater runoff released to the sea.

Delta City 2.0's contribution

Delta City 2.0 is contributing to knowledge, technology and society. From this project, our team has managed to receive a myriad of information about water drainage systems, water management, and flood management systems. The development of Delta City 2.0 would therefore increase the public's knowledge and awareness on the importance of having a good drainage system and a functional flood management system. Delta City also increases the performance in technology, as Buffer Blocks and the Permeable Pavement system are proof that such materials that allow the penetration of water exist.

As for environmental wise, the entirety of Delta City 2.0 is environmentally friendly as there are no drastic changes to earth's landscape. It also does not use any plastic pipes and it also involves construction using earth's resources (layers in the water harvesting system). Delta City 2.0 also ensures that natural flows of water can be restored without needing to build a reservoir pool. The filtration of stormwater before it is released out to sea also allows a decrease in water pollution. Finally, as a contribution to society, Delta City 2.0 allows all citizens to have low risk during heavy rainfalls and their safety is ensured.



Figure 1: Innovation prototype (front view)

Table 1: The data of damage expenses and government aid for floods

Flood year	Estimated Loss & Damage (RM/billion)	Government Aid (RM/billion)
1996	0.3	0.5
2014	2.6	0.5
2017	3.2	4.0
2021	5.3	6.0

Hence, in an estimation of 3 decades, if the Delta City 2.0 concept package is carried out, we can save RM 36 billion- a true one-time investment that can last for at least 2 decades.

CONCLUSION

From our Delta City 2.0, we have successfully created a LID and SIS system, filtering stormwater and storing it in the buffer blocks. Our main objective is obtained as no water would collect on the pavement's surface despite the large volume, thus ensuring that floods would not take place as well. We foresee that our project will be used widely in main cities, rural areas, and housing properties.

ACKNOWLEDGEMENT

We would like to pass our acknowledgement to Hills Innovation from the Netherlands, who started the production of Buffer Blocks for an excellent flood management system. We would also like to give our thanks to our mentor and Biology lecturer, Madam Nashimah Banu Habeeb Mohamed, who has guided us tirelessly throughout the entire project as well as Kolej Matrikulasi Selangor for the continuous support.

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GrOrgOma Repellent Pouch: Green Organic Aroma Repellent Pouch

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ABSTRACT

GrOrgOma (Green Organic Aroma) Repellent Pouch is an Environmentally Friendly Product which is made from natural vegetable oil, functions to repel insects and to produce pleasant odour. This innovative product is designed to overcome the pollution that is caused by uncontrolled oil disposal. Waste cooking oil can cause serious damage to local water supply and can be a problem for wildlife especially to marine life if it is not disposed of properly. Clogging pipes can also happen due to waste oil disposal. This will lead to natural disasters such as flash floods. Insect repellents normally contain hazardous chemicals like carbon monoxide which can destroy the ozone layer and cause global warming. The objective of this innovation is to produce a good beneficial product of insect repellent which is way better than any insect repellents sold in the market thus meeting the requirements of SDG 6 (clean safe water & sanitation) and SDG 9 (industry, innovation & infrastructure). Other objectives are to maximize the use of wasted materials, to reduce negative impacts on the environment and to promote love towards nature in the community. This product was made by using used oil, maltodextrin, oil hardener, vegetable oil, food colouring, ginger, pandan leaf, citronella, and clove. To minimise the amount of waste, used cooking oil is chosen. This can be a better product since it can reduce pollution and secure a better future. The preparation step of this product is by mixing all the ingredients, then stir the mixture before adding the heated used cooking oil, food colouring, pandan extract or citronella and clove extract together as for fragrance and repellent elements in this product. Place the mixture into the mould before putting it in the pouch bag. When the pouch bag is placed somewhere, for example in the car, the fragrance of pandan will reduce the bad odour in the car and produce pleasant odour. Meanwhile, the fragrance of citronella and clove will repel the insect. It is believed that GrOrgOma repellent pouch has high potential to commercialize as it is safer and environmentally friendly compared to the other repellent and fragrance products because this product is non-toxic. Thus, it can reduce pollution significantly. In addition, GrOrgOma repellent pouch are more efficient compared to the other repellent spray because the other repellent spray only last for a day, but the GrOrgOma repellent pouch can last longer around 3-4 month, but the price is much cheaper than other brand of insect repellent product exists in the market. In turn, the use of GrOrgOma Repellent Pouch is very efficient, durable, safe, and economical.

Keywords: GrOrgOma; nature; reusable; repellents; fragrance

INTRODUCTION

The presence of many insects either in private homes, vehicles and even at work is quite disruptive to daily life. The presence of insects around human life will cause the presence of infectious diseases, making the place dirty and smelly. According to [1] insect repellents have

long been used, since before the second world war as a measure to avoid the threat of insects to humans. At that time, there were only four principles of repellents used: oil of citronella, dimethyl phthalate, Indalone® and Rutgers 612. However, the production of insect repellents grew rapidly until N,N-diethyl-m-toluamide (DEET) was found to be the best mosquito repellent regardless of the safety of the material. Some toxic effects of the substance have been recorded such as encephalopathy in children, urticaria syndrome, anaphylaxis, hypotension and decreased heart rate [1]. Skin blisters, seizures, memory loss, headaches, stiffness in the joint's shortness of breath, and skin irritation are also some of the effects when humans are exposed to DEET in large doses. Besides, DEET breaks down slowly in soil and has the potential to contaminate groundwater [2]. DEET has been set as a reference standard since it is a powerful repellent material and the oldest kind of repellent available in the market but not suitable for pregnant women and children up to six months due to its toxicity [3]. Higher concentration repellents may protect people for longer. Repellents with less than 10% of an active ingredient may only offer protection for short periods of time around 1-2 hours [4].

Mothballs are one example of a commonly used insect repellent. Mothballs are made from naphthalene or paradichlorobenzene, both of which are toxic to humans. Humans will be exposed to these substances through inhaling the fumes. Mothballs should not be placed in closets, attics, basements, storage chests or trunks, garment bags or other spaces other than in tightly closed containers. This is due to gasses from the mothballs escaping into the air and can cause respiratory problems [5].

Because of the effects of chemical insect repellent as stated above, most of the researchers suggested changing to the natural insect repellent as an alternative. There is much research conducted for natural insect repellent. The current trend is to use natural insect repellent as it is less toxic and does not harm the environment. As research done by [6] in Thailand, it shows that Citrus Hystrix essential oil has good potential for being used as a cockroach repellent. This can be proved by [7] where several types of cockroaches were tested with different essential oils. The result shows oil containing citronella exerted both repellent and insecticidal activities for American Cockroach. Clove oils also give more than 90% repellency against nymphs and adults of American Cockroach. Extract of pandan leaves initially attracted nymphs but later the repellency was as high as 93% due to musky odour emitted by aromatic compound 2-acetyl-1-pyrroline present in leaves for German Cockroach.

Treatment of rice filled with rice weevils using synthetic insecticides is not recommended because of direct and indirect health hazards to humans. Maximum Repellency or Excess Proportion Index (EPI) is used to measure the citronella oil for repelling the rice weevils and the result gives -0.70 to 0.89 of readings [8].

Problem Statement

Pollution that is caused by uncontrolled oil disposal might seriously affect the environment. Waste cooking oil can cause serious damage to local water supply and can be a problem for wildlife especially to marine life if it is not disposed of properly. Clogging pipes can also happen due to waste oil disposal. This will lead to natural disasters such as flash floods. Besides, Insect repellents normally contain hazardous chemicals like carbon monoxide which can destroy the ozone layer and cause global warming and give bad effects to humans and the environment. Due to these two problems; green, organic, and aromatic insect repellent is invented named as GrOrgOma Repellent Pouch.

Objectives

The objectives of this innovation are: -

- i. to produce a good beneficial product of insect repellent which is better than any insect repellents sold in the market.
- ii. to maximize the usage of used materials to reduce negative impacts on the environment.
- iii. to promote love towards nature in the community.

INNOVATION DEVELOPMENT

This innovation is made from natural materials as repelling and fragrance elements. This GrOrgOma Repellent Pouch was made by using used oil, maltodextrin, oil hardener, ginger, vegetable oil, food colouring, pandan leaf, citronella, and clove. To minimise the amount of waste, used cooking oil is chosen. This can be a better product since it can reduce pollution and secure a better future. The procedures to make this product shown from Figure 1 until Figure 3.



Figure 1: Mix and stir the mixture to get a powdered texture then pour the mixture into heated used cooking oil



Figure 2: Put the food colouring, pandan extract (fragrance) / citronella and clove extract (insect repellent) into the heated used cooking oil.



Figure 3: After a few minutes, filter the oil flakes and put the oil into the container. Leave it to cool down before inserting it into the pouch bag.

RESULT

This innovative product has been tested in the rice dispenser, kitchen area and in the wardrobe for several days. The result shows that insects such as lizards, cockroaches and rice weevils are repelled from that area. That indicates that they don't like being in that place because of the aroma of pandan and citronella with cloves.

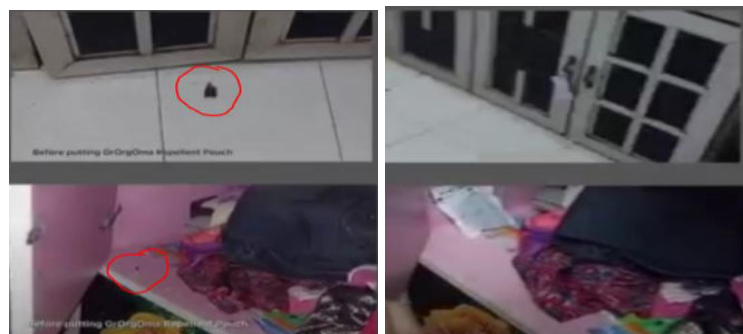


Figure 4: Before and after using GrOrgOma Repellent Pouch in the kitchen area and in the cupboard.



Figure 5: Before and after using GrOrgOma Repellent Pouch in a rice dispenser.

COMMERCIAL POTENTIAL

Most insect repellents in the market contain hazardous chemicals which bring harm to humans and the environment. The uniqueness of this innovative product is the use of used cooking oil as the main ingredient which meets the requirements of Sustainable Development Goals; SDG6 (clean & safe water sanitation) and SDG9 (industry, innovation & infrastructure). This innovative product just does not give the same effects as any insect repellents in the market, but it gives way better effects as it uses natural resources and reuse ingredients as main ingredients.

It can repel insects such as cockroaches, mosquitoes, flies, rice weevils, and ants. It also can produce pleasant odour from PANDAN and CITRONELLA with CLOVE to keep surroundings smell aromatic. The odour enhances when temperature increases as the repellent melts, but it will not drip out as the pouch bag absorbs it and will harden back when cold; it acts like a candle. GrOrgOma Repellent Pouch is much cheaper than any insect repellents in the market and does not have a strong chemical smell like any insect repellents in the market. It is safe to smell the odour thus can act as an air freshener. Natural odors of PANDAN and CITRONELLA with CLOVE can repel insects from the car, closet, bathroom, bedroom, dining room, kitchen cabinet, and rice dispenser. environmentally friendly and long-lasting.

CONCLUSION

For a conclusion, GrOrgOma Repellent Pouch is a good beneficial innovative product of insect repellent which is better than any insect repellents sold in the market. The aim of this innovation which is to maximize the usage of used materials is achieved because this innovative product is using used cooking oil and herbs plants as the repellent and fragrance elements. In turn it can reduce negative impacts on the environment thus promoting love towards nature in the community.

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Portable Charging Mat (E-Mat)

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ABSTRACT

How might we make it possible for people these days to charge multiple devices without the need of wires and extensions so that it can provide the utmost convenience to the users? In this paper, we will discuss about the innovation known as E-Mat, a portable charging mat which comes in place to overcome the needs of bringing several power banks or chargers around. E-Mat outcompetes power banks and chargers in the sense that users are able to charge up multiple appliances simultaneously by just placing several devices onto the charging mat. This innovation fully utilises the concept of electromagnetic induction by alternating current. By creating a constantly changing magnetic flux in the inductor coils, the copper coil receivers inside the electronic devices will pick up the alternating magnetic field and induces a current flow which is then passed on to the battery of the electronic devices. By using predictive and prescriptive analytics, we could confidently predict the upsurge in demand for digital appliances and many innovative products like E-Mat in the future. In essence, E-Mat is worth to invest in on account of its competency in the market as well as a multitude of benefits it offers.

Keywords: Charging mat; electromagnetic induction; wireless charging

INTRODUCTION

The Portable Charging Mat (E-Mat) is a modern and effective alternative to charge multiple devices without the need for wires and extensions. Even though there might be products similar to our innovation, however, they don't come close as this innovation is light and portable, as if a power bank but able to charge up multiple appliances simultaneously. By converting the AC current into DC current using a rectifier, E-Mat is able to store the charges in capacitors. Thereafter, the inverter will help convert the DC current into AC current which then flows through the inductor coils to charge the electronic appliances via electromagnetic induction or in other words, wireless! This innovation serves to overcome the need of bringing a big baggy power bank or charger around, and instead, use a thin, portable charging mat that can perform the task nice and easy.

COMMERCIAL POTENTIAL

By using descriptive analytics, we could clearly see the significant expansion and development in the Information and Technology (IT) industry. Innovation and creativity have driven the development of the field to now where it is today. This has been unprecedented and not practical a few decades ago, but humankind has yet proven nothing is impossible if we put our minds to it.

By using predictive and prescriptive analytics, we could confidently predict the surge in demand for digital products and appliances in the future. Other than that, we could expect many innovative products could be appearing within the sight of consumers. After analyzing and

scrutinizing massive data, charts, research papers, the IT field will be very competitive and in high demand in the future.

Before launching this product out to market, our team have considered various strategies like segmentation, targeting and positioning which could potentially raise the value and credibility of our product. Our product will be mainly focusing on household uses, companies' purpose and so on.

Our team will implement tactics (4Ps) which is product, price, place and promotion. We have applied cutting edge technology to our product to increase its competitiveness, reliability and usefulness to fulfil the needs of various consumers. Our price will be considered as affordable which is acceptable to every individual from different age groups. The place (channel) that we have considered is inviting an ambassador which has a great reputation to increase our credibility to consumers. Lastly, we will make promotions from time to time, for example during conventions and fairs we will showcase our latest technology and innovations to the public to gain some recognition, at the same time this could build up our brand personality and brand architecture.

Our brand personality would be competent, reliable yet intelligent while our brand architecture is attributed with many functions and benefits.

With the support of massive data, analytics, research and thesis, we will expect a significant surge in our brand equity in the future that has yet to come. By using the formula below,

$$\text{Equity} = (\text{Revenue Premium} - \text{Additional Variable}) * (1+d)/(1+d-r) \dots\dots\dots(1)$$

d = discount rate

r = stability factor

We will make sure the stability factor of our product will meet the requirements of our investors so that this could bring more equity to our product.

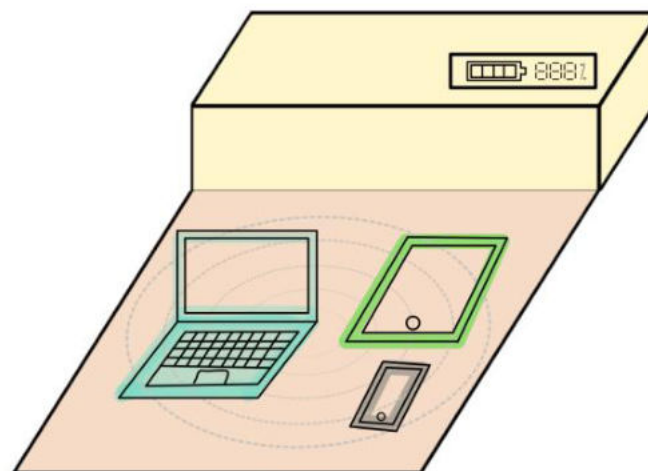


Figure 1: Innovation prototype

CONCLUSION

In conclusion, we believe that our product serves it 3 main objectives, which is i) Charge up multiple appliances without messy wires ii) Allow portable charging iii) Self-sterilise the mat with UV rays to curb the spreading of Covid-19. This product will be the future of the electronic appliances industry and we will do our best to improve our current industry. Due to the global pandemic, me and my friends are not able to get together and make an actual prototype, but with strong researches and calculations we strongly believe that we can make it happen in the future. We will also continue to improvise this idea to make it smaller in scale or add in even more functions such as music playing, speaker reminding the user or even stronger and faster charging. We will continue to do our best in this innovation and we hope that this innovation can be acknowledged and recommended by the panels and judges.

ACKNOWLEDGEMENT

We have taken a lot of effort into this project. However, completing this project would not have been possible without the support and guidance of a lot of individuals. We would like to extend our sincere thanks to all of them. We are highly indebted to Madam Norkamaisah for her guidance and supervision. We would like to thank her for providing the necessary information and resources for this project. We would like to express our gratitude towards our parents & our friends for their kind co-operation and encouragement which help us a lot in completing this project. Our thanks and appreciations also go to our teammates in developing the project. Thank you to all the people who have willingly helped us out with their abilities.

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PLASCANEMAS BOARD: AN ORGANIC BOARD THAT SAVES ENVIRONMENT

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ABSTRACT

PLASCANEMAS BOARD is an innovation of new product from the wastes such as bagasse (from sugar cane), discarded plastic bottles and used face mask. The inventors notice that we can overcome and adapt to the problems caused by the accumulation of these products by turning them into a new useful resource. The flow of idea to produce Plascanemas Board come from the problem of excess bagasse produced by street drink stall. Even though bagasse is biodegradable substances but excessive bagasse still needs a long period of time to make sure that it is completely decomposed. Most seller take easy way to dispose the bagasse by burning it. This leads to air pollution and global warming. Without proper management, the accumulation of bagasse may cause uneasy smell and encourage the growth of bacteria.

Besides, most people directly throw the plastic bottles after use as they think that it is just a small matter regarding their action. Some people throw the plastic bottles everywhere and it's become spot for mosquitoes to breed as water stagnant in it. This usually leads to the spread of dengue fever in a neighbourhood. Us inventors also want to remind the public that plastic bottles are threatening the marine life. Face mask has been a part of our daily needs throughout pandemic Covid-19. Disposal face mask is non-biodegradable and it produces harmful methane gas when burnt. Nowadays, used face mask is found almost everywhere in our country as it is very light and easily blown away by the wind to other places.

Thus, it is clear that Plascanemas Board is an environmentally friendly product which should be explored and worth to be studied.

OBJECTIVES:

- i. To reduce the effect of accumulation bagasse, discarded plastic bottles and used face mask.
- ii. To manage the bagasse, discarded plastic bottles and used face mask without effecting the environment.
- iii. To produce new product using bagasse, discarded plastic bottles and used face mask through the alternatives of production the Plascanemas Board.
- iv. To reduce the logging activities that can lead to ecosystem imbalance as the woods board can be replaced by the production of Plascanemas Board.

- v. To reduce the cost of the process making the board as all the substances used are wasted products
- vi. To practice critical thinking in solving environmental problems with science.

NOVELTY

Plascanemas Board is a 100% original idea from the inventors as there is no any copyright from another people. The name of the product is the combination of the materials' name that are used to produce the board. The word "PLAS" are from the discarded plastic bottle, "CANE" are from the bagasse (wasted sugarcane) and lastly "MAS" from the used face mask. There is no any cheating from the others idea or from the internet. This idea comes from the inventors' current situation at their current place as there are so many bagasse, discarded plastic bottles and used face mask which are not managed well by the people around them. By using the way, we can reduce the accumulation of the bagasse, plastic bottles and used face mask at the same time gain benefits from the waste.

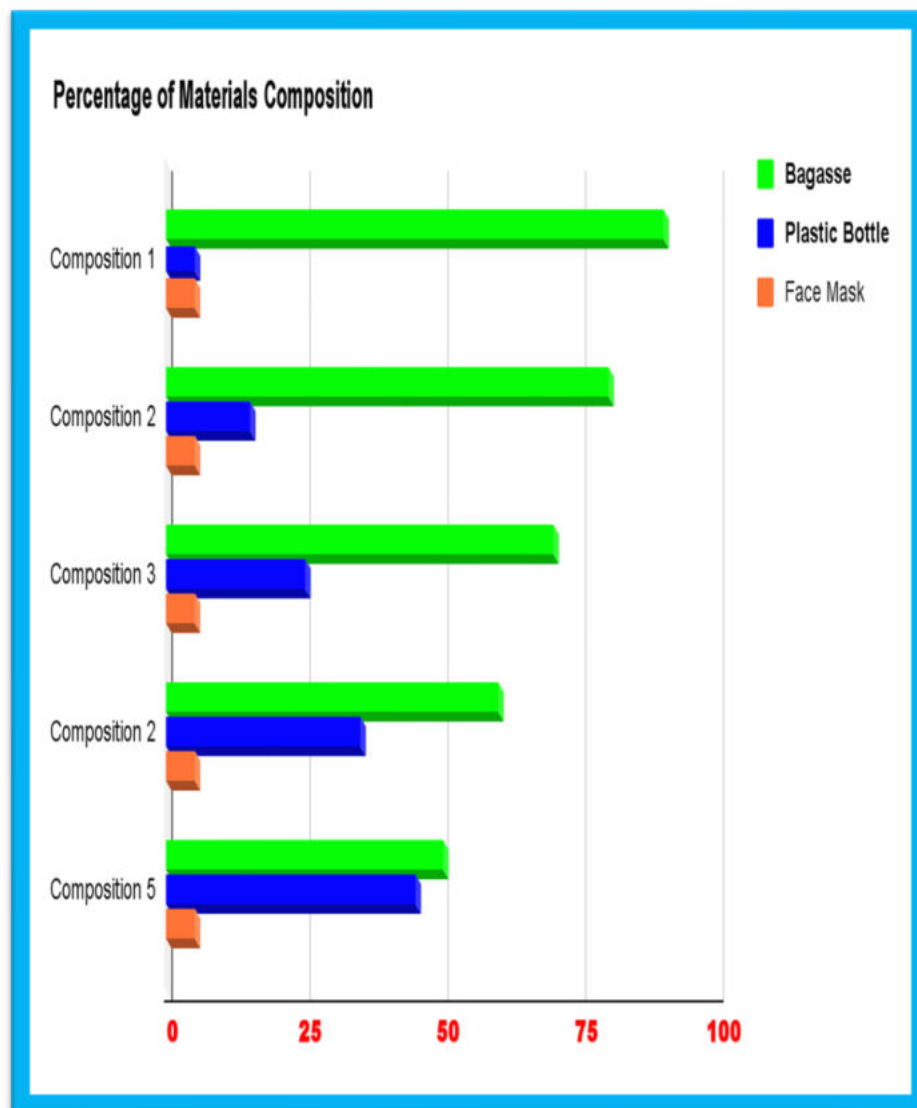


Figure 1

ADDED VALUE

The added value that we can include in this innovation is about the concern towards the nature. By using this method, we can open the young people mind on how to manage the waste without effecting the nature and appreciate our nature as nature is one of the treasure that we should take care of.

Next, it also can help to develop creative and innovative thinking to the people on how to manage the waste without doing the pollution to the nature. For example, if before this, people only know to burn the waste to eliminate it, but now people will start to think on what the new product that they can produce by using the waste substances. By using this alternative more people can be more creative on how to manage the waste to avoid the greenhouse effect.

Lastly, by doing this innovation, we also can save the money. It is because we do not need to use the money for do the logging to produce the board anymore. The money can be used to another important things as for our economic field. In the nutshell, there are various values that we can get by the innovation of the Plascanemas Board.

USEFULNESS

- i. To replace the used of the old board that are made of woods by this Plascanemas Board
- ii. The board is environmentally friendly as it was made by the wasted substance
- iii. The Plascanemas Board is stronger than the old board as the combination of the 3 substances such as bagasse, plastic bottle and face mask.

COMMERCIALISATION POTENTIAL

We believe Plascanemas Board could be a new resource that could replace timber in a long run. If it is considered rationally, Plascanemas Board is cheaper than wood as it is made of waste products. It gives interesting pattern comparable to wood. It can be used to make furniture such as chairs, tables, cupboards and even resistance to termite due to the presence of polyethylene mixed with bagasse. This eco-friendly product will surely gain interest among the society and successfully commercialized one day. The factory production side will see Plascanemas Board as an opportunity to gain profit and next compete to produce this product. In a long run, this product will help saving our environment by reducing the logging activities, reducing the number of waste and reducing global warming effect.

PRODUCT PHOTO

Result from numerous tests on Plascanemas Board quality: Composition 3 is the strongest and hardest.

Dunlop glue is used to stick the blended particle together.

This product undergoes processes of cleaning, drying, grinding, mixing and compressing



Figure 2: Front View



Figure 3: Side view

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PROJECT T: INNOVATION IN TRAFFIC SAFETY PROTECTION PLAN

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ABSTRACT

The number of traffic accidents recorded in Malaysia has gradually increased in recent years. In order to address this, we have developed an innovation known as Traffic Safety Protection Plan, Project-T which could manage traffic safety without supervision. This project comes with a road block barrier made up of polycarbonate and tungsten which is the strongest metal on Earth. It can help to protect pedestrians from being attacked when cars accidentally bump into barrier. This innovation uses the concept of electromagnetic waves which have a certain frequency. Based on how much the frequency changes, a speed sensor detector can calculate how quickly a car is moving toward the barrier. If the speed of the car is over a certain threshold, several speed bumps will raise up to slow down the car. Since this project could greatly reduce the maintenance cost, we could predict that this project will receive a high globalization demand. Project-T is worth the investment because of its humanized and advanced technology in the context of traffic protection.

Keywords: Road block barrier; speed sensor detector; humanized; advanced technology

INTRODUCTION

The Project-T, Innovation in Traffic Safety Protection Plan aims to draw a humanized and advanced traffic protection net for the public. A road block barrier with a height of 1.5m will be raised automatically at the junction when the red traffic light is on, and several speed bumps will be raised to slow down the high-speeded vehicle when detected with speed detectors. When traffic light turned green, the barrier will descent and a gate will be closed for the pedestrian. This innovation serves to overcome those drivers who are unaware of the traffic signals, and further, to manage traffic order more efficiently.

INNOVATION DEVELOPMENT

The main idea of Project-T is the 1.5m height road block barrier with speed detector and speed bumps. A 1.5m road block barrier with speed detector will be raised automatically at the junction when the red traffic light is on. The road block barrier is made up of polycarbonate and tungsten, the strongest metal on Earth. Of all the metals, tungsten reigns supreme in terms of tensile strength while polycarbonate is the strongest plastic which is 200 times stronger than glass and is warranted against breakage or cracks. It can help to protect pedestrians from being attacked when cars accidentally bump into barrier. Barrier installed with transparent stripe. It lets others see through the situation behind the barrier. Moreover, lights are installed on the barrier to catch drivers' attention especially at night. The main function of the barrier is to protect pedestrians from being bumped by vehicles.

While the speed detector will calculate how quickly a car is moving toward the barrier based on the frequency changes. If the speed of the car is over a certain threshold, several speed bumps will be bumped out immediately to slow down the car.

When traffic lights turn green, the barrier will descend. At the same time, a gate for pedestrians will be raised to warn pedestrians from crossing the road.

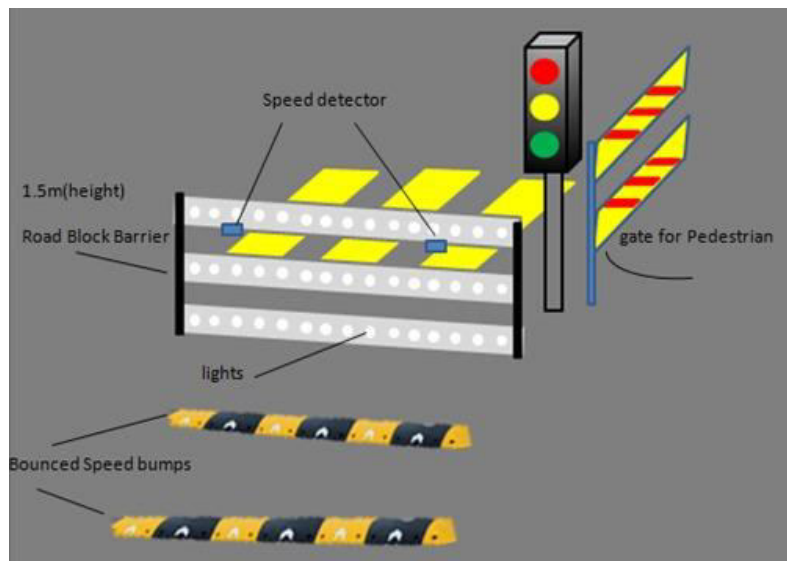


Figure 1

COMMERCIAL POTENTIAL

In modern times, there has been no way to improve the risk of pedestrians crossing the road. This is because the surge in the number of vehicles in our country has led to a dramatic increase in the risks people take when crossing the road. This is also a problem that our country is trying to solve. However, due to technical and cost budget issues and other more important things to be dealt with, there are still many tragedies caused by pedestrians crossing the road in our country.

So in order to get the best of both worlds, my team and I finally came up with the initial solution after countless discussions and planning, which is to set up a fully automatic barrier to ensure that pedestrians and passing vehicles can avoid car accidents.

There are several reasons why this plan will be accepted by the government

First, our fully automatic barrier uses the world's most advanced technology to ensure that the barrier operates for at least ten years.

Second, the maintenance cost of this automatic barrier is very low, because although it is high-tech, the entire production process and parts are very simple, so it is enough to ensure that there are regular inspections and maintenance every year.

Third, the production cost of this automatic barrier is very low, as the materials required for production are readily available

Fourth, the maintenance of this device only needs to have undergraduate mechanical graduates to be able to operate and maintain

Fifth, the purpose of our sales is to benefit the society, therefore, the state will give great help and support.

Our commercialization potential is huge because our sales target is the whole country. Other than that, the price we set is cost only so it shows that we are able to clear out all the competitors. Our goal is to nationalize our products. Our products can be seen wherever pedestrians cross the road. This is undoubtedly a vast process. Therefore, as long as our products can solve the national technical and financial problems, we can occupy the entire national market.

Later, when we have become an inseparable partner with the country, the country will be our media person to enter the overseas market. As long as we can constantly improve our products, then we can sell our products to other countries and our country will become our most solid backing to help us resist the pressure of foreign leading forces.

CONCLUSION

In conclusion, our project has 3 main objectives, which are i) Manage traffic safety without supervision, ii) Mitigation of traffic congestion and iii) Prevent innocent pedestrians from suffering traffic accidents. This project will be well used in traffic management and we will do our best to keep improving our current technology. Due to the need of extreme procedure to construct it, our team is unable to make an actual prototype of it, but with strong research and experiment we strongly believe that this project will be realistic in the future. We will keep improving this idea to make it more reliable and functional such as converting the road block in order to let the vehicles and pedestrians to cross to the road at the same time. We will continue to do our best in this innovation and we hope that this project can obtain a high recommendation from the panels and judges.

ACKNOWLEDGEMENT

First and foremost, we would like to thank our mentor, Madam Norkamaisah who guided us in doing this project. She had provided us with invaluable advice and helped us in difficult periods. She motivates and helps in contribute tremendously to the successful completion of the project.

Besides, we would like to thank our family and friends for their support. Without that support we couldn't have succeeded in completing this project. Also, we would like to thank everyone who helped and motivated us to work on this project.

Last but not least, we would like to express our gratitude towards organizer which provided such well platform for us to develop and perform our creativeness.

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Song & Lyrics: A Stress Reliever Music-Theme Website for Students

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ABSTRACT

Pandemic of Covid -19 has undeniably affected students' mental health. Based on research, the level of stress, anxiety, and depressive thoughts were significantly increased due to the pandemic Covid-19. With the objective to address this mental health issue, the Song & Lyrics Club members decided to create a website as a platform to unite everyone through singing, lyrics, and music. In research conducted in 2018, it is found that the participants reported improvements in their mental health, mood, sense of well-being, and feeling of belonging as a result of singing. The website would be a perfect positive coping mechanism for the students to cope with stress and anxiety. This idea is because, on the website, students are able to share their talent in singing by posting videos of themselves singing. They can also express themselves by posting meaningful lyrics. With this posting, the students can share their personal thought and how they view life from their perspective. This feature adds value to the website because it shows the versatility of the website, not only for those who are good at singing but also for everyone who loves music. The unique feature of this website would be the forum page where everyone could take part in the discussion to discuss any topics related to music. The website is one of the small efforts of the club members to provide a one-stop centre on music as a stress-reliever for students all over the world.

Keywords: Mental health; stress reliever website; singing; lyrics

INTRODUCTION

Sudden and radical lifestyle changes due to the Covid-19 pandemic have affected students' mental health in many ways.[1] Elevated levels of anxiety and depressive symptoms among students were reported during the pandemic.[2] Students also experiencing depressive thoughts and suicidal thoughts mostly due to fear from insecurity and uncertainty caused by the pandemic Covid-19.

According to research conducted in 2020, college students reportedly seek support mainly by using various self-management methods to cope with stress and anxiety caused by the pandemic. One of the methods is by listening to music. [3] With music, students can vent their emotions in a proper atmosphere and maintain their stable emotions.[4] Music provides an effective self-healing platform and at the same time helps students maintain a good psychological state.[5]

Based on these findings, the Song & Lyrics club members of Centre of Foundation Studies take initiative to create a website entitled Song&Lyrics: A Stress Reliever Music-theme Website to provide a perfect platform for students to find comfort in through music.

INNOVATION DEVELOPMENT

Prior to the creation of the website, the club members have established an official Instagram account as part of club's activities to showcase club members singing talent and any other skills. The idea to create the website came from the suggestion by one of the club members; which is to expand the function so that more people would be benefited, not only club members.

Creating a website has made it a lot easier to handle, as it is able to provide multiple ways for submissions to be accepted, alongside giving more options of activity and accessibility for the visitors. Having a lot of pages and a lot more reading materials as the users can watch the interesting and various colours of music and covers upon discovering this very website. Vary for people, providing a forum page and adding on many more for them to speak on their own view.

Among the objectives of the website are:

- i. To create a website as a platform to unite everyone through singing, lyrics, and music
- ii. To share their talent in singing by posting videos of themselves singing
- iii. To provide a platform that the students can relieve their stress
- iv. To offer a perfect positive coping mechanism for the students to cope with stress and anxiety

Organising club activities can be challenging during the pandemic because students are having open distance learning at their respective homes. Making it compulsory for all club members to contribute either song covers, meaningful lyrics or fun facts encourages their involvement in club activities. These contributions were compiled and shared on the website for not only the club members but for everyone who has access to the internet to enjoy and benefited together. The website is one of the small efforts of the club members to provide a one-stop centre on music as a stress-reliever for students all over the world.

The website is accessible for everyone who has access to the internet. It is the perfect go-to website for students because it provides entertainment, a platform for the students to express themselves in singing and writing and serves as an alternative to other social media besides Instagram, YouTube, TikTok; to name a few. The website can be accessed at <https://songnlyricsclub.wixsite.com/songco>.

It is interesting to note that all contents in this website were all contributed by club members as part of the club's activities. The contents are sorted and categorised into several pages.

Home Page

The home page contains the latest news, announcement, information, and an overview of the website. The visitor must subscribe to the website by signing up via e-mail and upon subscription, they will receive notifications on any updates made on the website. This subscription option is provided on the 'stay in the know' page.

‘Song Cover’ Page

The page ‘song cover’ would be the page where people can showcase their singing talent by submitting a pre-recorded singing video. The song is either self-written or covers a famous singer’ song. Currently, all the song covers were contributed by our own club members and Alumni of UiTM Dengkil.

‘Meaningful Lyrics’ Page

The website provides a platform for people to share their thoughts and personal views on lyrics that are meaningful to them. Everyone has their own stories and thus this page is perfect for those who seek inspiration or motivation to keep them going.

‘Fun Facts’ Page

Some people prefer to read something fascinating as a form of entertainment. On this page, fun facts or trivia about music are provided. They are designed in appealing and colourful posters to attract the visitor to scroll over the page.

‘Contact Us’ Page

On this page, visitors can reach the administrator of the website for any inquiries, recommendations, and most importantly for contributing content to the website.

‘Forum’ Page

It is a page where visitors can hold discussions and exchange information on any music-related topic among the website members. Another advantage of signing up with this website is that the visitor can participate in the existing discussion or initiate any preferred topic. This feature adds value to the website because it offers an interactive platform for visitors to exchange music-related ideas or opinions with other people from around the world.

COMMERCIAL POTENTIAL

This multipurpose website is one of its kind because, on the website, the visitor can:

- i. enjoy listening to song covers
- ii. showcase singing talent
- iii. read inspiring lyrics quote
- iv. self-interpretation through writing meaningful lyrics
- v. discuss anything related to song n lyrics with other visitors
- vi. acquire new knowledge on music via fun facts
- vii. obtain any news, information, and updates on the club’s activities

These functions make the website a one-stop centre and a perfect platform for visitors especially students to enjoy music and benefited from mental health. Being free to sign up and hear the covers, it is one of its kind.

In addition, the club members are currently working on producing merchandise for example bookmarks and notebook specially customized with music theme containing meaningful lyrics quotes to be sold online on the website to help to produce additional fund for the betterment of the club.

Donations is another of the ways aimed to gain fund. Due to this, the visitors would be able to donate minimum 1 cent to help the website to grow bigger. Moreover, sponsorship being in option for gaining more support. As in advertising their brand on the website would resulting in getting money from them. In addition, offering consulting services to the students who need it would also aid in collecting financially. This is because the website offers a place for people to release their stress. Therefore, opening a place for people to contact the administrator about anything; mostly focused on getting advices or a secondary opinion on problems, or simply having a place to rant.

On the sidenote, the website has recently gained the Gold Medal for this very innovation in Pre-University Matriculation Innovation Competition 2022.

CONCLUSION

With that, the target of being able to help many students to unite through singing, lyrics, and music, sharing their capability in singing via submitting video, becoming a platform for destressing and lastly transform into a coping mechanism for the students to be free from stress and anxiety are now able to achieve successfully.

The website is currently still waiting for many more recommendations and many improvements are in the plan, however, it is now published and quite known in the Centre of Foundation of UiTM. Expected to go premium site, to offer more choices and more activities for visitors to join in, as in plan if our plan to collect fund go as smooth as expected. The next objective is to hope to go bigger in form to help more students in demise of stressful days.

ACKNOWLEDGEMENT

The authors would like to thank the Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor Kampus Dengkil for the financial support given for this research paper.

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Survival Light

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ABSTRACT

Survival Light is one of the products that allows its user to use it without any help of electric current. It is well known by the whole world that some countries are actually struggling with electricity while some of us enjoy being in light and airconds. Some wouldn't even have light to accompany them during the night. Top three countries that are struggling with electricity are South Sudan, Chad, and Burundi- with only 5.1%, 6.4% and 6.5% of its population having access to electricity respectively. With these countries along with some other relevant countries on mind, we had come out with a creation in order to give them the source of light they needed during the night while also cooperating scientific values in it – in which we chose chemistry. We will be applying the concept of electrolysis in making this work. The salt water that we will use to sink the bulb will act as an electrolyte in which would connect the two electrodes and will end up making the bulb light up. Our main target is people who want to go green and also those who were impacted. Hopefully, with this creation, it will somehow help those who are in need of it.

Keywords: Electricity; electrolysis; impacted

INTRODUCTION

It is not a foreign knowledge anymore that electric is one of the non-renewable sources of energy along with other sources such as oil, gases, and petroleum. Electricity has existed since decades ago, although it was even more appreciated in the past as it is harder to obtain the energy. Not to mention the high price of it. In the 1800's, other natural sources such as wind and water were used to cut costs for electricity. They were so genius at that time that they managed to create windmills. The energy from the windmills is used to pump water and grind grain at that time. [2]

This action contrasts to our recent life though. As the electricity bill is not as high as the former bill was in the 19th century, people tend to take it for granted and spend million watts of it annually. In 2019, up to 23845 terawatt-hours of energy is used worldwide – 325.60% higher than what was used in the 1980's. It is fascinating how the usage of energy rose up to triple of the energy used in 1980 while the population only has increased by 75%. [3]. According to research, electricity is highly consumed to light up buildings, in industrial process for producing goods, and in transportation for powering rails and heavy-duty vehicles [4]. If we think of it rationally as well, we are practically surrounded by electrical goods. The traffic lights, side lamps, security cameras, speed cameras, and there will be too much from where it comes from.

Although, despite all the spoilt humans who have unlimited sources of electric energy, especially those who are wealthy enough to afford tons of them to use in the house, there are also some who their ultimate dream is to be able to light up the darkness at night using a bulb. In South Sudan, up to 10.62 million citizens are not funded with electric, which has increased from 10.29 million in 2019. They only use a number of 53.1 kilowattHour annually, which is only 2.15x-10 percent of worldwide power usage. [7][6] Lucky for them, there are still kind-hearted human out there who sponsored some solar panels for them [5].

Though it seems as if it is fixing the problem – which indeed it did but halfway. What would happen when it's not as sunny and they would eventually lose the power. For sure they need some innovation which could help them fixing the said problem. This could also be a help for those who are struggling locally, such as those in outskirts of Sabah, Malaysia.

INNOVATION DEVELOPMENT

With the same people in mind, we had come up with the idea of trying to light up a light bulb using nothing but science. We got the original idea from a YouTube video, but it turns out they were using rechargeable bulb. From there we got the idea to fix the lie that was told. Using the regular light bulb, we will stick two electrodes on the base of the bulb. Our initial plan was to use graphite, which also the mechanical pencil lead but we found the lead too fragile, so we are still making some research on what to substitute it with. It sounds like a complicated procedure, but it could be done in only split seconds. First thing first, the materials that will be needed are plastic glasses, glass or plastic bulb, electrodes – you can experiment with this, in our case we are using graphite, and not to forget our main ingredient, salt water. The salt water will act as a medium for the ions to freely move in the water, and eventually connect both electrodes together. You will have to cut the bottom one glass so that only the base of the bulb will hang out of the glass, we only want to submerge a part of the bulb into the salt water and not the whole thing. Next, what you would do is to stick on the electrodes. It could be in any way as long as there's contact between the electrode and the base.

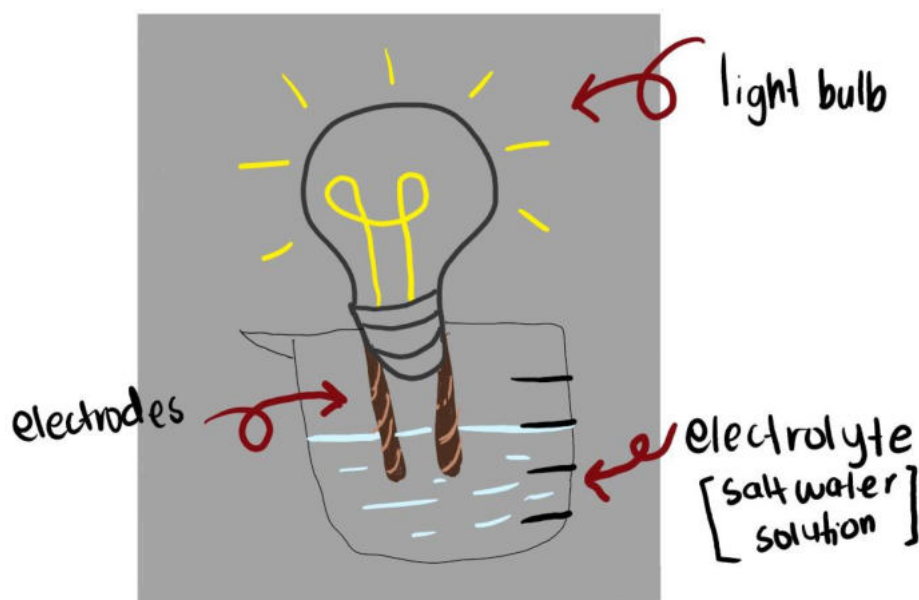


Figure 1

This is the rough sketch on our product, the electrodes will end up sending ions to each other and in the end the bulb would light up without having any help from others.

COMMERCIAL POTENTIAL

With the current innovation, it is safe to say that it could possibly bring the world to a better place. The kids in the affected countries would be thrilled to try this out as it also will manage to give knowledges to the kids. While they are doing so, the one teaching them could give a simple briefing on how the project works. It doesn't only will solve the problem faced by the affected individuals. Now the kids could learn at night with their lights on. They could also focus more with the light compare to having no light at all. Although, this will not go well commercially. But then again, our aim is not to commercialize the product but to create an innovation that would help those in needs even for the slightest bit.



Figure 2: Innovation prototype

CONCLUSION

Although we already came up with a design, we are sure there will be some flaws here and there that is yet to be done by us. In the future, it would be highly honoured if we could come up with design that would attract even more customer or students to try out this simple method. Firstly, it is concerning how we are using salt water as it is easy to be bumped and spilled around kids, so we will come up with a stable glass to hold the bulb so that the salt water would not spill. Besides from that, maybe we will come up with some more advanced bulb, such as controllable bulb. The user could adjust the light to their liking, bright, low, you name it we have it. Lastly, we think it would be better to have a better design on the project so it would attract more attention from the user and also the kids who are going to use it. They would lose interest quick with the current shape and design so we had decided we would brainstorm for a better-looking design.

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Multipurpose Swipe Glove Set

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ABSTRACT

Multipurpose Swipe Glove Set is being formed to fulfil several purposes. The first one is to facilitate and help the task of washing to be more efficient. Secondly, it helps to protect the skin from scratches and cuts. Thirdly, it also to help protects sensitive skin and allergies to detergents. The last one is to make people who use this kit apply less energy and time to wash difficult part. First main set is swipe glove made by rubber, attached with Velcro tape for a stronger grip while in action. The glove is thicker enough to protect hands away from sensitive skin, avoid wet hands, sharp objects and prevent injuries while working with house chores. In addition, second main set is available with various type of sponge and brush that also attached with Velcro tape. Effective cleaning process is a matter of daily duty so that people can choose any suitable sponge or brush in this set to do certain task such as washing dishes, washing cars and cleaning dirt which is required less energy for washing process using hands. This set has the potential to be commercialized specifically to housewife, people with sensitive skin, car washer, cleaning worker and dishwasher. Therefore, this 'Multipurpose Swipe Glove Set' is very appropriate to everyone in any residence.

Keywords: Multipurpose swipe glove set; cleaning activities; house chore; velcro tape; sponge; brush

INTRODUCTION

Cleaning is a core part of daily life. Whether you're cleaning your hands, a kitchen countertop at home, or high-touch surfaces in a workplace, everyone carries out cleaning at some point during their day [1]. This innovation is focus on cleaning using own hands and it is not much a problem unless people need to protect their hands from direct connections from any liquids or chemical. Indeed, wearing gloves keeps you protected from things you may come into contact with [2]. The innovation idea of cleaning tools set named as Multipurpose Swipe Glove Set is the best choice to fulfil problem statement. Rubber gloves can be worn during dishwashing to protect the hands from detergent and allow the use of hotter water [3]. In addition, this glove is thicker enough to protects hands away from sensitive skin, avoid wet hands, sharp objects and prevent injuries while working with house chores.

This innovation product aimed is to facilitate and help the task of washing to be more efficient. With Velcro tape attached to both gloves and cleaning tools, it will make cleaning process efficiently and stronger grip while cleaning in action [13]. A versatile fastener, Velcro is used whenever someone needs to secure two items or sides together. Easy to apply, easy to connect and open, using Velcro is a DIY and craft go-to once you know how to properly apply it to stick to a wall, fabric or other surface [4]. Secondly, it helps to protect the skin from scratches and cuts. Cuts and scratches can happen to anyone. People are more likely to get cuts

if they are in a combative situation or if they handle sharp objects [5]. Thirdly, it also to help protects sensitive skin and allergies to detergents. Kitchen dishwashing gloves are an essential part of your cleaning collection – no, doing dishes is not for the faint-hearted. It requires continuous contact with soap and water. This may lead to dry skin, burning sensations or allergic reactions [6]. Fourthly, less energy applied so that less time spend to wash difficult part. When it comes to essential cleaning tools, there’s no need to spend a lot of money [7].

INNOVATION DEVELOPMENT

Whole product is a set of cleaning tools. It has two main parts which are gloves and variety of sponge and brush. Moreover, each part attached with Velcro tape. Comfortable while doing cleaning work is very important so that old cloth patched inside the glove at palm part. Meanwhile, this set also has complete cleaning equipment in a single package so that save time purchase. It is not necessary to waste time looking for separate cleaning tools. In addition, it is self – packing set and suitable for use in the workplace. Figure below shows items in Multipurpose Swipe Glove Set.



Figure 1 Glove attached with kitchen sponge



Figure 2 Glove attached with car sponge

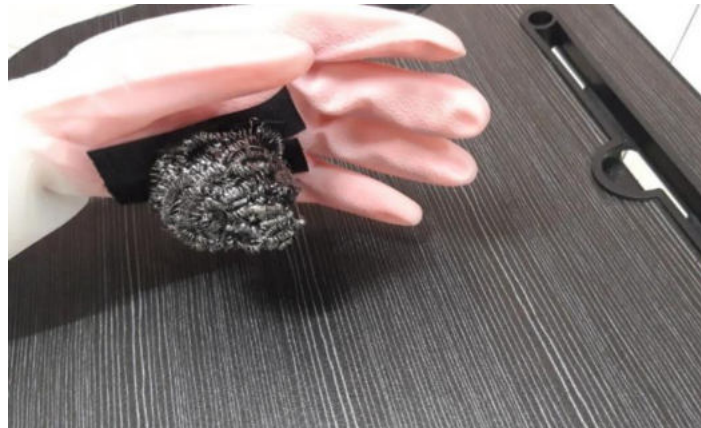


Figure 3 Glove attached with stainless steel scour pad



Figure 4 Glove attached with handy brush



Figure 5 A set of cleaning tools in Multipurpose Swipe Glove Set

COMMERCIAL POTENTIAL

Correlation between invention and innovation while doing this project is very close to necessity of society. It has the potential to be commercialized specifically to housewife, people with sensitive skin, car washer, cleaning worker and dishwasher.

Housewife

Housewife plays an important role to make sure the house is cleaned and organized [9]. This requires a lot of cleaning process such as mopping the floor, washing dishes and cleaning the pantry. It is possible for them to encounter accident such as contacting broken glass and chemical detergent. Also, the Multipurpose Swipe Glove Set consists of many types of sponges and brushes which can assist the cleaning process for different types of surfaces.

People With Sensitive Skin

People with sensitive skin are allergic to water, chemical detergent or even bacteria from dirty surfaces [10]. It is common for them to have skin rash, bacterial infection and wounds especially when they use their bare hands to clean something. Hence, this glove can protect them from direct contact with these harmful substances.

Car Washer

Washing cars requires long period of time, gallons of water and the use of highly alkali detergent. This can damage the hands of car washer specifically for the car wash shop worker [11]. Additionally, sponge for car is typically big and difficult to be handled. With the help of Velcro tape, holding this big sized sponge is no longer an issue. The washing process will be easier and much comfortable.







Cleaning Worker

Cleaning workers are the people who highly exposed to bacteria, fungi and viruses including COVID-19. Wiping tables, cleaning toilets, mopping and sanitizing are their common duties [12]. If they have wound, these pathogens can enter their body and make them feel unwell. In this era of pandemic, they are also not excluded from getting corona virus. While wearing Multipurpose Swipe Glove, we can reduce the frequency of the users to touch their eyes, noses and faces, which can reduce the risk of getting infected. After done their duties, the gloves are taken off and their bare hands are less possibly to contain and spread pathogens.

Dish Washer

There aren't many of us that enjoy washing dirty dishes by hands.[8]. In restaurant, dish washer works for at least 2 hours straight. Using bare hands to wash all the dishes is terrible for their hands. Plus, holding sponges and brushes for hours may cause muscle exhaustion and can turn off their mood. Therefore, Multipurpose Swipe Glove can cope with these problems because velcro tape that we apply on the gloves and sponges can reduce the use of muscle energy. This can prevent the hands from getting tired and eroded by the dish soap.

Table 1 Total Cost for Multipurpose Swipe Glove Set

No.	Item	Item's Picture	Quantity	Cost Per Item
1	Gloves (Pvc)		X1	RM 2.20
2	Velcro Tape		X3	RM 2.20
3	Stainless Steel Scour Pad		X1	RM 2.20
4	Car Sponge		X1	RM 2.20
5	Kitchen Sponge		X1	RM 2.20
6	Handy Brush		X1	RM 2.20

Total Cost = RM 17.60

Table 1 above is total cost for overall in Multipurpose Swipe Glove Set. Suggested selling price per set is RM25 which is 40% profit from the cost margin.

CONCLUSION

The Multipurpose Swipe Glove Set is very useful for housewife, people with sensitive skin, car washer, cleaning worker and dish washer. While cleaning in progress, people that have this set required less energy and stronger grip while doing cleaning activities and people can choose different brush and span during cleaning process.

ACKNOWLEDGEMENT

In order to complete this project, many parties were involved and we were deeply indebted by that. Firstly, we are very thankful to UiTM for holding Creations de UiTM 2022 that we can join and gain new experiences. We would like to express our gratitude and thankfulness to our lecturer, Madam A'bir Wardati Abd.Latif as an advisor who helped us throughout the process of making this project. We are thankful for her help along the time allocated in completing the project. The project cannot be completed without the effort and cooperation from our group members, Nur Mirza Nafeesa, Nur Lailatul Jannah, Nur Amni and Muhammad Khabir. Lastly, thank you to our group members who never give up in order to complete this project. Again, sincerely thank you to everyone who was involved throughout the process in bringing this the end.

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Legasi - A Gamification of Malay-cultured Pencak Silat and Empu's Blacksmithing

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ABSTRACT

Gamification has become an effective way to promote interactive learning by playing video games in the era of globalization. However, this method can be utilized in reintroducing Malay culture that is overwhelmed by the modern era. Introducing Legasi, a third-person action video game with the theme of Malay cultured martial art, Pencak Silat as the base game design. Exploring the culture of the Malay martial art along with the art of blacksmithing of Empu. The objectives of the innovation are to introduce and promote the culture of Southeast Asian especially Pencak Silat and Empu's Blacksmithing on par with current technological developments as well as fostering the spirit of love for culture among young people. By using Unity 3D as a game engine, the prototype was developed with 6 Pencak Silat movements. The commercial potential is enormous as the global gaming market is expected to generate billions of incomes yearly; examples of well-known platforms such as Steam and Epic Games. In conclusion, the implementation of gamification in introducing culture is desirable in line with technological advances.

Keywords: Gamification; video game; culture; pencak silat; empu

INTRODUCTION

Pencak Silat, a martial art that originated from Indonesia, is also known in the historical culture of Java. Nowadays, it is a professional competitive sport that was recognized by the Southeast Asian Games and Asian Games. Pencak Silat has grown rapidly throughout the globe and is governed by The International Pencak Silat Federation (IPSF), the national organization in Malaysia called Persekutuan Silat Kebangsaan (PESAKA) [1].

Empu, on the other hand, is the title of craftsman or ironsmith (also called blacksmith) who possesses the special talent of forming the kris. The process of forging kris by the empu is believed to consist of high philosophies and is considered a special and dignified artifact in dimensions of the life of the Malay race. The raw ingredients or kris-making materials such as iron, fertilizer, and nickel are extracted from the earth and combined with fire and water during the making process. The stone meteors are then mixed in the production of daggers to cut magnificent prestigious shapes and patterns [2].

The tradition and culture of Pencak Silat and Kris are almost forgotten by the new generation due to the process of modernization of Malay society. Various Javanese arts, such as kuda kepong, wayang kulit, ketoprak, barongan, and Pencak silat, have been introduced, but virtually all this art is being forgotten by new generations due to a lack of initiative and effort to raise and sustain it [3]. Nonetheless, some art is still alive in some places, particularly among the residents who dwell among the older generation of Javanese people [4]. This may be due to

fewer practitioners in the younger generation. The kris which has been the Malay community's pride icon since the ninth century has been forgotten to the point where today's youth are unaware of the historical legacy [5].

With the advancement of information and communication technology; the objective of this innovation is to introduce and promote the culture of Southeast Asian such as Pencak Silat and Empu's Blacksmithing as well as fostering the spirit of love for culture among youngsters. A video game called Legasi was proposed by implementing a method called gamification which could increase the engagement of users by designing game-based elements into non-game contexts [6]. Based on the previous research, any application that includes gamification features could raise user engagement and motivation [7][8]. However, it was noted that the design itself is the main factor as it needs to be interactive or intrusive to the user [6].

INNOVATION DEVELOPMENT

Legasi is a 3rd person action video game with the theme of Malay cultured martial art which uses Pencak Silat as the game base design. The game is at the initial phase of developing the prototype by using Unity 3D and Blender.

2.1 Model



Figure 1: Player Model by using Blender.

The process includes rigging the skeleton and meshing the vertex on the poly-surface (model) as shown in Figure 1. The model prepared is not the official design of the Pencak Silat Uniform. The purpose of the design is to allow users to visualize formal uniforms by showing nearly identical models.

2.2 Layout

Gameplay

As shown in Figure 2, the gameplay is in the Third-Person View, the advantage of it is the player can see the movement and animation from the character clearly.



Figure 2: Gameplay Layout on Unity.

Map

As shown in Figure 3, the map or scene created is 3D. For the current development, the prototype is using 1 map that consists of 1 flat platform and mountains.

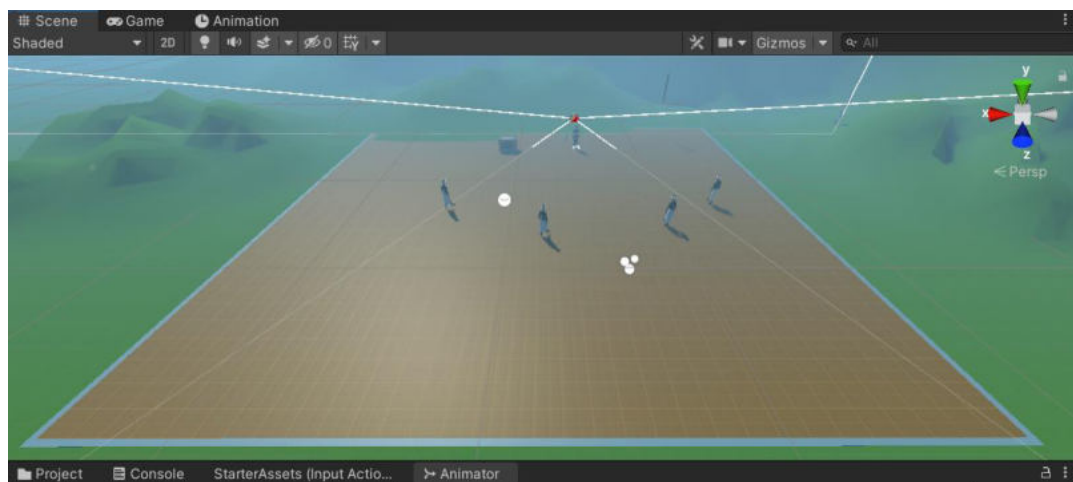


Figure 3: Map Layout on Unity.

2.3 System

Legasi consists of two modules: Silat and Empu/Kris.

2.3.1- Silat

All movements in Silat are based on Pencak Silat performed by Master Purnama Poer from Youtube Purnama Channel [9]. There are various forms and movements in Pencak Silat. For now, the prototype provides 6 basic steps (refer to Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Figure 9) arranged in a combo, sequenced at random. The purpose of the combo is to expose the user to six out of many Pencak Silat's moves. Do refer to any certified Pencak Silat instructor nearby for more info.

a. Chest Level Straight Punch



Figure 4: Chest Level Straight Punch Preview.

b. Jetblag Punch



Figure 5: Jetblag Punch Preview.

c. Upward Hand Block



Figure 6: Upward Hand Block Preview.

d. Front Kick



Figure 7: Front Kick Preview.

e. Outward Hand Block



Figure 8: Outward Hand Block Preview.

f. Upside Down Hand Block



Figure 9: Upside Down Hand Block Preview.

2.3.2 Empu/Kris

The process of making kris is based on the Portrait of a Keris Blacksmith - Baliproduct Story [10]. By using an asset called the Ultimate Crafting System by PolyPerfect [11], this allows demonstrating the process of making Kris. The asset comes with Smelter, Workshop, 3D Printer, and Chemical Lab. For Kris-crafting, the only assets needed are Smelter, Workshop, and 3D Printer.

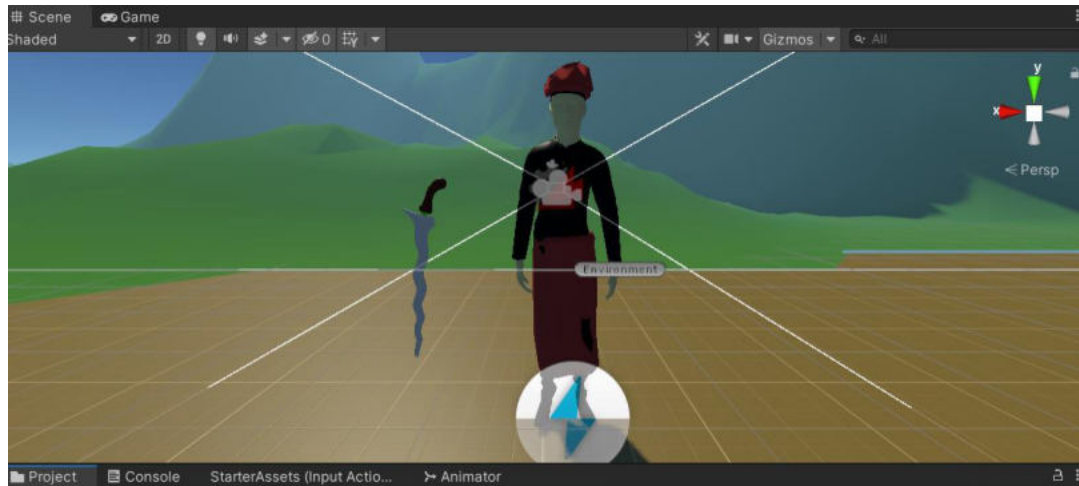


Figure 10: Kris and Player Model in Unity.

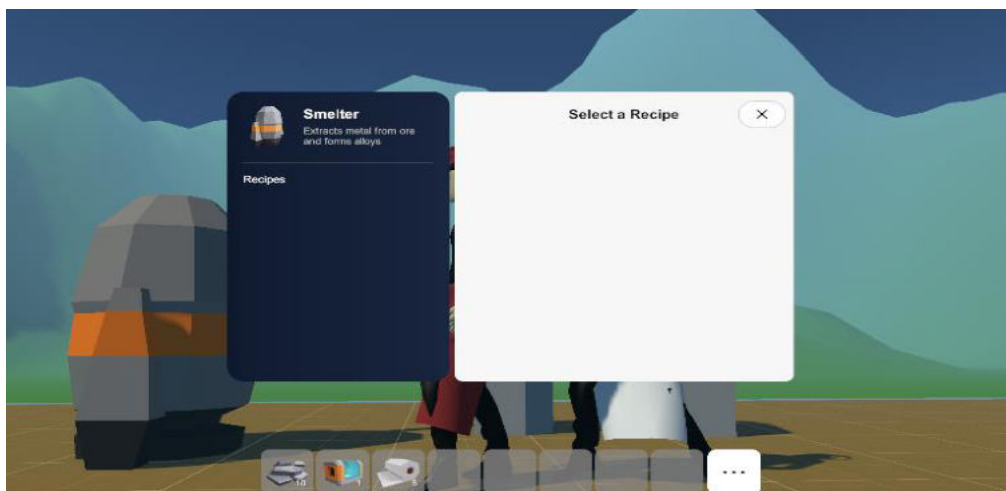


Figure 11: Smelter UI in Unity.

The smelter is used to melt nickel and iron ingot in order to make it nickel-iron material, which can be used to forge the blade of Kris, while the 3D Printer is the alternative of Wood Crafting for the handle. As per result, by using Workshop, a kris is created throughout the process.

COMMERCIAL POTENTIAL

There is a huge advancement in the gaming industry, the total number of new users has increased tremendously throughout the decade. As stated in (Clement, 2021), Asia had about 1.48 billion gamers in 2021, making it the world's largest video gaming market, with Europe in second place with 715 million gamers. A total of 3.24 billion gamers were projected to exist over the world [12]. This demonstrated that the gaming industry is a worldwide entertainment enjoyed by various users, especially youngsters.

In addition, the pandemic COVID19 has been spreading worldwide and forcing people to stay at home. This may be a golden opportunity for the product to set a milestone. Based on the statistic above, our target customers are adults, students, or youngsters who like to try something new and are possibly on lockdown right now.

CONCLUSION

According to the commercial potential, the anticipated size of participants should be enormous, as the users and demand are high, which enables them to reach out to anyone on the global market, which achieved the first objective. Other than that, the designed prototype was implemented with gamification, which could potentially increase the user engagement and pique their interest in Silat and Empu's Blacksmithing. Thus, attaining the second objective. As for the prototype, there is a lot of improvisation that needs to be executed such as the UI system, character interactions, and the Silat module that has many rooms for improvement. The representation of Pencak Silat still lacks some important mechanisms such as the grappling system as Pencak Silat is a full-body martial art that needs a full-body contact mechanism. Not to mention, fixing the bugs of the Empu/Kris module accordingly. Further research needs to be conducted on society's mindset on Southeast cultures as most of the resources are outdated.

ACKNOWLEDGEMENT

Special thanks to the esteemed supervisor - Dr. Norzilah Musa for invaluable supervision, support, convincing support that was very influential in shaping my methods of experimentation and critique of my results, and guidance during innovation development. Thanks to eelabvisual for the Sampin Pucuk Rebung Motif and TANJAK LANG models, licensed under Creative Commons Attribution [13]. Expressing gratitude to Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil for the funding opportunity to further studies under the Engineering Foundation course, MARA University of Technology.

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Kids Torquilibrium Learning Kit

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ABSTRACT

Most people didn't realise that any physics theory occurred to surroundings. Therefore, Kids Torquilibrium Learning Kit is being formed to introduce on basic physics application which is about Torque and equilibrium of a system, together with gravitational force. It is also to reduce gadget addiction among children, promote critical thinking and help in development of social skills. It is made especially for kindergarten and primary school children to learn how to balance things and play at the same time. This kit is complete with beam balance set together with moulded clay which has different kinds of animal shapes such as ladybugs, ducks, monkeys, elephants and rabbits. Each animal has a different size which causes the weight to differ in mass. A balance is built out of wood because it is durable materials. Thus, it will not break easily. Fulcrum being set as adjustable. Hence it can move along the balance either to shorten or lengthen the length between the fulcrum and the weightage. Children will be tested on how much time needed to balance both sides at different centres of mass (pivot point) using stopwatch. If balancing cannot be achieved, the result of rotation either clockwise or anticlockwise is learned. In addition, children also will learn another physics theory about gravitational force shown always toward downward direction. Likewise, manual books will be provided, equipped with multiple difficulty levels as a guide for children to try out. This set has the potential to be commercialised specifically to all teachers, students and children from kindergarten and primary schools. At the end, they will learn how to achieve stability of a system at different pivot points and about gravitational forces that always act towards downward direction.

Keywords: Kids Torquilibrium Learning Kits; beam balance; moulded clay; pivot point; gravitational force

INTRODUCTION

In this day and age, children are now easily exposed to technology at an early age. As we all know, technology can be beneficial to mankind if used wisely. However, misusing the technology for selfish desire can cause disruption to our kind by affecting our mind and behaviour. Although it is true that technology is important for children to learn in this developing era, there are too many issues that technology has caused detrimental health to children [3]. This is highly due to their addiction towards technology. This is because technology introduced the children to the world of gaming, where they can experience any type of games from virtual reality to stimulation online. Even though these games are fun to play and enjoyable for children, they are not suitable for young children to interact with. This is due to the fact that it can affect the development of the children's mind.

Online games are now well-known by children of many ages. There are many types of genres that can be played such as action, supernatural and fantasy. However, some of these games portray violent acts and gruesome scenes which cause aggressive behaviour towards children [2]. Plus, technology also promotes social isolation and antisocial behaviour. Owing to the fact that children nowadays have become addicted to technology, they are technically glued to their screens which leads to less interaction with their friends and family. Hence, they tend to be introverts when interacting and communicating with others. This act will lead to low self-esteem and depression. This is not the desirable trait that we need for our future generation to be. It is troublesome for our future if we fail to create the future generation with a bright and strong mind. This is because these children are our hopes as leaders in the near future.

Thus, the children should be exposed to more knowledge at an early age in order to develop a bright and strong mind. Therefore, our group prepared a new invention by creating a game kit for children called “Kids Torquilibrium Learning Kits”. This kit is beneficial for the children by helping the children to develop their thinking skills. At this age, early child development is important as a foundation for them to have continuous learning experiences and good behaviour [4]. This will shape the children’s brain development by improving their capacity to learn, to socialise with others and respond to challenges. This is a wonderful experience for children as it teaches the children to think and respond through their actions. With this innovation, we focus on developing the children’s mind and brain through a game that can be both entertaining and knowledgeable.

INNOVATION DEVELOPMENT

This innovation is created by the idea of a physics concept on stability and torque. Stability is defined as the ability or the strength of an object to maintain its balance while torque means a measure of the force that can cause an object to rotate about an axis [5]. The stability of an object depends on the centre of its gravity [1]. Hypothetically, the lower the centre of gravity, the greater the stability. Hence, we create this innovation to entertain and simply introduce the idea of stability and torque to children while playing a game.

Firstly, a balance is built out of plywood. It is because plywood is one of the materials that is durable. Plywood is made up of layers/piles of wood veneer bind together with resin using the cross-graining method. This alternation provides stability and strength consistently across all direction [7]. Thus, it will not break easily as children tend to be clumsy when handling any items. Plus, the size of the balance will be 28 cm in length and 16 cm in width. Therefore, it is quite big which is compatible with children as choking hazard can be avoided and they can easily bring along the kit together with anywhere they go.

We used the idea of a see-saw to act as our balance. A fulcrum, or pivot point, is the area around which a lever turns. A lever is a hard length of material or a bar used to put out force or maintain weight at one end, while pressure is exerted on its second end. In other words, when force is placed on one end of a bar or handle, which turns on the third point, or fulcrum, force or weight is managed on the second point of the lever [8]. However, unlike a see-saw which its fulcrum is static to the ground, our balance’s fulcrum is adjustable. Hence it can move along the balance either to shorten or lengthen the length between the fulcrum and the weight. Thus, it will also affect the centre of gravity (equilibrium) and torque as the distance between weight and the centre of rotation (pivot point) is differ. Hypothetically, the smaller the distance between weight and pivot point, the larger the force. Hence, to achieve equilibrium children have to put more force on the shorter side in order to achieve equilibrium. This will allow the children to

explore more on finding the centre of gravity(equilibrium) by adjusting the fulcrum in order to obtain stability.

Next, the weights that are used to balance are made of air clay. Air dry clay is a versatile product that can be used in many craft projects. Air dry clay does not need to be heated, unlike traditional clays that need to be fired in a kiln at a high temperature, or polymer clays that need to be heated in an oven to cure. This kind of clay hardens and cures at normal room temperature and once dry, it can be painted and decorated in a variety of ways [6]. Air clay is suitable as our weights as it easily moulded into any shape. Once the clay is dried, it will become hard and does not easily break. The clay is moulded into different kinds of animals such as ladybugs, ducks and rabbits. This is mainly due to the reason that children tend to be fond of cute animals. Hence moulding the shape into animal shapes will attract the children to play. Plus, each animal has a different size which causes the weight to differ in mass. Hence, it will be more fun and challenging to play with when balancing both sides of the weight.

This game requires the children to balance the weights given on both sides of the see-saw given like shown in figure 1 below. It is more fun playing with friends as by challenging them to balance the weights given. Children can also play along with friends by solving the challenges given to them in order to make the balance stable on each side. A manual book will be provided, equipped with multiple difficulty levels as a guide for children to try out, so that they can improve their thinking skills when solving the challenge.



Figure 1: The Whole Invention of Kids Torquilibrium Learning Kits

COMMERCIAL POTENTIAL

Kids' Torquilibrium Learning Kit is a game that can help youngsters develop critical thinking abilities by requiring them to think outside the box in order to balance the seesaw. Aside from that, it can help youngsters become less addicted to devices by allowing them to

play with their peers and improving their social skills. This game teaches youngsters the concepts of stability and torque at a very young age. Because of the torque principle, youngsters will figure out which direction the seesaw will turn if it is not balanced. Torque can be applied in either a clockwise or anticlockwise direction from the pivot point.

USEFULNESS

Sharpen kids' thinking ability by developing problem solving skills

As this game has different levels such as beginner, intermediate and advanced, the kids' thinking ability will increase as the level goes on. Since kids love challenging activities, this game is very suitable as it not only provides fun activities, but it can also help in the development of the kids' brain cells.

Trigger the kid's ability to make decision in short time

This game has been set up by timer, so the player has to finish the task before the time ends. This will not just trigger the kids' ability to make decision in the time given, but it also develops the skills in working under pressure as the medium 'time' that we used can strengthen fine motor and analytical thinking skills

Filled up the kids' free time with beneficial and challenging activities

Since kids do not have much to do, this game is very convenient to fill up their free time during weekends or school holidays or even after doing homework. Aside from watching television, parents can encourage their kids to play this game so that the kids can get so many benefits from just playing this game. The parents also do not have to be worried as this game is safe to play for kids and does not contain any harsh or inappropriate content that doesn't fit for underage kids.

MARKET POTENTIAL

Parents

Parents with young children are the main target market for the toy industry. Parents like these searches for quality products that can educate their children while having fun. Thus, buying this innovative game could help them educate their children and also distract them from being addicted to gadgets. On the other hand, this game is not only built for children, parents can also play with their children, thus strengthening the relationship between them.

Kids

Kids are very interested in colourful and cute things. The kids also just want cool playthings to pacify their time. As a result, this adorable game will entice them to play it. This game not only brings happiness to them, but it is also such an introduction to scientific knowledge as this game brings with it the idea of stability and torque. Otherwise, it would help in creating critical thinking skills and social skills in children. As they have to think critically about how to stabilise the seesaw with different pivot points, and they also have to communicate with their friends to convey some ideas.

Schools

One of our target audiences in commercialising our innovation is also a school. In the school, students were introduced to science concepts such as in the subject of science. In that subject, students were taught the concepts of balancing and stability. Thus, this kit would help them easily memorise the topic they had learned by experiencing it by themselves. Experiencing something with our senses is a better way of memorising something. Hence, providing this tool in school is a great idea to do as it will help students understand easily.

Teachers

Teachers need teaching tools to deliver knowledge efficiently to their students. The material of a class or a lecture can be presented synchronously or asynchronously. The aims of your course and the instructional style will determine which tool is best for you. When students use educational resources that are currently in front of them, learning is more effective and interesting. In addition, when students understand what tools they have and how they operate, they are more likely to pay attention and learn what they need to succeed in the long run.



Figure 2: Innovation prototype

Table 1: Budgets and costing of products

ITEM	QUANTITY	BUDGET (RM)	ACTUAL PRICE (RM)
Plywood	1	5.70	5.70
Plywood sheet	1	1.40	1.40
Air Hardening Modelling Clay (500g)	1	16.50	16.50
Acrylic paint (set)	1	10.70	10.70
Wood Glue	1	3.90	3.90
Score Board	1	4.90	4.90
Stopwatch	1	5.00	5.00
TOTAL COST (RM)			48.10
SELLING PRICE (RM)			72.15
PROFIT PERCENTAGE (%)			50

CONCLUSION

To conclude, our project, Kids Torquilibrium Learning Kit, may be the perfect approach for children to have fun while also learning something new. This learning kit may be able to meet the main goal of providing early exposure to physics concepts that are present in the environment in order to decrease gadget addiction among today's children. Despite the fact that our product has the potential to be marketed and has numerous advantages or benefits for youngsters, there is always room for improvement in order to improve the product's quality. As a result, we are hopeful that we will be able to improve some of the features in this learning kit. The design can be modified to appeal to children more by using colourful wood for the body of the beam balance, as we all know that colours are the most appealing to children. Apart from that, another enhancement that may be done to this product is to allow children to shape their own air clay animals rather than using ready-made moulded animals, since this will allow them to express their creativity.

ACKNOWLEDGEMENT

The final outcome of this project, Kids Torquilibrium Learning Kit required a lot of guidance and assistance and we were extremely privileged to get this all along the completion of this project. All that we have done is due to such consistency and assistance from each of our team members and we would not forget to thank those who were intentionally or unintentionally involved in our completion of this project. Firstly, we are very thankful to UiTM for holding Creations de UiTM 2022 that we can join and gain new experiences. Secondly and foremost, we would like to thank the one who guided us throughout this project, Madam A'bir Wardati for her patience, helpful information,

practical advice and unceasing ideas that have helped us tremendously at all times in completing this Kids Torquilibrium Learning Kit. We would also like to extend our gratitude to our parents and friends that keep supporting us throughout this entire journey until we would be able to complete this project successfully. Without these people who never give up on giving motivation and encouragement, the completion of this project could not have been possible. For all these people, our group would like to express our deep appreciation and indebtedness to all of them. Thank you for your contribution whether financially or physically which created the most memorable journey ever.

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Attack on Physics

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ABSTRACT

At first glance most of students consider physics subject to be a hard one to learn and not much interest. Therefore, to make learning physics fun, 'Attack on Physics' is being formed as a game product to attract students to learn basic physics introduction using a game card and they can play at the same time. The squared board is prepared of questions parts and surprise platform consist of 2 in 1 combination of monopoly and scrabble basis. To play the whole game, players were provided cards consist of questions on basic physics topics, privilege cards and false cards. Initially, the game conducted by a dealer and maximum five players required to play from the beginning which is for monopoly part. The player will throw a dice and will move to the question platform according to the number which the dice shown. In order to move to scrabble part, each player needs to obtain 6 privilege cards as a weapon for players to win the whole game. Just like any other scrabble game, the first player must put one of their letter tiles at the center of the board. The arrangement of letter tiles allowed is in vertical and horizontal only. Marks from each player will be displayed during the game if they can answer correctly. To win this game, the player with the highest point will be the winner. This set has the potential to be commercialized specifically to secondary school and foundation level students, teachers and lecturers. In the end, players are able to memorize and retain physics knowledge longer as it is an interactive way of learning.

Keywords: Attack on Physics; physics introduction; game card; privilege card; letter tiles

INTRODUCTION

Attack on Physics is a multi-player physics-themed board game. In the game, players roll two dice to move around the game board, answering questions provided, collecting privilege cards and brainstorming the correct answers for the scrabble. Players need to collect most of the points from the scrabble words, with the goal to win. Privilege cards can be gained if questions were answered right or getting privilege cards from '?' square.

Attack on Physics is derived from the Monopoly and Scrabbles game as a way to demonstrate that students can learn Physics in a fun way, less stress and more effectively by creating a game about it. Thus, for students who are weak at basic physics concepts can learn by playing this game to help them study for exams. Players are able to memorize and retain physics knowledge longer as it is an interactive way of learning.

Attack On Physics game-board consists of two parts. The first part is a bit similar with 'Monopoly' game and the second part is a 'Scrabble' game. For the first part, it contains 32 spaces containing one starting square, 8 lucky square (?) and 23 random questions from a stack of cards. Meanwhile, the second part, which is a scribble game, contains 15×15 squares for

the letters. Several squares have multipliers of words or letters by 2 and 3 to increase the player's points.

The problem statement in this project is mostly specified for students. Mainly, Attack on Physics is for students who have problems with basic physics concepts. While playing the game, players can teach each other the basic rules of physics. While playing the game, the players would positively be inquisitive about knowing and understanding the question and answer thus for sure will remember the answer next time. Next, students who are weak in mathematical skills. Since each tile of the letters used in the game carries specific points, the players would have to multiply those points with the value given to the box. In short, the players would have to apply addition and multiplication methods after putting every answer on the board. This calculation would improve their mathematical skills.

Other than that, students who are bored during their free time. This game will entertain the students. Spending a happy time, full of laughter and fun and of course free of stress will help the players to build stronger immune systems. Fourth, the relationship between students was not close enough. Attack on physics game is a board game for groups because it can be enjoyed by people of all ages and backgrounds and is heaps of fun. Instead of just sitting around making small talk, students can play a game and enjoy each other's company while learning basic physics concepts. Lastly, students who have confidence problems and are not firm in decision-making skills. Players must act with confidence and make well thought out decisions based on thorough considerations while thinking about whether they should use the privilege cards or not. When players take action and succeed, it's a great confidence boost.

INNOVATION DEVELOPMENT

The board game Attack on Physics is unlike any other board game. To begin, this board game was created specifically for folks who want to learn more about physics. As a result, it serves an educational purpose. Second, you'll need to gain privilege cards to have a chance to win this board game. In order to obtain it, players must attempt to correctly answer the questions, and if they fail, they will be unable to continue farther in the game. This demonstrates that the participants will learn how to brainstorm solutions in a reasonable length of time. Finally, this board game focuses on assisting players in memorising key points in physics. We believe that if a player plays this board game frequently, they will be able to apply their knowledge and competence to questions like tests and quizzes. Finally, learning physics in this manner would be enjoyable. Individuals who are having difficulty learning physics through books or traditional classes will find this to be a far more fun and participatory way to have a firm grasp of the subject.

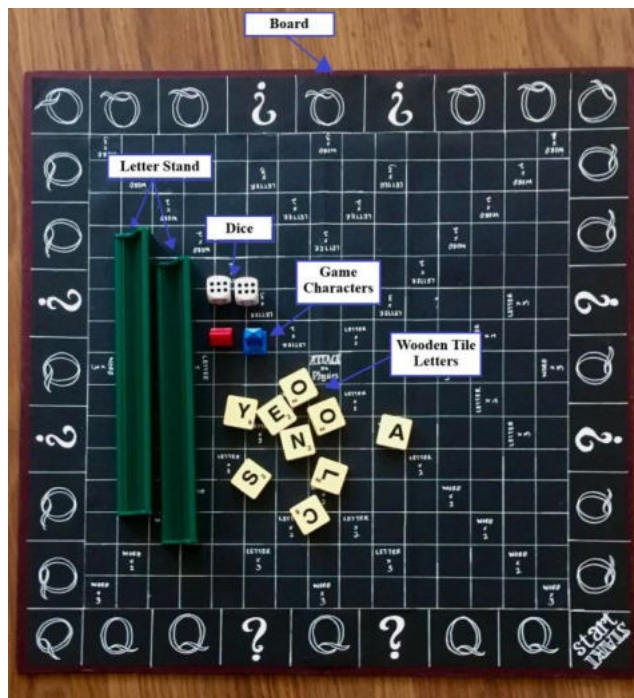


Figure 1: Board game materials



Figure 2: Attack on Physics Cards

COMMERCIAL POTENTIAL

Objective

The Attack on Physics board game is introduced to help students that have problems with basic physics concepts, students that are bored during their free time, students that are distant with friends and families and students that are unable to make firm decisions. This is because the Attack on Physics board game serves as a physics quiz whilst still maintaining the style of a board game. By playing Attack on Physics, players can understand basic physics better as the questions are simple and it does not require any sort of calculation, can memorize difficult and confusing physics terms as the questions are always the same and it stimulates the areas of the brain that are responsible for memory formation. Furthermore, Attack on Physics would encourage a healthy competition among players as they must compete with one another to win the game which will instill important skills like resilience, perseverance, and tenacity.

Market Potential

Our target market would be students ranging from middle school level to university level. This is because Attack on Physics emphasizes on physics questions which would be helpful for any students that are struggling with physics. Attack on Physics could reach students through schools, parents, and game manufacturers.

Firstly, Attack on Physics could reach students through schools as schools would be able to use this product as an additional tool to teach students physics. Furthermore, adding Attack on Physics in teaching materials helps to increase student participation, foster social and emotional learning, and motivate students to take risks. Other than that, Teachers can teach their students physics in a fun way so that students would have a more positive outlook on the physics subject.

Secondly, parents would buy Attack on Physics to keep their children occupied but still learn physics at the same time. Therefore, students are able to gain knowledge while having fun with Attack on Physics. Next, parents can use this board game to bring the family closer as the family members could play together. Furthermore, parents would also know the understanding level of their children in physics based on the questions answered by the children.

Lastly, game manufacturers could be used to reach our target market which are students. This is because Attack on Physics takes board games to a whole new level as it incorporates physics knowledge into the board game. Game manufacturers would be interested to invest in Attack on Physics as it is more educational and entertaining.

Budgeting

Table 1: Board Materials and Price

Materials	Unit price (RM)	Unit	Price (RM)
Cardboard	RM 5.62	1	RM 5.62
Blank game board	RM 25.12	1	RM 25.12
Printed paper (offset printing)	RM 9.00	1	RM 9.00
Lamination (matt) + UV	RM 2.50	1	RM 2.50
PVA glue	RM 3.50	1	RM 3.50
Total			RM 45.74

Table 2: Cards Materials and Price

Materials	Unit price (RM)	Unit	Price (RM)
Paper card	RM 0.21	80	RM 17.09
Lamination (matt) + UV	RM 0.11	80	RM 8.40
Total			RM 25.49

Table 3: Box Materials and Price

Materials	Unit price (RM)	Unit	Price (RM)
Cardboard box (20x29) inch	RM 1.30	1	RM 1.30
Thin plastic film	RM 0.93	1	RM 0.93
Total			RM 2.23

Table 4: Game Pieces Materials and Price

Materials	Unit price (RM)	Unit	Price (RM)
Game pieces	RM 0.63	5	RM 3.14
Wooden tile letters	RM 0.36	100	RM 36.38
Letter stand	RM 7.76	5	RM 38.80
Total	RM 78.32		

Total expenditure = 151.78

Expected selling price = RM 199.00

Expected profit margin = RM 47.22

Questions and suggested answers for the cards

Table 5: Electrical Energy and Capacitance Questions and Answers [1]

Questions	Answers
The quantity of electrical potential, the volt, is dimensionally equivalent to:	electric field x distance
At which location will the electric field between the two parallel plates of a charged capacitor be the strongest in magnitude?	midway between the two plates nearest their center
Increasing the voltage across the two plates of a capacitor will produce what effect on the capacitor?	increase charge
If two parallel, conducting plates have equal positive charge, the electric field lines will:	leave both plates and go to infinity.
Inserting a dielectric material between two charged parallel conducting plates, originally separated by air and disconnected from a battery, will produce what effect on the capacitor?	increase capacitance

Table 6: Energy Questions and Answers [2]

Questions	Answers
A force that acts on an object is said to be conservative if	the work it does on the object is independent of the path of the motion.
Give an example of conservative force	elastic spring force
Give an example of a non-conservative force	kinetic frictional force
Work done equals to the change in	Kinetic energy
Power is defined as work done _____ by time interval or the rate at which energy is transferred.	divide
When a person drops off a plank into a pool, what happens to kinetic and potential energy	potential energy increase, kinetic energy decrease.

Table 7: Current and Resistance Questions and Answers [3]

Questions	Answers
Materials having resistance changes as voltage or current varies are called:	nonohmic.
The unit of electric current, the ampere, is equivalent to which of the following?	V/Ω
The unit of electric resistance, the ohm, is equivalent to which of the following?	V/A
Replacing a wire resistor with another of the same material and length but with three times the diameter will have the effect of changing the resistance by what factor?	1/9
A wire has resistance R. A second wire has twice the length, twice the diameter, and twice the resistivity of the first wire. What is its resistance?	R
What is the unit of power?	J/s

Table 8: Direct-Current Circuits Questions and Answers [4]

Questions	Answers
Three resistors connected in series each carry currents labelled I_1 , I_2 and I_3 . Which of the following expresses the value of the total current I_T in the system made up of the three resistors in series?	$I_T = I_1 = I_2 = I_3$
Three resistors connected in series have individual voltages labelled V_1 , V_2 and V_3 , respectively. Which of the following expresses the value of the total voltage V_T taken over the three resistors together?	$V_T = V_1 + V_2 + V_3$

Table 9: Scientist and Their Contributions Questions and Answers [5]

Questions	Answers
What are the contributions of Michael Faraday?	Discovery of Electromagnetic Induction Faraday's Laws of Electrolysis
What principle did Blaise Pascal created?	discovered that pressure applied to an enclosed fluid is transmitted undiminished to every part of the fluid and to the walls of its container (Pascal's principle)
What did Sir Isaac Newton discover?	Gravity
What did Georg Ohm discover?	discovered that current flow is proportional to potential difference and inversely proportional to resistance (Ohm's law)

Table 10: Vibration and Waves Question and Answer [6]

Questions	Answers
In simple harmonic motion, what law should the force obey?	Hooke's
Maximum position of the object from its equilibrium position.	Amplitude
The time that it takes for the object to complete one complete cycle of motion.	Period
The number of complete cycles or vibrations per unit time.	Frequency
What energy exist in compressed spring?	Potential
What energy exist in stretched spring?	Kinetic
The total mechanical energy of the system is the kinetic energy if the surface is?	Frictionless
Each element that is disturbed moves in a direction perpendicular to the wave motion.	Transverse
The elements of the medium undergo displacements parallel to the motion of the wave.	Longitudinal / Compression

Table 11: Sound [7]

Questions	Answers
When one object vibrating at the same natural frequency of a second object forces that second object into vibrational motion.	Resonance
A standing wave is fixed in location, but oscillates with ----	Time
The ---- the materials, the faster sound travels through it.	Denser
The speed of sound is higher in what state?	Solid
What is the name of the effect when experiencing a relative motion between a source of waves and an observer?	Doppler
What is the interference of sound waves if the compressions and rarefactions of the two waves line up, they strengthen each other and create a wave with a higher intensity.	Constructive
Standing waves is a ---- occurs where the two travelling waves have the same magnitude of displacement, but the displacements are in opposite directions.	node
When the source and the observer are moving toward each other, what happen to the frequency that being heard by the observer?	Higher

Table 12: Electric Forces and Fields [8]

Questions	Answers
Who named the two types of charges exist which is positive and negative charges?	Benjamin
Nature's basic carrier of negative charge.	Electron
Nature's basic carrier of positive charge.	Proton
An object that contains an equal amount of positive and negative charge has zero net charge is electrically ---.	Neutral
Electric charge is always ---?	Conserved
What is the value of the electric field inside the conducting material?	Zero
Any excess charge on an --- conductor resides entirely on its surface.	Isolated
Measurement of the electric field that is perpendicular to a surface.	Flux
What law stated that the electric flux through any closed surface is equal to the net charge inside the surface divided by the permittivity of free space.	Gauss

CONCLUSION

In conclusion, players are able to acquire basic physics knowledge by playing this game. Students can learn and strengthen their physics knowledge in an entertaining way rather than studying hard until late night making long notes and memorizing them. Students are able to deepen their knowledge as well as their bond with friends and family as they play the Attack on Physics board game. In other words, this game can be considered as preparation for exams and a short quiz for a teacher to use in their class. We hope that our Attack on Physics board game can be recognized world-wide and help students and teachers to excel in basic physics. For future development, we are planning on adding more interesting elements to make the game more interesting and learning efficient. For example, we might insert an automatic question generator to generate random questions from the internet. Furthermore, we are also considering developing an application on all devices of Attack on Physics to make it more accessible for everyone and for students to be able to play the game at anywhere and anytime. With this application, we would be constantly updating new questions for students to answer. This can help students to avoid cheating and memorizing the questions beforehand.

ACKNOWLEDGEMENT

We have taken efforts in making this project a success however the completion of this project would not have been possible without the help and guidance of many individuals and an organization. We would like to show our appreciation towards the Creations de Uitm team for providing an opportunity for us students to unleash our creativity and innovativity in making a creation. We are thrilled to have our participation in this huge competition. We sincerely would like to give much gratitude to our beloved lecturer, Madam A'bir Wardati

Abd.Latif for her advice and supportive demeanour. Without her giving us a basic idea on what to create for this competition, we might not have come to this conclusion. She would also constantly give us moral support to motivate us as well as offering some advice in making this project work. Her experience in handling the competition affairs greatly helps us in saving time to complete this project on the assigned time. Last but not least, our thanks also go to our parents for their help and funding. Without the fund provided for us by them, this project might not be able to make the prototype for this project.

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Python Based Machine Learning Application in Agriculture for Crop Recommendation, Yield Prediction and Disease Detection

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ABSTRACT

Agriculture sector accounts for 7.1% of Malaysia's gross domestic product per capita (GDP) as the third-largest contributor with 26.09% of landmass allocated specifically for agriculture. Globally – a RM 10.3 trillion industry. However, the lack of food provisions for the global population remains significant and everlasting, especially in underdeveloped and developing nations. This be in essence of improper crop management, wrong choice of crop, and/or the variation of monsoon season patterns. A viable approach to address this issue is through the implementation of a web application (Plant+) that utilizes python machine learning modules to analyse weather patterns, soil pH, temperature, rainfall, type of soil as well as the land size of a particular location to predict and recommend the most suitable type(s) of crops for plantation that would produce an increased yield. The algorithm could be trained to cater for different countries and parameters; whilst maintaining the accuracy in the prediction model. The system also provides information on the ideal amount of fertilizers that are required to cultivate the recommended crop. Consequently, this minimizes the losses faced by farmers due to unforeseen atmospheric circumstances and maintaining the profit margins year-long for the farmers. With the integration of AI disease detection algorithm; farmers would also be able to detect diseases in plant based on the coloration of the leaves. Thus, a step in the direction towards ending global food shortage and expanding the economic potential for agriculture-dependent nations could be achieved.

Keywords: Crop prediction; Python; neural network; machine learning

INTRODUCTION

Famine has been a persisting threat to humanity over decades affecting underdeveloped and developed nations alike in poverty-stricken communities. Man has been concerned about ensuring survival by assuring a sufficient, healthy, and safe food since the start of civilization. Thousands of years later, this remains a formidable problem. The number of individuals affected by world hunger is hovering well over 720 million of people with 1 in 3 people not having access to sufficient food in 2020. [1]. On the contrary, the food produced globally is adequate to feed every single person in the world. [2]. Several elements contribute to the occurrence of this issue, but the most crucial is poor food distribution and improper farming managements.

Historically, agriculture as the engine of growth of the Malaysian economy until the early 1980s, when the then-Prime Minister, Dr. Mahathir Mohammed, shifted the economic paradigm of Malaysia to an industrialist state. The facts still remain that agriculture was the backbone of Malaysian economy [3]. However, the contribution by agriculture to the nations GDP has been ever declining since the 1970s and eventually being surpassed by industrial and

manufacturing sectors. This situation stems from unfavourable commodity prices, shortage of agriculture labour, lack of awareness regarding government grants and private investors as well increased competition for land use. The food security of the nation is at threat with the burgeoning populace and declining growth in the agriculture sector [4].

In the smallholder agricultural industry, digital tools and services are projected to play an increasingly essential role. New technologies like the Internet of Things (IoT) and Cloud Computing are projected to accelerate this trend by allowing farmers to exploit artificial intelligence. Even in more resource-constrained areas of the globe, a tremendous proliferation of hand-held devices, along with ever-increasing mobile network and internet coverage, has offered chances for disruptive breakthroughs under themes such as ‘Smart Farming’ and ‘Farming 4.0’ [5]. The goal of this propose project, Plant+ Ecosystem, is to address these issues that is to overcome the evident disparity in food distribution, declined interest in the agriculture industry, poor crop management systems, and induce machine learning technology in agriculture as well as ensure Malaysia’s food security and sustainability which in line with the national policy of Malaysia.

INNOVATION DEVELOPMENT

The study research is divided into two stages; Stage 1 analyses the type of data required for the development of this project’s ecosystem, the collection method and validation of those data, while Stage 2 outlines the application development method as well as the characteristics of the website and mobile application.

Stage 1 - Data Collection

Two major types of secondary data were collected and used in this project: data concerning soil composition with respect to location and plant disease survey. The first type of data collected in this research was obtained from the website of the Department of Agriculture and Farmers Welfare, a subdivision of the Ministry of Agriculture and Farmers welfare under the government of India, and from the website of the U.S Department of Agriculture [6,7]. Both data sources used are reliable since the information was obtained from the websites of government agencies and is up to date for the year 2021. The information acquired from these websites were the type of crops with their suitable soil compositions (Nitrogen, Phosphorus, Potassium and pH Level) for adequate growth as well as the soil composition of respective locations. Both datasets will be compared to produce an output of suitable crop recommendations for the input of a specific location or soil composition [8].

As mentioned above, the plant disease survey was procured from the Mendeley open-source database data for the identification of plant leaf diseases. The data obtained is credible and valid as it was adapted from the research by Geetharamnai (2019) [9]. The dataset consists of images of leaves of plants categorized and based on the diseases of the plants used to train the Deep CNN based Model.

Stage 2- Development

The project was produced over two platforms, both with separate mutually exclusive functionalities, which is the website and companion mobile application.

2.2.1 Website Development

The websites adopt the model-view-controller architecture in developing the front-end of the website and HTML programming language. The backend was developed using python programming language and utilizes python-based libraries such as NumPy, flask, Gunicorn, BS4, Mako, Pyowm and Pycrypto. The integrated development environment (IDE) used to build the website was Microsoft Visual Code version 1.65.

The user interface is user friendly for each component in the website and is specifically designed to display individual tasks at a time. The user interface was designed for a wide range of targeted audiences; technophiles and non-technophiles. The menus on the website are organized in a proper hierarchy to ensure that new traffic could navigate the website with minimal trial and error (Figure 1). The navigation bar is pinned to the top of the homepage; even when the homepage is scrolled, the navigation bar would still be visible. In addition, the website utilizes Google Translate API to translate the website according to the user's preferred language. Therefore, the website would have a larger reach and stretch to a community of diverse languages.

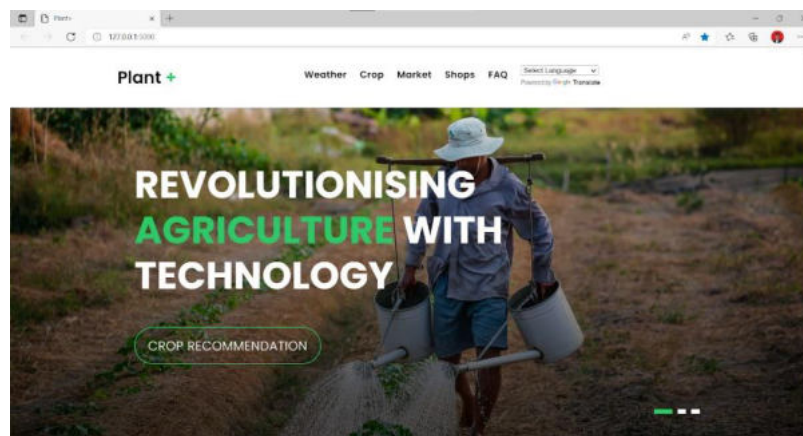


Figure 1: Website homepage

The website primarily offers 4 services and a guide on how to use them: Weather Prediction, Crop Recommendation, Current Market Demand and Agriculture Shops. The weather prediction, divided into two use cases: (i) OpenWeatherMap API to acquire the current weather forecast and (ii) timeanddate.com Time API for the 15 days forecast as shown in Figure 2. The user inputs the desired location and weather prediction today or the next 15 days would be forecasted, depending on the user's selection.

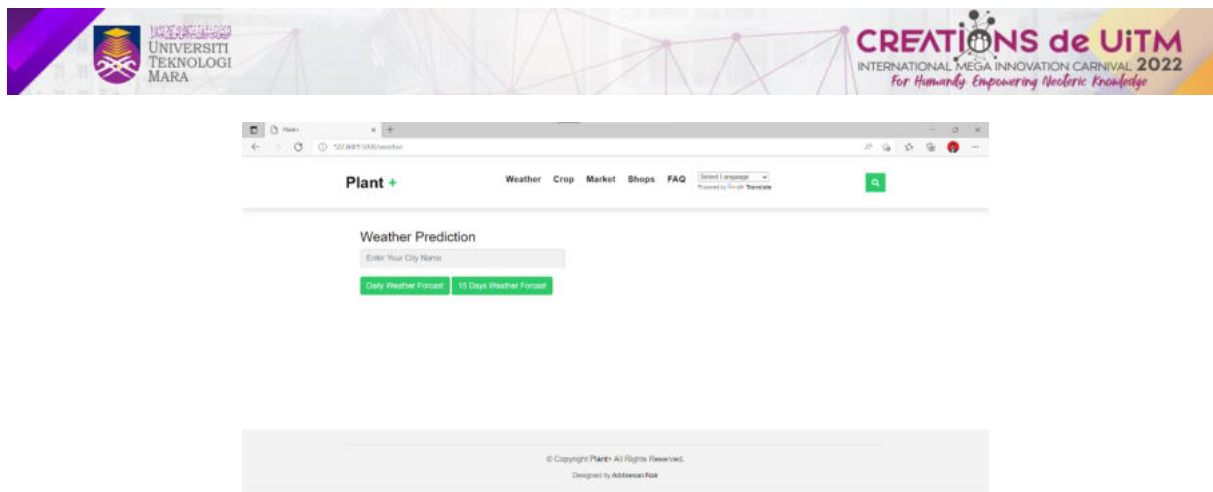


Figure 2: Weather prediction page

Next, for the crop recommendation part, the user could obtain information on crop recommendation by either entering the region or manually keying in the soil composition as the input. The python script would scrape the database to find a matching location and/or soil composition (approximation of ± 2 values for each field) and output 5 closest crops and guidelines to plant them. The crop recommendation page is as shown in Figure 3 and Figure 4.

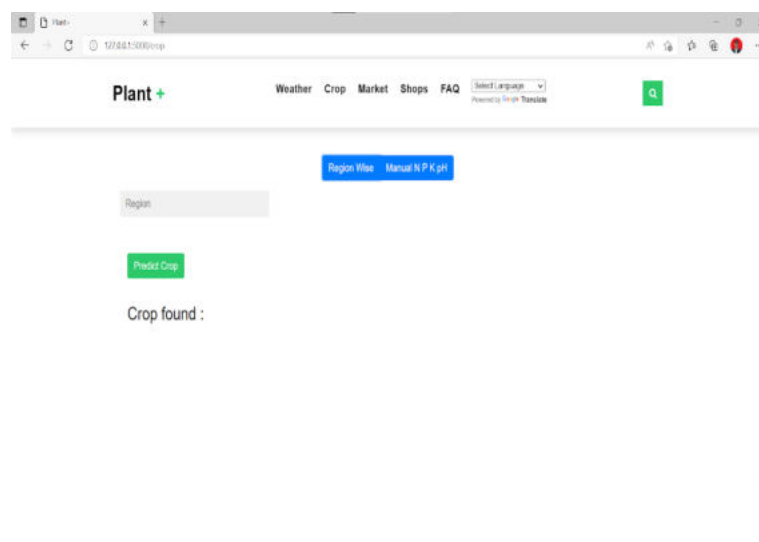


Figure 3: Crop prediction page - Region Wise

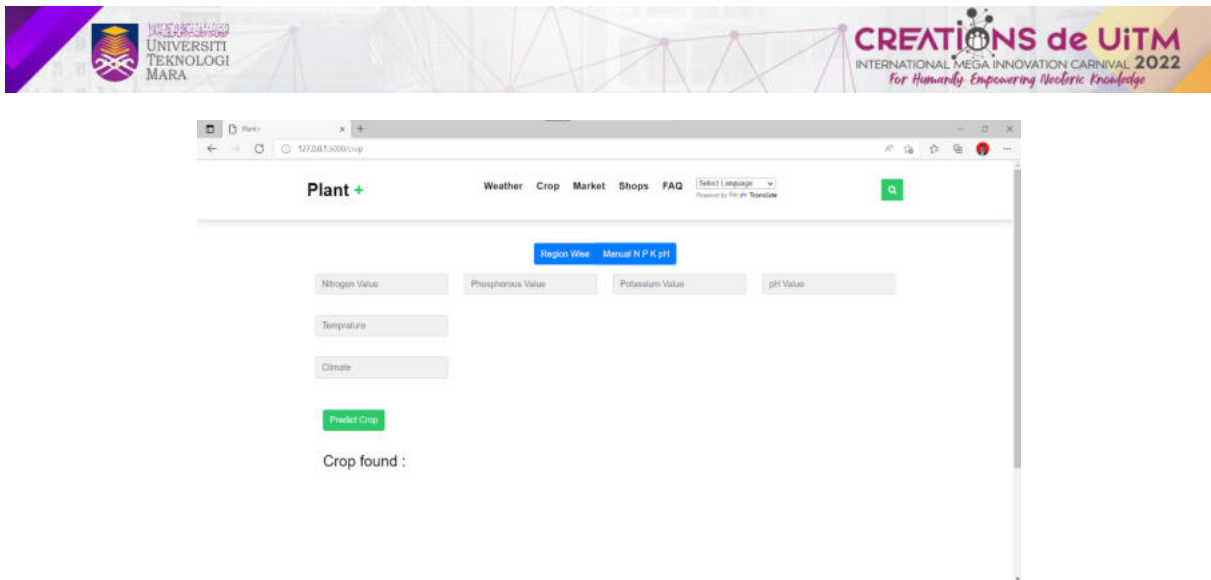


Figure 4: Crop prediction page- Soil Composition

Moreover, the current market demand page displays the profit per acre that users would earn based on the selected region and crop. The data is regularly updated via a python web scraping script to procure information from the Malaysian Agricultural Research and Development Institute (MARDI). Consecutively, the agricultural shop page displays the location of nearby plantation facilities and shops based on the location imputed by the users. The map and search bar uses Google Maps and Google Autocomplete API to display data as shown in Figure 5.

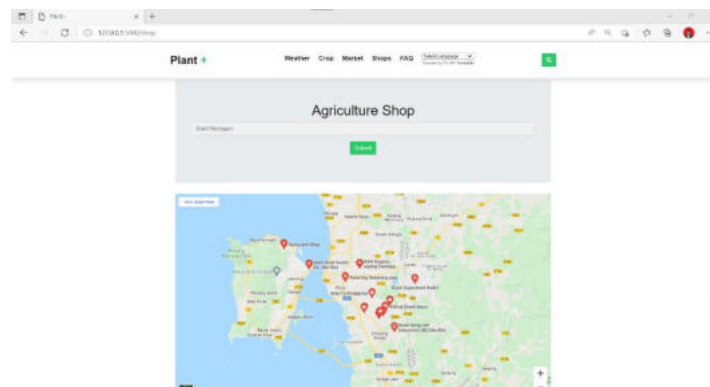


Figure 5: Agriculture shop page

2.2.2 Mobile Application Development

The mobile application was developed in the Android Studio integrated using flutter software development kit with the Dart programming language and firebase database. The application serves as a companion to the website and not a mobile version of the website. Therefore, features on the website are not available on the mobile application and vice versa. The app offers Planting and Harvesting Databases, News on the Latest Government Grants and Agriculture News, Harvesting statistics, Soil Composition Monitoring, and Crop Disease Detection. In the Planting and Harvesting Database section, the user can update the database with their own crop data — name, number of plants, date of plantation and estimated harvesting date — and harvesting data. The application would generate a comprehensive charting system for easy visualization and monitoring of crops. The news section offers the user updated news on government grants and the latest technological developments in the field (Figure 6).

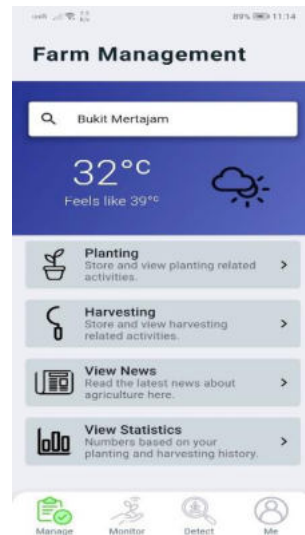


Figure 6: Farm management

Furthermore, the soil composition monitoring section was developed using a firebase real-time database. When the user updates the soil composition through the Internet of Things (IoT module) which was created using MATLAB, the data would be fed into the firebase database, resulting in the application being automatically updated with real-time data. This allows the user to monitor their soil composition accurately via their mobile devices (Figure 7).

The disease detection section allows users to detect disease in their crops by taking or uploading a picture of the plant leaves. This disease detection architecture is based on a deep convolutional neural network (Deep CNN) module. The Deep CNN module was trained via the AutoML API and passed through the python TensorFlow library and is stored in the firebase server [10]. The Deep CNN module analyses the leaf's color and veins and outputs of the plant disease and the confidence level of the prediction as well as methods to cure the plant (Figure 8).

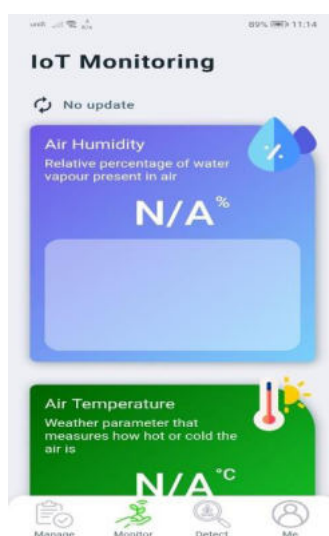


Figure 7: Soil monitoring

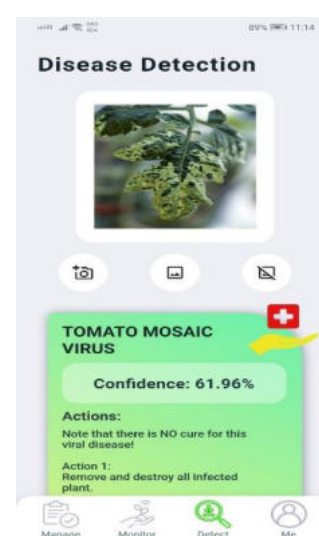


Figure 8: Disease detection

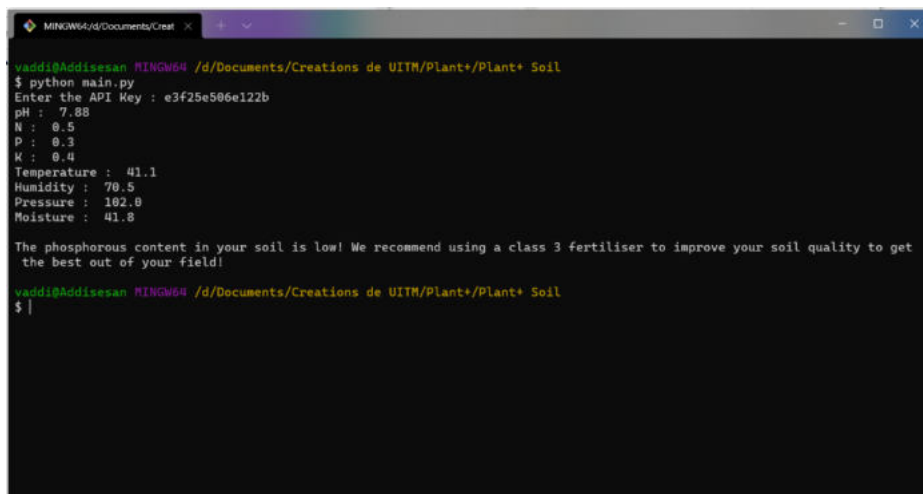
COMMERCIAL POTENTIAL

The recurring complication in agriculture in underdeveloped and developing countries is improper crop management, wrong choice of crop, and/or unpredictable variation of monsoon season patterns.

Plant+ project contributes significantly to the agricultural field by primarily improving crop prediction, for planting and harvesting. For decades, this hassle has persisted for plantation owners and farmers, and Plant+ introduces an Artificial Intelligence (AI)-induced solution by simplifying the agricultural process. It does this by keeping farmers up to date on the latest growths in the field and available government grants and aids. The decision on types of crops based on soil performances and planting methods will also be an easier process for farmers, and in the long term, aids in curbing large scale problems like soil and water problems, food production or even climate change.

Statistics reveal that out of 31.8 million Malaysians, around 44% are youths. However, from this figure, only 15% of youths are involved in the agricultural sector. The appeal of the field towards large masses of the Malaysian youth is declining as the nation gradually moves on towards more technologically advanced fields [11]. AI is a powerful tool, and with time more and more of it is being implemented in different fields of work with the positive results it brings about. The same is expected with the use of the Plant+ project. With this ambitious but promising project, the agricultural scene in Malaysia can be transformed, creating and improving existing job openings in the field and in the company as well.

The project, when deployed, would be offered on a freemium based model, where basic features would be offered with no upfront cost and the advance feature would be charged a certain pricing. The essential service of the app is accessible by anyone and everyone. Agriculture companies seeking a personalized plantation profile would be offered a commercial package which offers unlimited custom recommendations, larger database storage options, 24/7 real time assistance, recommendations to expand profits and fertilizer recommendations. Small-time farmers can also benefit from the service with the option of purchasing a pro package that would allow them to gain access to the 24/7 real time assistance and fertilizer recommendation page (Figure 9).



```

MINGW64/d/Documents/Creations de UiTM/Plant+/Plant+ Soil
vaddi@vaddisesan MINGW64 /d/Documents/Creations de UiTM/Plant+/Plant+ Soil
$ python main.py
Enter the API Key : e3f25e506e122b
pH : 7.88
N : 0.5
P : 0.3
K : 0.4
Temperature : 41.1
Humidity : 70.5
Pressure : 102.0
Moisture : 41.8

The phosphorous content in your soil is low! We recommend using a class 3 fertiliser to improve your soil quality to get the best out of your field!

vaddi@vaddisesan MINGW64 /d/Documents/Creations de UiTM/Plant+/Plant+ Soil
$ |
  
```

Figure 9: Fertilizer recommendation dashboard

CONCLUSION

This research had addressed the prevalent issue concerning ineffective crop management, improper food distribution, reduced involvement of the community in the agriculture industry, and induce machine learning technology in agriculture as well as ensure Malaysia's food security and sustainability. The website offers crop recommendation with proper guidelines on cultivating seedlings which in return prevents soil pollution and premature death of crops. The news section of the companion application would allow users to be well informed on the upcoming technologies in the field as well as aids and subsidies provided by the government and private investors. As a result, a surge in participation of individuals in the agriculture industry would occur. The proprietary disease detection feature allows farmers to detect and cure disease at an early stage. Consequently, it reduces the spread of the disease and increase the yield of the crop. The Plant+ ecosystem also allow farmers to monitor their crop plantation and harvests with a comprehensive and succinct user interface by taking advantage of the database feature on the application. However, the current backend design of the website and mobile application has its drawbacks; the server end crashes during a traffic overload and lacks a registration page. These drawbacks will be addressed by upgrading the current server to an industrial grade server farm as well as incorporating Google Authentication API. Despite this issue, the Plant+ ecosystem still functions efficiently in achieving its objectives.

ACKNOWLEDGEMENT

The authors would like to acknowledge Centre for Defence Foundation Studies, National Defence University of Malaysia, for funding and supporting this project.

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Area Marking by Backward Bent Duct Buoy

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ABSTRACT

Malaysia has a lot of coastlines that is near with other country such as China, Philippines, and Indonesia. Thus, marking the shorelines or any water bodies within our country is important. This technology called Backward Bent Duct Buoy (BBDB) will help our country to maintain certain interest such as to improve capabilities of our country to mark a certain area or to warn seafaring vessel about shore at night by using the energy from the wave to power the signal lamp (electrical energy) on the buoy. This technology can be useful, in sectors such as tourism, and defence in which the technology can be used to mark area for divers or swimmers that is safe for them or help us determine or mark a certain area within our coastline. Basically, this particular device applies the Principle of Conservation of Energy which states that energy can't be created nor be destroyed by converting wave energy to electrical energy with the concept of BBDB. On a larger scale, this BBDB can be used to power up Forward Operating Bases (FOB) at sea instead of fossil fuel generator.

Keywords: Backward Bent Duct Buoy (BBDB); Forward Operating Bases (FOB); energy

INTRODUCTION

The sea is filled with energy and a great place to harvest green energy. One such example is that we can harvest wave to be converted into electrical energy

Some of the devices that we can use Overtopping Devices or OD, Oscillating Water Columns (OWC) and Wave-Activated Bodies (WAB). The energy conversion for OD is the wave energy converted into potential energy which water is stored in the reservoir and into electrical energy by releasing the water which will turn the turbines. For OWC, the wave energy will be converted into pneumatic energy by which the rising water level will compress air which will be released and will turn the turbine which will be converted into electrical energy. Finally, for WAB the wave energy will be converted into kinetic energy and into electrical energy by the moving waves that would cause the mechanical part of the device to move which will make the kinetic energy to be converted into electrical energy.

For a large number of islands around Malaysia securing electricity comes at a high price. Today they are dependent on expensive fossil fuels that pollute our beautiful nature.

But wave energy can change all that. Ocean waves hold the power and the promise to produce electricity. With the BBDB at their disposal, they can reduce their dependency towards fossil fuels by relying with BBDB that have been connected to them via underwater sea cables.

Area marking is important for ships and as an example the cruise ship, Costa Concordia crashed into shallow waters since it was too dark at night. This misfortune had caused 32 people to lose their lives. Area marking is also important to mark diving spots because there are cases

of divers being rammed by boat in which causes the fatality of the diver who are affected. With the inspiration to avoid more fatalities and the idea of the wave converters, we have developed a buoy that will take advantage of the wave energy as the source for the electrical energy since wave energy is relatively limitless at sea.

INNOVATION DEVELOPMENT

Our innovation which is Backward Bent Duct Buoy (BBDB) will help to solve the problems by utilising OWC to convert the wave energy into electrical energy. Firstly, the main part that will help generate the electricity is the impulse turbine (Figure1). The impulse turbine will turn the generator in one way only since it is designed to spin in one way regardless the direction of air entering the turbine. Secondly, the circuit which consist of an LED, a capacitor, a rechargeable battery and a generator connected in parallel (Figure 2). The generator will be turned by the impulse turbine which will generate electricity and it will start to charge the battery and capacitor plus lighting up the LED. The capacitor will help to maintain current since it can store energy and it is important because the energy generation is irregular according to the waves itself. Thirdly, the body of the buoy which are made from acrylic with certain dimensions (Figure3). Finally, the sensors which are located on top of the buoy to detect the pressure and height of the wave.

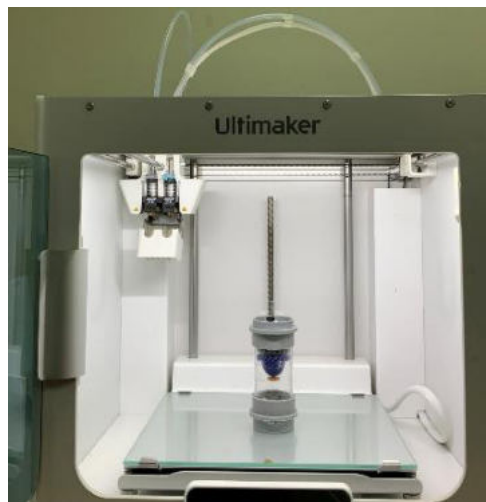


Figure 1

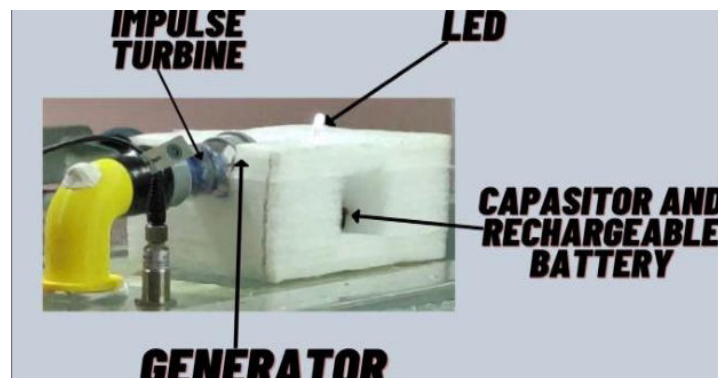
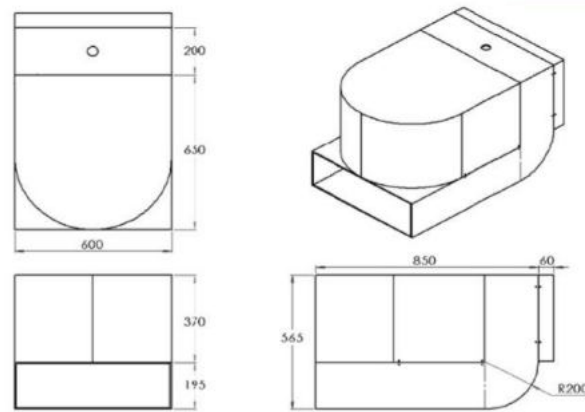


Figure 2



Detailed Drawing (units in mm)

Figure 3

During our testing, we have collected a few data such air pressure and flow rate, then the data are exported to excel spreadsheet to calculate the frequent output of the chamber pressure and air flowrate by using MATLAB Fast Fourier Transform (FFT). The product of the total wave energy per unit ocean surface, P_{EX} are calculated using the formula (1).

$$P_{EX} = \frac{1}{T} \int_0^T \Delta P(t) Q(t) dt \quad (1)$$

After we got the P_{EX} , the primary conversion efficiency, ζ are calculated using formula (2) to determine whether it is efficient or not.

$$\zeta = \frac{P_{EX}}{P_{Total}} \quad (2)$$

P_{Total} is the total energy that have been used by the Flume Wave Maker to create the waves that we have used to test the BBDB.

After all the calculations, we collected all of our data into Table 1 as shown below.

Table 1: Data of the Test

Wave height,H (m)	Period (s)	Lambda/L	Pressure (Pa)	Zi	1/T	Cg	Ewave (W)	Eair,m (W)	Efficiency, Eair/Ewave	Eair,r,scale,1:10,(W)
0.03	1	1.84	0.18	0.015	1.00	0.78	0.52	0.16	0.31	504.89
0.03	1.2	2.64	0.25	0.015	0.83	0.94	0.63	0.17	0.27	532.78
0.03	1.4	3.57	0.28	0.015	0.71	1.14	0.75	0.23	0.30	715.50
0.03	1.6	4.56	0.32	0.015	0.63	1.36	0.90	0.38	0.42	1191.36
0.03	1.8	5.58	0.27	0.015	0.56	1.61	1.07	0.30	0.28	948.30
0.03	2	6.59	0.26	0.015	0.50	1.84	1.22	0.26	0.21	817.67

The row that been highlighted in yellow is the datasheet which have the most efficient and the most power converted into electricity and based on with this datasheet, we can able to design the best buoy with specific width to produce the most electricity that suits the ocean according to the wave wavelength. Figure 3 is the graph that shows the relationship between the efficiency and the ratio of lambda over width.

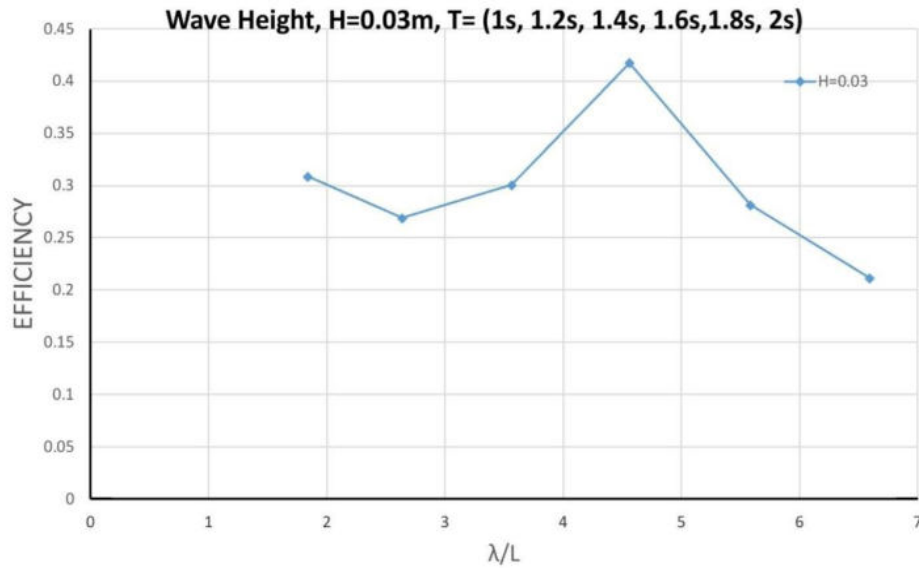


Figure 3

From the graph in Figure 3, we can see the best ratio is around 4.5 and with this ratio we can determine the best buoy width for the ocean. As an example, if the lambda of the wave is 0.5m, then we can calculate the best width with (3).

$$4.5 = \frac{\lambda}{L} \quad (3)$$

After rearranging (3), we will get (4).

$$L = \frac{\lambda}{4.5} \quad (4)$$

Substitute $\lambda = 0.5\text{m}$ into (4) and we will get $L = 0.11\text{m}$ and with this width we can get the most energy from the waves that have the lambda of 0.5m

COMMERCIAL POTENTIAL

The BBDB have great potential to be an alternative for buoy that exist in the market. Some buoys are just a simple floating body to mark area but these are ineffective during dark since it does not emit any light. There are buoys that uses solar panel to generate electricity for the navigational aids but solar panels are relatively expensive and can only generate energy with the presence of sunlight. Sometimes in the sea there are storm clouds that could block sunlight for days or even weeks and that would make the navigational aids on the buoy to run out of electricity. With the relatively unlimited wave energy, the navigational aids on the buoy have continuous energy source which make it a more efficient marking buoy in all conditions whether it is dark stormy night or calm sunny sea. This buoy will be cheaper since it does not use solar panels and the buoy only requires specific body, impulse turbine and the circuitry.

CONCLUSION

In the end, the BBDB can help to save more lives with a more efficient area marking whether it is human lives of the sea creatures in the ocean. The efficiency of BBDB can be further improved by increasing the amount of impulse turbine which are connected to more generators more energy can be produced with each wave. Other than that, the width of the buoy

can be adjusted to fit the wavelength of the sea waves so it can produce energy at the most efficiency. This BBDB can be further scaled up to be generator for naval bases for our navy since it uses wave energy and the electricity can be transferred via underwater cable that connects with the base. This will reduce the dependency of the navy towards diesel-based generators plus reducing pollution.

ACKNOWLEDGEMENT

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COVID-19 Hygiene Kit

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ABSTRACT

COVID-19 with its variants and recently the Omicron variant continue to spread globally and in Malaysia, the number of new cases reported daily is alarming with the cumulative coronavirus infections has reached 3.5 million cases. It has become a major cause of concern for everyone and reopening of schools during this pandemonium making parents concerned about their children's safety towards COVID-19 infections. The awareness of maintaining good hygiene among the public as well as children need to be practiced and parents play an important role in keeping them in check. Good practice in sanitization among the school children will lower the risk of them getting infected. To help spread the awareness of COVID-19 including maintaining good hygiene habits, a COVID-19 hygiene kit is introduced. The purpose of the hygiene kit is to ensure the public and children especially always to keep themselves cleaned and sanitized as to prevent the virus transmissions from indoors & outdoors. This kit is designed with a combination of refillable masks, hand sanitizer and antibacterial wet wipes compartment in a sleek and easy carry-on bag. The design of this hygiene kit is very practical and convenient as one can easily reach for all the items you need in one place without having to recall the whereabouts of each item. Such practicability of this hygiene kit will bring good impact to ensure the preparedness of COVID-19 among the public and school children. Additionally, this kit is also environmentally friendly by reducing the single-use plastics especially in packaging the masks and wet wipes. It's also a green effort towards helping the earth from plastic pollution as the practice of reuse and reduce is adept even during pandemic.

Keywords: Hygiene kit; sanitization; awareness; single-use plastic; COVID-19

INTRODUCTION

COVID-19 was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020, however the world is still reeling from the consequences of COVID-19. COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. The disease was initially discovered in Wuhan, China and then the cases were known to spread all over the globe.

COVID-19 is a respiratory infection that is conveyed primarily through droplets in the air. When an infected individual coughs or sneezes, these droplets are released. Once symptoms appear, they become less infectious, and a person's virus load gradually decreases. Infected people, on the other hand, continue to shed the virus in their saliva and faeces for up to two weeks after recovering from COVID-19. People who are infected but have no symptoms may have a very high viral load in their upper respiratory tracts. They can pass the infection on to others by spitting, touching their mouths or noses, or even chatting. SARS-CoV-2 has also been found to persist for days on surfaces. [1]

The most common symptoms are fever, dry cough, and tiredness; in mild cases, people may merely experience a runny nose or a sore throat. In the most severe cases, infected people have trouble breathing, and organ failure may ensue as a result. Some cases result in death. The Wuhan population has been quarantined or placed under lockdown by Chinese officials, who have also halted trains and flights out of the city. Certain long-distance bus routes, including those that depart or arrive in Beijing, have been suspended. On March 11, WHO announced the outbreak to be a pandemic, which means that multiple countries are seeing sustained transmission between people, causing disease or death. [2]

The Ministry of Health Malaysia has come up with a comprehensive preparedness plan to control the spreading of COVID-19 virus among Malaysian citizens by making a Standard Operating Procedures (SOP) [3]. These procedures as a guideline for people to live in new norms. For example, people need to wear their face mask regularly when they go for outside, practice social distancing, wash their hand frequently and more.

Since pandemic hit, it is become a norm for school kids to eat at their own place to avoid having close contact in the school canteen. With the limited access to water in the classroom, it is needed for them to bring along wet wipes to wipe their hands and table after eating. After that, they must change their face mask to avoid any contamination. Undoubtedly, wet wipes, hand sanitizer and face mask must be kept together within reach to ease of use.

Therefore, Hygiene Kit is developed. It's a waterproof, light-weight bag with compartments for wet wipes, face mask and hand sanitizer within hand reach. Thus, there will be no excuse for people to not keeping themselves clean and sanitize. This product also suitable for men, women as well as kids as it light and easy to carry everywhere.

Since the SARS-CoV-2 outbreak, there has been a significant increase in the amount of discarded single-use surgical and face masks, as well as latex gloves, found littering the streets, roads, medical institutions, parking lots, dumpsites, beaches, gutters, and shopping carts. A study was found that more than eight million tons of pandemic-associated plastic waste have been generated globally, with more than 25,000 entering the ocean, [4]. Therefore by using this product the amount of plastic usage and wastes can be controlled as it reduces the single-use plastics.

INNOVATION DEVELOPMENT

COVID-19 Hygiene Kit is a pandemic all in one essentials bag for daily use in combatting the spread of COVID-19. There are three necessary items can be stored in this kit which are face masks, hand sanitizer and antibacterial wet wipes. Face mask is used to prevent the transmission of virus through breathing which is via nose and mouth meanwhile hand sanitizer is to kill unseen germs and very advisable to use it before and after in contact with contaminated surfaces. Antibacterial wet wipes with soft textured fabric help cleanses skin without irritation and also can be used to disinfect any surfaces.

The advantage of this kit includes how lightweight it is to carry around. This hygiene kit only weighs at 10 gram and it can be stored easily in medium sized handbags and school bags without taking too much space. Current issues circulated recently on heavy school bags which the children has to bear everyday contributes to why the kit is made to be lightweight and this will lift the weight off students' shoulders during schooling in the time of pandemic [5].

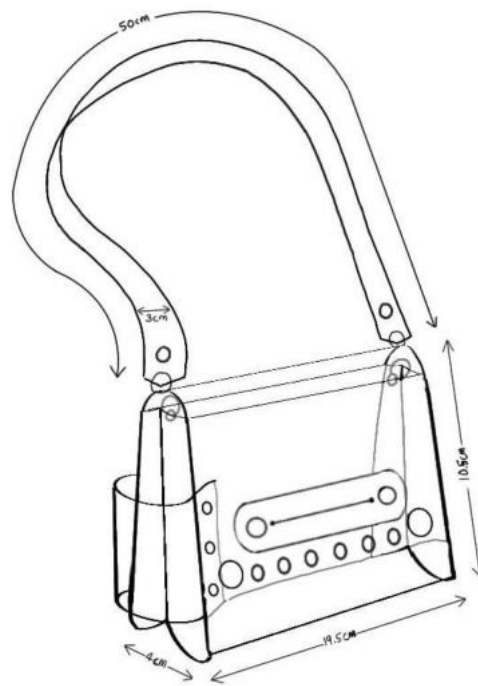
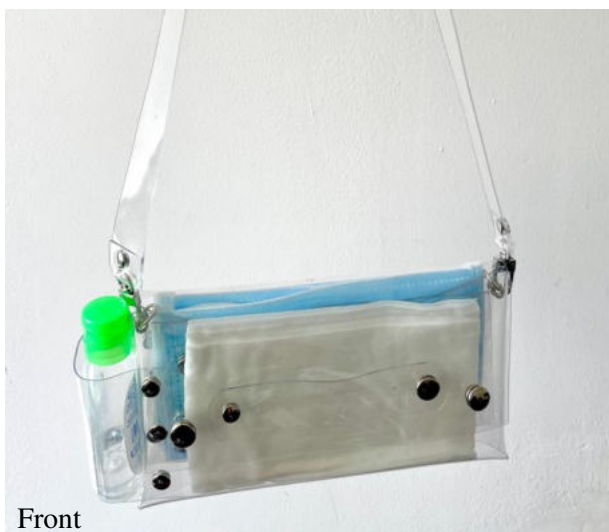


Figure 1: Illustration COVID-19 Hygiene Kit



Front



Back

Figure 2: Innovation Prototype

Moreover, this hygiene kit is water resistant and has triple compartments. This hygiene kit is made from water resistant material for the reason of to prevent dehydration of the antibacterial wet wipes and retain its moisture besides to keep the wipes secured to avoid contamination. Separation of the three essential items; dry face masks, hand sanitizer and antibacterial wet wipes is the niche element to the triple compartments which this hygiene kit is made to be. Most hygiene kit provided by some organizations, the Ministry of Human Resource for instance equipped the three items all in one compartment case. Our hygiene kit offers better and cleaner approach by separating these items.



Figure 3: Comparison between single compartment case and separate compartments case

Another great highlight of this product that it is also made from transparent material where the users will well aware of the availability of the face masks, hand sanitizer and wet wipes and know when to refill the items when they are running out.

The design of the product is unique and sleek, this will be favoured most by users who are into minimalist design and without over-the-top unnecessary accessories. Alas, the simplicity of the design will give way to users who like to accessorize which they can refashion it by pasting or adding stickers, beads, sequins or personalized name tags to the hygiene kit. Furthermore, our hygiene kit is unisex and suitable for all ages.

Plastic pollution is one of the Earth's major problems when million tons of plastic produced each year is being disposed and end up in landfills after single-use like plastic bottles, bags, food container, gloves and cups [6]. The disposition of plastics could linger for hundreds of years and with COVID-19 pandemic happened, this problem will exacerbate the global plastic pollution as the use of personal protective equipment, gloves and face masks become mandatory [7]. To reduce the usage of plastics during pandemic, the users are encouraged and advised to buy facial masks, hand sanitizer and antibacterial wet wipes in bulk rather than buying them in small packaging when replenish the items into the kit. Hence, this hygiene kit is very environmentally friendly as it promotes less plastics use.

COMMERCIAL POTENTIAL

Ministry of Education has announced that 21st March 2022 marks the first day of school opening in full capacity towards entering endemic phase in Malaysia [8]. Most of the parents are now busy making a lot of preparations to provide their kids with thing needed like new books, bags, stationaries and not to forget apparatus needed to sanitize. However, there are lack of a suitable bag that is light-weight, waterproof and with adequate compartment to keep every sanitization apparatus in one place for kids to reach.

COVID-19 Hygiene Kit may provide efficient measure to users in keeping oneself clean and sanitize over bacteria and virus during pandemic and offers better solution and convenience as one can easily reach all the items in one place. A preliminary study was conducted to eleven teenagers aged 17-18 years old from a foundation study institution shows that 81.8% would want to use it for daily hygiene practice and 72.7% are keen to buy this hygiene kit as shown in Figure 4. The cost of this product is RM 55 and from the study conducted most of them willing to pay between RM 30 – RM 60.

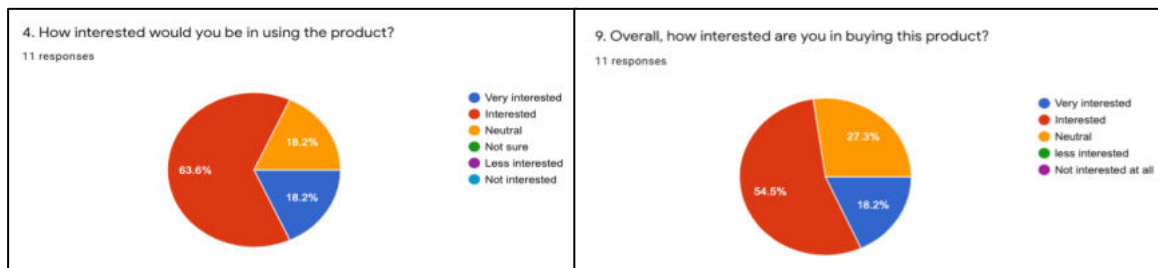


Figure 4: Preliminary study conducted on foundation students aged 17-18 years old

Optimistically, strategic collaboration is planned with some local bag designers to produce COVID-19 Hygiene Kit in various design, colours, and accessories to meet the demands of various gender and ages as well as maintaining its function to keep oneself clean and always sanitize.

CONCLUSION

Malaysia is moving towards endemic phase where new norm is practiced. This product has high potential towards to be commercialized as it provides easy usage of personal hygiene, as well as encourage us to self-refrain on plastic usage by buying sanitization apparatus in bulk and constantly refill them in the COVID-19 Hygiene Kit. Improvisation has been planned to upgrade the design and accessories to attract user.

ACKNOWLEDGEMENT

We would like to express our utmost gratitude to Centre of Foundation Studies UiTM for this opportunity and the fellow students for participating in the preliminary study case of the product.

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EBook: Understanding Islam II

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ABSTRACT

In the present challenging pandemic world, it is inevitable for learning institutions to evolve as a digitalised vocation to accommodate its students and teachers. A textbook in eBook form is usually culpable as an underestimated value for teaching and learning. Nevertheless, it is no doubt paves the way to effective teaching and learning processes. The eBook aims to help students understand the course, i.e., Understanding Islam II (a course in CFS IIUM Gombang) better. It also guides them to utilise it as a core reference before pursuing other sources that might be unsuitable for the course. The eBook is readily available for purchase and downloaded through the corresponding Google Site. Students are encouraged to read it before classes together with pre-recorded lectures. The eBook helps students to improve their understanding since they can easily access it anytime, anywhere, and anyhow. Simultaneously, it may create a firm foundation for Islamic Studies to extend the discipline to others regardless of faith, race, social standings, etc. The contents can be shared as educational videos or notes for some topics via social media. Thus, an eBook is definitely a worthwhile effort in teaching and learning.

Keywords: EBook; digital; value; Islam; CFS IIUM

INTRODUCTION

Ebook is an electronic version of a printed book to be read on a computer or a specifically designed handheld device. The COVID-19 pandemic has shifted all conventional teaching methods at higher learning institutions to an online mode. On the other hand, online learning was not initially developed and planned, thus affecting the stakeholders' adaptability, implementation difficulty, and posing several challenges to lecturers, students, and the administrative officers. The pandemic has affected universities' teaching and learning processes, including research, seminars and conferences, outbound and inbound mobility, and education delivery. The challenges of e-learning were related to the use of technology and the ability of educators to deliver the subject matter online.

Understanding Islam II is among compulsory subjects for all students offered by the Department of Islamic Revealed Knowledge, CFSIIUM Gombang, through an eBook platform. The students and the lecturers involved in teaching this subject also had to adapt and learn how to apply and teach this new experience via the eBook platform.

Ebook is pivotal to help students understand the subject since their prior knowledge can help them. It may determine the extent, quality, and nature (e.g., declarative vs procedural) of students' prior knowledge and students' expectations on the subject matter (topic/subtopic). Besides, it helps to activate relevant prior knowledge that students had/have since by highlighting main point/ use analogies/reasoning etc. The ways used by students to organise knowledge influence how they learn and apply what they know. Reading the eBook encourages them to organise material like brainstorming and further discuss the subject matter. Moreover,

effective teaching involves articulating explicit expectations regarding learning objectives and policies. The exposition and explanation of the Learning Outcomes and rubric for the assessments of the topic are crucial for students to establish goals in their studies. Students may receive feedback from the lecturers and their peers and can improve themselves day by day. Effective teaching also involves prioritising the knowledge and skills to be focused on. The eBook promotes intellectual development, clear the uncertainty or show evidences from the tradition and aspire them to be as guided by the Revelation. (Ambrose, S. A. et al., 2010, p. 10).

INNOVATION DEVELOPMENT

Since there are numerous conceptual understandings involved in the subject, it is crucial to emphasise the related terms such as the Arabic terms, specific names and concepts, principles, and categories of a specific concept etc., in a simplified manner.

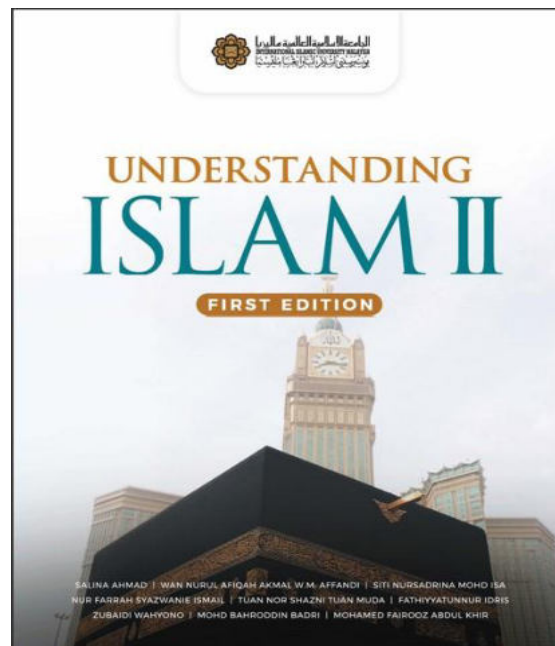


Figure 1: Innovation

أَفَقَرَّ دِينُ اللَّهِ يَبْعُونَ وَلَهُمْ أَسْلَمَ مَنْ فِي السَّمَوَاتِ وَالْأَرْضِ طَوْعًا وَكَرْهًا وَإِلَيْهِ يُرْجَعُونَ

"Do they seek other than the religion of Allah (the true Islamic Monotheism worshipping none but Allah Alone), while to Him submitted all creatures in the heavens and the earth, willingly or unwillingly. And to Him shall they all be returned."

Key words

- أسلم and سلم: to submit and to gain peace
- اسلام: submission and peace

Literal Meaning

Besides, Allah S.W.T also reveals the notion of Islam as a **religion of peace** in the following *ayah* of *Sūrah al-Baqarah*; 2: 208:

يَا أَيُّهَا الَّذِينَ آمَنُوا ادْخُلُوا فِي السِّلْمِ كَافَّةً وَلَا تَتَّبِعُوا خُطُوَاتِ الشَّيْطَانِ إِنَّهُ لَكُمْ عَدُوٌّ مُبِينٌ

Figure 2: Keywords in Arabic

from him. No one, and no particular group, therefore, should have a monopoly over him, as no one, and no particular group can claim special attention, affection or treatment from or by him except them¹⁴⁶. Plus, they equate the attribute of man to God which is having a child.

ii. Christianity

The concept of monotheism is expressed through two major sects, which is Unitarian and Trinitarian or Trinity conceptions.

a. **Unitarian** is related to the belief of the Father as the only God, and Jesus was a messenger of God. This belief was initiated by Arius (256-336) and his followers was known as Arianism. He was the Christian presbyter for Alexandrian Church. This sect still exists though they are using different names such as

Key points

Forms of Monotheism:

1. **Absolute monotheism:** belief in one God who is also the creator-God, and this God is supreme with no association with His divinity at all.
2. **Qualified monotheism:** belief in one god and this god can appear or take expressions in other forms.
3. **Shared divinity:** belief in one god, but this god shares his divinity or bestows equal divinity on other gods.
4. **Pantheism:** belief in one creator-God who resides in his creations.

Figure 3: Key points for specific concepts

Key points

Major principles:

1. Non-Discriminatory
2. Tolerant
3. Ethically progressive
4. Provide solutions

b. **Tolerant:** It should tolerate the existence of differences in belief, language, and cultural diversity among peoples of the world.

c. **Ethically progressive:** It should not oppose advancements in science and technology but rather provide universal ethics to ensure the positive consequences of such advancements.

d. **Provide working solutions to pressing problems:** It should provide solutions to humanity's problems such

Figure 4: Key points for specific principles

All of this is easily accessible in myriad devices, for instance, cell phone, tablet, iPad, laptop, kindle etc. Apart from the device, teaching materials are essential in the learning process. Adequate learning resources will be able to complement, maintain, and enrich the learning process itself (Darmawan, 2012, p.43). Currently, learning materials also continue to experience development due to technological advances. The growing development of electronic references that are easy to use and very useful has a significant contribution to the development of digital literacy. A single device is enough to read any number of books. Students benefit the most from it as they do not have to carry a bag full of books every day. It allows the user to store plenty of books on the device, way more than anyone can read in their lifetime.

COMMERCIAL POTENTIAL

The eBook is shareable content as it creates a firm foundation for Islamic Studies to extend the discipline to others regardless of faith, race, social standings, etc. The emergence of educational technologies and the conviction in the importance of the diversity of methods of

providing information and its effect on increasing student achievement leads the eBook to emerge as one of the modern technology emergencies in introducing e-content more attractively and interactively, which has never been seen before through the traditional printed book. The EBook industry made it easy to exchange information and data via the internet and mobile phones and emerged as a new type of learning; referred to as mobile learning. It provides teachers and students with the chance to acquire a large number of electronic educational materials in the form of eBook.

Moreover, it includes interactive elements as it paves the way for more exciting innovations in Islamic Studies. The interactive features in an eBook make the reading experience a more engaging one. EBook can be embedded with audio and videos and external links to offer additional information. Likewise, augmented reality can be experienced as readers can view a computer-generated 3D model of the image, which makes reading and learning a much more immersive experience. The read-aloud feature in the Ebook has been designed with text to speech or read aloud features that allow people to listen to the eBook if they are too busy to read it, for example, while driving or doing some chores. The feature is also helpful for children and adults with a learning disability or visual impairment. It is also helpful to assist the user to understand the pronunciation of words. The eBook is disseminated to the students, and a form is distributed for their feedback. It is meant to look into the effectiveness of eBooks as an e-learning method among university students. Besides, it is to identify the potential of eBooks in supporting online learning.

The eBook can be marketed to the public since it portrays a basic understanding of Islam and the language usage is concise yet straightforward. It is accessible simply by using any device, for instance, cell phone, tablet, iPad, laptop, kindle, etc.

The eBook has been marketed to the students who enrolled for the subject. The sales record is RM5010, in which the students bought 501 copies.

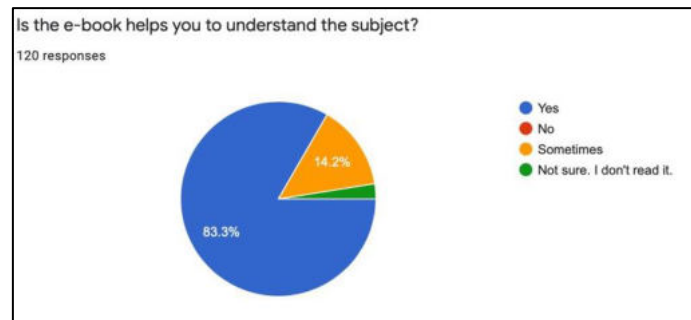
In addition, the innovation has won a medal gold in Inter Pre-University/ Matriculation Innovation Competition (PIITRAM) 2022, which was held on 2nd to 4th and 8th March.



Figure 6: Gold medal achievement

CONCLUSION

The eBook of Understanding Islam II has received significant positive feedback that more than 83% of the students agreed that the eBook does help them in their understanding of the course.



Shiratuiddin et al. (2003) discovered that using eBooks can help distance learners gain access to more teaching and learning materials. A study by Lam et al. (2010) investigated the usability and usefulness of eBooks in an e-learning environment and discovered that using e-learning can help to increase access (more readings, multimedia, and portable resources), enable remote access, and improve reading time.

It is suggested that this eBook platform be used and implemented in other courses and service courses under the Department in helping the teaching and learning become effective. Other Departments and institutions could benefit from the eBook platform too. The eBook content can be a guideline, and it should fulfil the constructive alignment of the course, i.e. learning outcomes, assessments and teaching, and learning activities. In addition, providing a rubric in the eBook can promote task assessment. Providing multiple strategies or peer review or self-assessment can promote reflection and adjustment. The exposition of the genuine matter in understanding the religion can promote true beliefs about learning. Equally, modifications in the designs, colours, graphics, etc. are a must since today's generations are exposed to the technology earlier than the former.

Moreover, factors such as lecturers, content and design of course, and university support positively affect eBook acceptance and learning outcomes. The findings indicated the important roles of these three factors in ensuring the successful implementation of the eBook platform and the effectiveness of online learning. The difficulties of adapting to online learning could be moderated and minimised should the lecturers manage to convince and engage students in an interactive teaching environment. The faculty could take initiatives to revamp the course content (slides, media information, case studies, and assessments) to suit the needs of an online mode; and the university support especially technical support for adapting to the eBook platform, is provided to the students (Arham, et al., 2021). A previous study by Muhsin et al. (2020) highlighted that good university governance, teaching quality of lecturers, and learning facilities had a positive and significant effect on student satisfaction.

In conclusion, eBook is definitely a worthwhile innovation to be utilised in today's world as it gives a lot of benefits in many dimensions, including saving the earth as it does not use any paper and saving money as the eBook do not involve any printing.

ACKNOWLEDGEMENT

The authors would like to express their thankfulness to the students who involved in this study, namely students of sections 300, 307, 802, 803, and 823 for the subject of Understanding Islam II, Semester II, 2021/2022, the Department of Islamic Revealed Knowledge and the Centre for Foundation Studies IIUM Gambang for their encouragement

and support as well as the organisers of PIITRAM 2022 for their acknowledgement of our innovation. Not to forget Madam Salina for her contribution of providing the record sales.

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Dispensable Sajdah

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ABSTRACT

Dispensable means can be used once. The word was also created by us from two other words, which are "dispenser" and "disposable," which mean the container that dispenses and one-use, respectively. The objective of this product is to make it easier for Muslims to pray at mosques without having to bring their own Sajdah. Our target market are Muslims, the owner of the mosque, or RnR. This product's unique among other products is that it is created from biodegradable materials. This product is suitable for everyone because it is very easy to handle.

Keywords: Dispense; one-use; biodegradable

INTRODUCTION

Our objective is to facilitate Muslims to perform 5-time prayers anywhere especially at the crowded place. Besides that, we also target to reduce the risk of travelers as COVID-19 virus cases all around the world drastically increase every day.

INNOVATION DEVELOPMENT

The difference between this product and other product that have been published before is our product is thin material which only as thick as a paper while other product is thick as they use is fabric instead of recycling paper. As we all know, paper is a biodegradable material which is environmentally friendly. Since the other product is thick so they will take a lot of space when bringing it anywhere or while keeping it. But our product is the best when it stored because it did not take a lot of space since it is a thin paper made sajdah. Since it is made from paper, so it is a foldable material and easy for Muslim traveler. Most importantly, this sajdah is easily disposable and easy to throw away or reuse again.



Figure 1: Design of dispensable sajdah

The design of the product is very itself. The product is made of two components which are the dispenser and the sajdah itself. We make the product to be attached to the wall for saving even more space. We can just get the disposable sajdah by pulling down the sajdah which is very convenient as it is not even tiring. The combination of color that we choose for the sajdah is black and gold. This theme will provide the look of the sajdah to be even more aesthetic and elegant as well as pleasant to the eye.

The novelty of this product is it can reduce the risk of infection of COVID-19 since it is a worldwide pandemic of this disease. As we all know, this sajdah is dispensed out from the dispenser, so the sajdah is freshly and clean to use. If we keep on using the old traditional fabric sajdah, it will increase the risk of infection as the virus will stay on the surface even though it been sanitized repeatedly. This product is relevant to use during this time because as informed that the coronavirus will stay on a surface for a long time. So, if we use this sajdah that freshly out from the dispenser and apply it on a surface where it is exposed to the virus, for sure it will reduce the infection to ourselves. After that, we can just throw it away as we throw the virus away. So, the sajdah really gives us a lot of benefits as it can prevent us from infected by the virus.

COMMERCIAL POTENTIAL

Our target market is to Muslims people. This is to facilitate prayers in crowded places such as RNR and Supermarkets. Besides that, we also ease the traveller as it can lighten their load to bring a prayer rug or find a clean place to prostrate. Finally, we also target the international market. This product brings benefits in terms of providing pleasure to all Muslims. Of course, this sales product can be expanded to the entire world, especially Islamic countries and in places that are crowded to perform prayers. The sales can rise in the global market especially during pandemic seasons as they need to avoid getting disease by sharing public sajdah. Our profit for this product is RM8.50 per unit (including non-woven polypropylene)

The materials that are required to make this product are dispenser and non-woven polypropylene. A unit of dispenser will cost us RM29.00 while the price for non-woven polypropylene is RM12.50 for the size of one meter squared.

CONCLUSION

All in all, this innovation can help a lot for Muslims because it has plenty of benefits. Thus, Muslims can pray at any place and any time by having this product. For Muslims, it is compulsory for them to pray five times a day. So, never, ever forget to do our job as Muslims and do not focus only on this world. Last but not least, hopefully this product can help all Muslims increase their spirit to fulfil their obligations.

ACKNOWLEDGEMENT

First and foremost, praise and thanks to Allah SWT, the Almighty for His showers of blessings throughout our work of this Creations-de-UiTM innovation until we finally succeed in completing the work.

Secondly, we would also like to express our deep and sincere gratitude to our lecturer, Ustazah Nik Nurul Akmal Ab Alim, our region lecturer, for the guidance and encouragement in finishing this work and for teaching us this course. It was a privilege and

honor for us to study under her guidance, therefore we were incredibly grateful to have her throughout our studies.

Other than that, we are extremely grateful to our group members for their cooperation, time, and energy in preparing this work together. All our views and opinions were discussed fairly and taken into consideration to bring a thorough discussion between us about our product. With utmost appreciation, our works finally could be compiled successfully.

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CHOKUMA

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ABSTRACT

Obesity, underweight, malnutrition and stunting are part of the health problems that are often experienced by children due to unhealthy and unbalanced eating habits. Consuming healthy and nutritious food are able to maintain body health and it is very encouraged in Islam as stated in hadith of the Prophet SAW narrated in Al- Bukhori, "Indeed you have an obligation to fulfil the rights of your body". Hence, the innovation of CHOKUMA is an initiative innovated by the researchers to assist the children practicing healthy eating lifestyle which are important for their physical and mental development while exposing the children with prophetic dietary habits. The innovation of CHOKUMA is inspired by dates- chocolate based products that are available in market nowadays. The uniqueness of this product found in this innovation are in terms of ingredients used, the texture, shapes and patterns that are favorable by children. CHOKUMA is a nutritious chocolate produced through combination of the main ingredient; dates and other ingredients such as dark chocolate, honey and almonds. The combination of this sunnah food is rich in vitamins and minerals are needed for the children's growth. The various shapes such as in animals and flowers shapes shall attract the children to consume it. The delicious taste and its unique combination of softy and crunchy texture makes CHOKUMA is favorable among the children. Apart from that, this product is an alternative source for the parents to get nutritious food to ensure the children enjoying healthy food and help them to grow up healthily physically and mentally.

Keywords: Innovation; prophetic food; chocolate; nutritious; children

INTRODUCTION

In Malaysia, the health problems such as underweight, malnutrition, stunting and obesity are vital among the children. Among the factors lead to this problem is due to unhealthy and less nutritious food consumption among the children. Consuming unhealthy foods, high level of sugar and salt like in junk food are affecting children's physical and cognitive development (Rachon & Kuzbicka, 2015; Nasir et al., 2021). In fact, they are risky to be affected with chronic health problems such as obesity and heart disease (Donin et al., 2018). To address this issue, the innovation of this nutritious and healthy product specifically for the children to imitate sunnah food-based products. Healthy eating practice among the children is vital to improve immune system and assisting physical and mental development. (Mydin et al., 2017).

The innovation of food product known as CHOKUMA is an initiative developed by the researchers to help the children enjoying nutritious food in their dietary routine while exposing the children with prophetic eating practice. The innovation of this product is inspired by the dates- chocolate based products that are currently available in the market. The peculiarity of this product in terms of its ingredients, unique texture, patterns and shapes that are favored by

the children. CHOKUMA is a nutritious chocolate produced through combination of the main ingredient; dates and other ingredients such as dark chocolate, honey and almonds. The dates used in this product enriched by minerals such as selenium, copper, potassium and magnesium (Al-Farsi & Lee, 2008; Ali et al., 2018) that are needed for children growth. Dark chocolate contains flavonoid which is good for cognitive development (Haritha et al., 2014), while honey and almonds contain minerals and vitamins to improve children's immunity body. (Mydin et al., 2017; Harmiyati et al., 2017). Fond, attractive shapes, delicious taste and crunchy texture attract children to consume this nutritious food product as their favorite choice. With the innovation of this product, hopefully the children may grow up healthily and selecting sunnah food as part of their eating practice in daily routine.

INNOVATION DEVELOPMENT

Children are easily attracted to foods that are in cute shapes, unique texture and having delicious taste (Laureati, 2022). Most of the nutritious foods that available in market are less appealing in terms of textures and tastes that children are not really prefer. With the innovation of nutritious chocolate-based product known as CHOKUMA, allow the children to consume a nutritious food, enriched by nutrients and delicious taste that definitely will be loved by them.

CHOKUMA is a nutritious chocolate-based product through combination of the basic ingredient; dates and other ingredients such as dark chocolate, honey and almonds. The used ingredients are in high quality to produce a delicious and nutritious taste. Comprised with numerous of cute shapes and patterns make this product chosen by the children. These are steps to produce this product. The first step is roast the almonds until cooked and crunchy. Then, cool and grind the almonds coarsely. Next, separate the seed dates and grind the dates. Next, melt the dark chocolate using the double boiled method and take some melted chocolate using a silicone brush around the mold before put them into refrigerator. After five minutes, remove the mold from the refrigerator, add the dates, almonds and honey into the mold. The next step is filling the remaining melted chocolate onto a mold filled by dates, almonds and honey. Lastly, chill the chocolate in the chiller for 20 minutes before they are ready to serve.



Figure 1: Ingredients

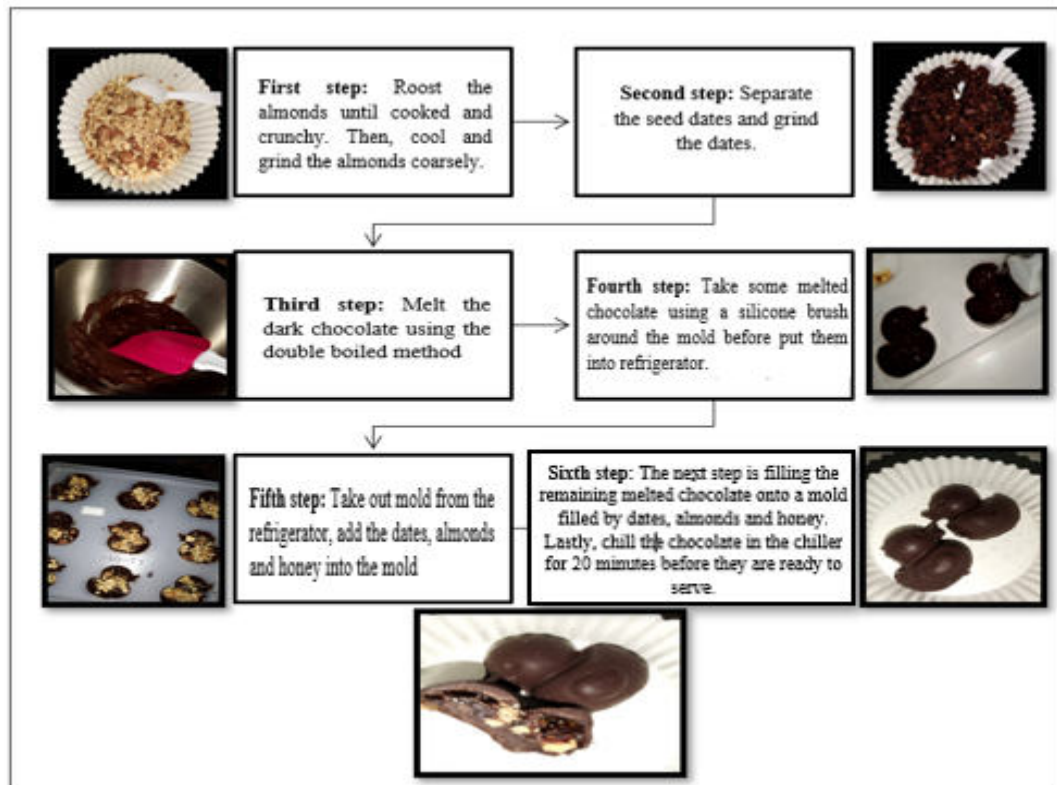


Figure 2: The process of producing CHOKUMA

First step: Roast the almonds until cooked and crunchy. Then, cool and grind the almonds coarsely.

Second step: Separate the seed dates and grind the dates.

Third step: Melt the dark chocolate using the double boiled method

Fourth step: Take some melted chocolate using a silicone brush around the mold before put them into refrigerator.

Fifth step: Take out mold from the refrigerator, add the dates, almonds and honey into the mold

Sixth step: The next step is filling the remaining melted chocolate onto a mold filled by dates, almonds and honey. Lastly, chill the chocolate in the chiller for 20 minutes before they are ready to serve.

POTENTIAL COMMERCIAL

CHOKUMA has a good potential to be marketed as it is categorized as part of the essential food that needed for human survival. This product is made from combination of dates, dark chocolate, honey and almonds which are nutritious and rich by nutrients to maintain the body health and good for development of children's mental and physical. The community prefers to consume this product as a result their level of awareness to practice healthy lifestyle is quite encouraging where they will certainly choosing healthy food products as part of the dietary routines. The Muslim consumers prefer to consume this product in order to obtain good rewards from Allah s.w.t as a result practicing prophetic dietary ethics. In addition, the Muslims

are also required to choose good and nutritious food to maintain body health. This product is more unique compared to date- chocolate products in the market where this product is a combination of dark chocolate with dates, honey and almonds. Moreover, this product has a soft and crunchy texture, appealing taste and numerous shapes in cute patterns that able to appeal children's appetite.

CONCLUSION

CHOKUMA is innovated as a healthy food product specifically for children. This product comprises sunnah foods such as dates, almonds and honey which are good for children's physical and mental development. In addition, the children also are exposed with prophetic dietary practices through this product. Hence, it is an obligation for all parties to ensure the children are growing healthily as they will be responsible towards community development in the future.

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MisTic: New Pen Generation with Dual Usage

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ABSTRACT

The importance of pen as a writing instrument has been widely known over decades. It is used during writing and drawing tasks in daily routine. The coronavirus diseases-2019 (COVID-19) shock has affected everyday life in many ways. World Health Organization (WHO) emphasizes the use of hand sanitizer to minimize the spread of the virus. Studies reported that workload causes stress. MisTic dual function eco-friendly pen with wellness applicator is an innovation aimed to improve the writing and drawing activities while maintaining proper hygiene and reducing stress in addition to soothing the tired-looking skin. MisTic is a writing instrument comprises refillable pen with pen cap on one end and wellness applicator on the other. The wellness applicator includes the roll on aromatherapy oil and spray hand sanitizer and spray face mist. This innovation reduces the use of plastic as the pen barrel is made of used papers. It has a high potential to enter the stationery market focusing on Educational Services Sector and Administrative and Support Services. A report stated that the sales value of manufactured stationery in Malaysia was approximately RM 1.23 billion in 2020. Both pen and wellness applicator can be easily carried in a single equipment.

Keywords: Innovation; eco-friendly pen; dual function; hand sanitizer; aromatherapy

INTRODUCTION

Pen is the most important device which was invented and many improvements were made over decades. Even though technology has evolved, the pen still stands as the most essential thing for writing up until today [1]. The use of pen is important for traditional read-write learners [2]. The report also stated that learning is more effective by writing than typing. In current digital learning technology, many people still prefer to just use pen to write. The cost of replacing the ink is low and affordable. Other than that, pen can be used to improve the writing skill and get good handwriting.

Since recent years, the world has been shocked with the coronavirus disease-2019 (COVID-19) crisis. In decreasing transmission of the disease, many preventive control measures are emphasized including maintenance of proper hygiene. The transmission of the virus can be prevented by proper hand hygiene [7]. World Health Organization (WHO) also highlighted the importance of hand sanitization in minimizing the spread of microorganisms. Alcohol based hand sanitizers are one of the most effective hand sanitizers which is present in different dosage forms including liquid form.

In today's modern era, the world is very demanding in terms of anything ranging from sanitation, education and beauty attraction. In education, learning and thinking capabilities of an individual is affected by mood disturbance that is caused by stress [4]. Studies reported that

preparing for exams and quizzes as well as busy schedules in university life triggers stress. The researches also reported that aromatherapy is an alternative treatment to reduce stress, produce relaxation and enhance mood. The treatment uses aromatherapy oil that is extracted from natural sources including flowers, petals and bark of plants.

Besides aromatherapy oil, products from natural sources are also important ingredients in cosmetics. Researches have formulated face mist from natural products [3]. The face mist soothes the skin and can also protect the skin from sun burn.

The COVID-19 shock has affected daily life in unusual ways. Thus, the innovation of MisTic aimed to allow people to continue their daily life while maintaining wellness. This dual function ecofriendly pen with wellness applicator allows people to continue doing their daily activities while maintaining hand hygiene. Stress level during writing or drawing tasks can also be reduced with MisTic. More than that, this writing instrument also helps to freshen the tired-looking skin and provide additional hydration. The usage of plastic is reduced by using used papers to invent MisTic.

INNOVATION DEVELOPMENT

MisTic comprises one end containing pen ink and the opposite end containing wellness applicator. Both ends are attached with permanent magnets. The pen barrel is made of used papers. The pen is refillable. The refill can be easily removed and inserted into the barrel. The ink is prevented from drying out of the pen with a pen cap which is also made of used papers.

The wellness applicator end comprises a spray vial containing hand sanitizer. The vial is refillable and removable. This end can be replaced with face mist spray vial or roll on aromatherapy oil vial.



Figure 1: MisTic covered with pen cap and attached to a spray vial with permanent magnets



Figure 2: MisTic attached to a roll-on vial



Figure 3: MisTic with spray vial, roll on vial and pen cap

COMMERCIAL POTENTIAL

MisTic dual function eco-friendly pen and wellness applicator focuses on Educational Services Sector and Administrative and Support Services. The sales value of manufactured stationery in Malaysia was approximately RM 1.23 billion as reported in 2020 [5].

CONCLUSION

MisTic comprises refillable pen on one end and replaceable wellness applicator on the other. This innovation allows people to continue their everyday life while maintaining wellbeing. The pen helps to improve writing and drawing activities and at the same time maintains proper hygiene. Other than that, it helps to reduce stress and promotes skin hydration. MisTic has a high potential to enter the stationery market targeting on Educational Services Sector and Administrative and Support Services. With the development in technology, attachment of the pen barrel and vial can be modified and improved.

ACKNOWLEDGEMENT

The authors are grateful to Centre of Foundation Studies UiTM Cawangan Selangor Kampus Dengkil for the support in completing the innovation project.

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Bitaqat Jamila: 3D Ring Book for Kids

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ABSTRACT

Bitaqat Jamila is an alternative to attract children in teaching and learning activities. The idea comes when we see how difficult to maintain children's focus on teaching and learning activities, especially teaching language to children. So, to solve this problem, we come out with this idea to help children stay focused and enjoy the teaching and learning activities. The word 'Bitaqat Jamila' comes from an Arabic word; 'bitaqat' means card and 'jamila' means beautiful or attractive. The main objective of this product is to give an appropriate method for teaching language to children. Bitaqat Jamila is 3D visual dictionary with DIY-designed glasses. This attractive card is focused on three main languages; Malay, English and Arabic. It comes with a simple and interesting pattern to make it easier for everyone to use and access. The specialty of this card is, it comes with 3D DIY-designed glasses that will make teaching and learning more enjoyable and interactive. This 3D visual dictionary is suitable and well suited to children at three to twelve years old, because at this age, the children are more active and need something enjoyable to attract them in the teaching and learning process. Besides, the price for this card is cheaper than other dictionaries, making it affordable for all layers of society. Target customers for this product are parents and educators. We believe this product will give an enjoyable and attractive learning experience to children and help them to master a language well.

Keywords: Card; attractive; children; language; 3D visual dictionary

INTRODUCTION

Teaching language to children needs a proper and suitable method to make sure their focus stay maintain (Widodo, 2005). As we know, the nature of the children is very active, so we must find an appropriate method of teaching and learning activities for them to gain an effective result. Although children have the ability to learn a language quickly, but it is not easy to maintain their focus during the learning process, because they get bored very fast if the teacher is only using the teacher-centered method (Bakhsh, 2016). Gadget intervention also becomes a big challenge in teaching children. They are more interested in the sophisticated effects displayed on the gadget than in books whose pictures are only printed on paper. Besides, most autistic children and other developmental disabilities experience severe language delays or disorders (Ganz, 2009). This problem will cause learning a language becomes more challenging and difficult for them. For example, autistic children have problems with focus and eye contact when talking to others, these problems will cause an ineffective and stagnate learning process. The other problem that we faced when teaching the kids language is, they are less interested in memorizing new words from multiple languages. So, to solve these problems we come out with the idea of this project; 'Bitaqat Jamila: 3D Ring Book for Kids' to help develop language learning in children.

Bitaqat Jamila is one initiative to help children learn a language in an interactive and enjoyable method. The word ‘Bitaqat Jamila’ derives from two Arabic words which are, ‘bitaqat’ means a card and ‘jamila’ means attractive or beautiful. This product is a memory card that is used with special glasses to get 3D images while using it. In this ring book, we have specified the dictionary of animals along with the names of the animals in three languages, which are Malay, English and Arabic. The main objectives of this 3D ring book are, to give children an attractive method to learn various languages with colorful pictures of animals and a 3D visual dictionary, making reading activity easier and more interesting by using special DIY- designed glasses and increasing the number of children proficient in basic vocabularies and nouns of multiple languages (Malay, English and Arabic). Through this innovation, we believe this product will give a fun learning experience for the children.

INNOVATION DEVELOPMENT

The innovation applied to Bitaqat Jamila is a special pair of DIY-designed glasses to view a 3D pictorial dictionary as a gadget replacement. So, Bitaqat Jamila is more user-friendly because children can see the 3D picture dictionary more easily and effectively. The main function of this product is to stimulate children’s interest and cognitive system to learn languages continuously. The main advantages of this innovation are, it has more attractive 3D illustrations, the words use in the memory card is a basic vocabulary of the children’s level, the content of the dictionary correspond to the teaching and learning process of 21st Century Learning (PAK-21), this 3D ring book is easy and fun to use and help children to recognize animals more effectively.

The tables below show the similarities and differences between Bitaqat Jamila and other dictionaries:

Table 1: Bitaqat Jamila and Kamus 3D Bergambar

SIMILARITIES:
Both assist children in learning the names of animals.
Both consist of multiple languages.

KAMUS 3D BERGAMBAR	BITAQAT JAMILA
It requires gadgets and internet networks.	It is easy to use.
It requires parental supervision.	It is safe to use even without parental supervision.
The pictures are smaller and more compact.	The pictures are bigger and clearer.
It can be purchased for a high cost.	It can be done on our own for a low cost.

Table 2 Bitaqat Jamila and Mu'jamul Mustaqbal

SIMILARITIES:
Both assist children in learning the names of animals.
Both consist of multiple languages.

MU'JAMUL MUSTAQBAL	BITAQAT JAMILA
Flashcards.	Ring book.
It's easy to become disoriented.	It's easier to store and maintain.
It uses only Malay and Arabic.	It uses Malay, English and Arabic.

Table 3 Main Material to Produce Bitaqat Jamila

(1). Drawing paper
(2). Double-sided tape
(3). Transparent colored paper
(4). Anaglyph paper

Application:

- (1). Using 3D spectacle and flash card with ring



Figure 1:

- (2). Recommended to the student to do self-revision



Figure 2

(3). Recommended to the teacher to monitor the student



Figure 3 Student wears 3D spectacle



Figure 4 Teacher holds flash card in front of the student

- i. Student needs to memorize the name of the animals before start playing, and let the student guess the card shown before moving on to another card.
- ii. If the student cannot recall the name, the teacher may show the answer to them or you can do any style of teaching.

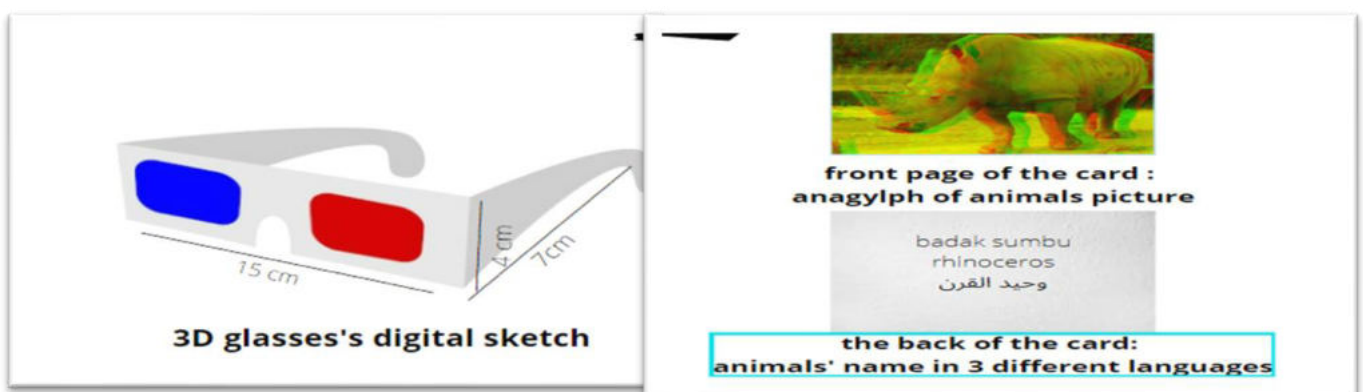


Figure 5

COMMERCIAL POTENTIAL

Generally, Bitaqat Jamila is suitable for all layers of society and exclusive for children at three to twelve years old, because at this age, the children are more active and need something enjoyable to attract them in the teaching and learning activities. Our main target customers are parents and educators because this innovation will help them in teaching activities and make it easier for them. Besides, the price for this card is cheaper than other dictionaries, making it affordable for all walks of life. In addition, parents and educators also can make it by themselves since the materials are easily be found at a lower cost. We believe this product will give an enjoyable and interesting learning experience to children and they will remember a basic vocabulary well by using this 3D card.

Materials	Cost
- Drawing paper	MYR 1.00
- Double-sided tape	MYR 2.00
- Transparent colored paper	MYR 2.00
- Anaglyph paper	MYR 0.50
Total	MYR 5.50
Selling Price	MYR 10.00
Expected Profit Margin	MYR 4.50

Table 4: Cost for This Product

CONCLUSION

Bitaqat Jamila exists as one of the initiatives to encourage many, especially children in the age range of three to twelve years old to learn different types of animals in three languages. By using this dictionary, a person's verbal-linguistic skills can be sharpened from the beginning. This product will also be refurbished frequently by improving the diversity of its vocabulary. Here are some recommendations to improve this 3D visual dictionary; diversify the contents of the picture dictionary that is not intended only for animals to expand knowledge, use stronger materials to produce 3D glasses and add more languages to Bitaqat Jamila such as Tamil and Mandarin. In conclusion, interactive and enjoyable learning activities will give effective and great learning outcomes to children.

ACKNOWLEDGEMENT

We express our appreciation and gratitude to our organizer, Creation de UiTM for giving us an opportunity to participate in this International Mega Innovation Carnival 2022. We hope through this opportunity, we will improve our knowledge and skills in the innovation field.

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Hololo.o

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ABSTRACT

Hologram is a technology that has the potential to be expanded in most fields such as education, medicine, and art. However, the application of this technology is not widely used and known in several industries. For instance, in education system hologram helps students in understanding complex mechanism by demonstrating through 3-Dimensions. To date, students find it difficult to understand complex mechanisms in 2-Dimensions in certain subjects such as studies of biology, hence lack of understanding of the concepts taught by their teachers. Therefore, the innovation of hologram technology, Hololo.o has the potential to prove the effectiveness of hologram technology in aspect of education, medicine and healthcare, arts and culture. This innovation is intended to fix the weaknesses of existing hologram technologies. Hololo.o has its own uniqueness that differ from the existing ones. Hololo.o can play variety types of videos and accessible for various languages which cannot be found in existing hologram technologies. Besides, it is lighter in weight, portable, and the price is affordable. We believe that Hololo.o can contribute to the advancement of science and technology and ease the affairs of all levels of society. Therefore, Hololo.o can be targeted to educators, healthcare providers and players in film industry.

Keywords: Hologram; 3-Dimensions; education; healthcare; film industries

INTRODUCTION

Recent technologies provided many benefits to humans in various areas of study such as education system, medicine and healthcare, and film industry. Since hologram is a technology that converts information in 3-Dimensions, it is expected to bring up a lot of advantages towards the development of targeted fields.

There are sorts of problems that we concern the most with regard this technology. Firstly, students find it difficult to understand complex mechanisms in 2-Dimensions in certain subjects such as studies of biology, hence students do not clearly understand the mechanisms taught by their teachers. However, our innovation of this technology, named as Hololo.o helps to fix the weaknesses of the existing ones in the market.

The prices of existing hologram technologies in current market are quite costly, which result in limitation in the usage of this technology. People with average income cannot afford to buy a hologram technology. Besides, the existing hologram technologies are not accessible for all languages. It is only can be used by people with good command of English.

Furthermore, most of hologram technologies in market nowadays are large in size, too heavy in weight and not portable. The users find it hard to carry anywhere as its dimension is

much bigger than Hololo.o. Hence, it cannot be moved from a place to another easily without the help of others.

Therefore, the innovation of hologram technology, Hololo.o has the potential to prove the effectiveness of hologram technology in aspect of education, medicine and healthcare, arts and culture. This innovation is intended to fix the weaknesses of existing hologram technologies.

INNOVATION DEVELOPMENT

Step 1

Cut a transparent perspex sheet into triangular shape as in figure 1. Repeat this step 4 times.

Step 2

Combine all sides of the traingular perspex just now.

Step 3

Cut a mounting board into squarish shape based on suitable sizes. Combine all the squarish mounting boards into shape as shown in figure 1.

Step 4

Compile the pyramidal perspex and squarish mounting boards just now as figure 1. Put your gadget on of it and play any videos.

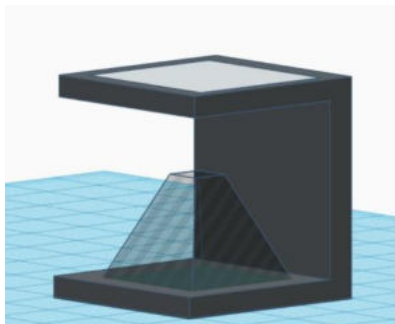


Figure 1: Prototype of Innovation (Hololo.o)

Materials:
 Transparent Perspex Sheets A4 (3mm)
 Hot glue gun
 Cutter
 Mounting board

NOVELTY

Hololo.o has a lot of specialities that make it stand out from the existing hologram technologies. Hololo.o is much lighter in weight and smaller size compared to the ones in the market nowadays. Besides, Hololo.o is powered by rechargeable battery meanwhile most of the existing hologram technologies are wired. Hence, Hololo.o is portable.

In existing hologram technologies, only certain types of videos can be played. However, Hololo.o is capable to play various types of videos. It also accessible for all languages. It is not limited to English only just like others.

Hololo.o is also made up of easily available materials. Therefore, the manufacturing costs are lower compared to the existing ones. As a result, Hololo.o is expected to have reasonable and affordable selling price. With that, the innovative features of Hololo.o have high potential to give more benefits for all societies.

COMMERCIAL POTENTIAL

This innovative product is useful to several fields such as education, medicine and healthcare, art and culture.

In the field of education, this product is capable to facilitate students for thorough understanding of their learning as Hololo.o can convert information in the form of 3-Dimensions. To date, students find it difficult to understand complex mechanisms in 2-Dimensions in certain subjects such as studies of biology, hence lack of understanding of the concepts taught by their teachers. Furthermore, Hololo.o also capable in becoming a hologram teacher for the students. Hololo.o can help students feel the real teacher and student interaction in the class.

With its own advantages and uniqueness, this product has potential to increase its sale and widen its market. In addition, Hololo.o being sold at affordable price as the manufacture of Hololo.o consists of items that are easily available. With this, the price is expected to be cheaper than hologram technology that has been found in the international market.

Furthermore, Hololo.o can project various types of videos such as in the format of Mp4, Flash video, Window Media video and WebM. This is because most of the hologram technologies found in the world market are limited to some types of videos only. Therefore, the novelty we want to bring to Hololo.o is that there is no limit on the type of video that you want to broadcast.

Another uniqueness of Hololo.o is a wide option of languages that can be used. This is because the existing hologram technology can only be used to individuals who has good command of English. In this vast world, there are different types of human backgrounds. Not all users can master that world language.

Through this approach in the technological innovation of holograms, Hololo.o can expand the use of holographic in this era. Moreover, Hololo.o can expand the involvement of this technology in various fields and without limitations. To conclude, Hololo.o can be used by all walks of life of the world because of its great potential.

Table 1: Selling Price and Profit Margin

Types of Materials	Product 1	Product 2
Transparent Perspex Sheets A4 (RM)	RM10	-
Mounting Board (RM)	RM5	-
Glass (RM)	-	RM25
Sensors (RM)	-	RM300
Aluminum (RM)	-	RM50
Capital Price (RM)	RM90	RM1950
Selling Price (RM)	RM150	RM2100
Profit Price (RM)	RM60	RM150

CONCLUSION

All in all, studying science and developing technology in this world are some of the things that need to be prioritized. This is because, all these innovations and invented designs will help in facilitating the lives of society from various aspects such as education, medicine and so on. Hololo.o has the potential to boost the efficiency of hologram technology in aspect of education, medicine and healthcare, arts and culture. It is also an innovation to improve the function of existing hologram technology while reducing its weaknesses. In the future, we hope that hologram technology can be widely used with the creation of powerful systems such as the use of overarching IoT. In addition, we also hope that hologram technology in the future will have a clear sound system and higher image quality. Lastly, we hope that hologram technology will become more accessible and cheaper in upcoming future.

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Hey, Rhythm!

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ABSTRACT

Our modern digital era forces us to use devices that emit blue light, also known as high-energy visible light (HEV light), 24 hours a day, which results in the symptoms of addiction, causing us to be undisciplined, reducing direct family time and lack of interest in reading [1]. Instead of using a phone to set a time, which is still a technology that produces hazardous light, we invented Hey Rhythm to manage our time so that we can be more disciplined and minimize addictions to electronic devices. At the same time, direct family time still occurs in our everyday life. Hey Rhythm has three buttons that are made from squishy substances to help people divide their time between reading, going outdoors and spending time with family while releasing their stress. It is also portable because it comes with a keychain that makes it easy to handle. It has a digital timer to set a specific period of time and even comes with an alarm to alert you about the timing. It also comes with the colour of black and white which looks more elegant and stylish, made from stainless steel and there is a seal as a cover. This product aims to enhance teenagers' skill in managing time wisely by having a digital timer to set a specific period of time for specific activity. It is also helping teenagers from having too much stress in everyday life activities or academic activity for university or school students [10] by using the three buttons to do other enjoyable activities while giving the effects of ASMR when clicking the buttons, and it reduces the gadget addiction by setting the choices of mode of time given. Hey Rhythm will be easily commercialized especially to the teenagers, parents and educators. As a conclusion, this product will be really helpful to humans so that they can enjoy their life meaningful to the fullest.

Keywords: Time management; teenagers; addiction to electronic devices; discipline; family time

INTRODUCTION

Nowadays, the use of electronic devices is not a will anymore but it is more to a need. It is something compulsory especially for teenagers that results in tons of problems. The first problem is that electronic devices can affect teenagers' eyes because all electronic devices will expose their eyes to blue light or in other words, high-energy visible light (HEV light), 24 hours a day. This leads to eye diseases such as long-sightedness etc. Next, it can make teenagers to be undisciplined in managing their time wisely because they tend to focus and give more time to one thing that they want to do at one time which makes them complacent and end up wasting time for useless things. Furthermore, it can reduce social time with people around them like family and friends. This is because they spend too much time using their electronic devices in doing any particular thing [6] that causes them to lack time to spend with their family or friends.

Thus, from all the problems stated above, it leads us to produce Hey, Rhythm! with four main objectives that we want to accomplish. Firstly, we want to reduce gadget addiction amongst teenagers so that they will not experience eye diseases at an early age. At a very young age, they already have to wear contact lenses or spectacles because of the addiction to using gadgets. Besides, we want teenagers to be more disciplined in managing their time wisely [11] as they are wasting too much time in front of their gadgets doing useless things such as scrolling their social media and playing games. Moreover, we want to teach time management to teenagers because of their inability in managing their time wisely. Lastly, we want teenagers to have more time to spend with their family and friends. On the grounds that they spend most of their time towards their gadgets and not towards their communication between themselves, family and friends.

Hence, the motivation of this innovation is to settle all the problems by accomplishing all the objectives for the innovation of “Hey, Rhythm!”. We created this product because instead of using gadgets or electronic devices like smartphones to set an alarm, teenagers can use “Hey, Rhythm!” to set an alarm for beneficial activities. Hence, we make the three buttons specifically for three activities which are doing outdoor activities, learning times or spending time with family and friends.

Through this product, teenagers can reduce their addiction to using gadgets or electronic devices which will benefit them as they will not be exposed to the hazardous light that can badly affect their eyesight at a very young age. [6] In addition, they also will be more disciplined in managing their time wisely as they get to gain the knowledge on how to manage their time by using “Hey, Rhythm!” to arrange their daily schedule for more beneficial things. In short, by having good management time, they will have more time to socialize with their family and friends which leads to a healthy lifestyle for them physically and mentally [5].

INNOVATION DEVELOPMENT

Since the main idea of creating Hey Rhythm is to ensure that users will be able to manage their time productively and reduce stress along the way, the device has been specifically designed to fulfil these criteria as well as have additional features to make it stand out from other similar products in the market.

One of them is that the buttons are constructed of a squishy material that has been shown to relieve stress, hence the term “anti-stress pad.” The buttons also have custom illustrations on top of them, such as images of the sun for being outside, books for reading, and people for being together as a family. This is to ensure that users can distinguish between the functions of each button and use them accordingly. From there, the user may utilize a three-in-one timer to divide their time into three segments: going outside, reading, and spending time with their family, all of which will help them reduce stress in their daily lives.

Hey Rhythm is fastened to a keychain to make it easy to carry about. This allows the user to take the timer with them wherever they go. As a result, they will not have to worry about the timer getting lost or misplaced because they can attach it to a familiar place. Hey Rhythm also contains a digital timer to keep track of the time. A digital timer, as opposed to an analogue timer, allows the user to specify the exact time they desire, decreasing the risk of mistakenly setting the wrong time. In addition, the digital timer has two buttons, one pointing upwards and the other downwards.

The buttons represent an increase or decrease in time, with upwards indicating an increase and downwards indicating a decrease in time. As a result, users can set any duration they desire, no matter how long or short, because the activities can be tailored according to their needs. When the timer runs out, an alarm will sound, alerting the user to stop the current activity that they are doing.

To use Hey Rhythm, firstly determine which mode the user prefers. As stated before, each button carries a different mode activity so choose which activity either reading, going outdoors or spending time with family that you want. After choosing the preferred mode, set the time that the users want for how long they want to spend on the activity. To do that, simply press the triangle button where the red downwards triangle will decrease the time while the green upwards triangle will increase the time. The time period will be displayed on the digital screen. When the user has already set the time that they want, they will then have to push back the image with the mode that they have selected before to make the timer go on. Once the timer is alive, the beeping alarm will be set and it will notify the user once the time has ended.

Since the primary target audience for Hey Rhythm is teenagers, fashionable colours such as black and white are offered. This is due to the fact that both colours are considered timeless and may be mixed and matched with any other colour. If the teenagers choose the black-colored device, stains and scratches are easier to hide, making the timer more sturdy and long-lasting. Hey Rhythm also has some safety measures, such as a stainless-steel body and a seal that covers the front half of the timer. This is to prevent the device from rusting and easily denting. Furthermore, the cover will ensure that users can always see the time clearly without any cracks or scratches.



Figure 1: Hey Rhythm models in colour black and white.



Figure 2: The mode buttons; books symbolize reading, sun symbolize outdoors and humans are for family time.



Figure 3: The timer buttons; green button will increase the time and red button will decrease time.

COMMERCIAL POTENTIAL

As we know in this modern era, people spend most of their time on their gadgets and kind of forget their responsibilities as a human. They did not exercise, read books or spend their time with family members anymore, especially the teenagers. So, we created this Hey Rhythm to help people who have problems with managing their times for daily activities. After doing some research, we decided to focus on three categories which are parents, teenagers and educators. These people need something to guide them to manage their time properly since these people are most likely to be the busiest people. We can't deny that as young people we are interested in gadgets so that's why we created this timer with the help of technology so we can attract our customers. This device is created with three important buttons which are for reading, outdoor activities and family time. The users can set their own time according to their daily activities to make sure they do something beneficial and can reduce their stress.

Is it important for someone to spend their time on reading? Even though we know that in this generation we already have an e-book,[3] we still need to make sure our eyes get some rest and we are not forcing it to watch the screen with blue light for a long time to reduce eye

problems. In this device, we put a reading button as a reminder to our user that it is the time to stop using gadgets and pick up the physical book instead. Besides that, our users can improve their knowledge by reading instead of wasting their time scrolling through social media [9].

Next, as human beings, we need to exercise to stay fit and to create a healthy lifestyle. Spending too much time on gadgets can make us stress, feel drowned and burn out.[6] So we came out with a solution. In Hey Rhythm we provide another button with the symbol of sun to remind our users that it is time to do some physical activities such as jogging or playing football. Our users can also do some indoor activities such as yoga or simply just baking. It is time to distract ourselves from using too many gadgets. Spending too much time on gadgets can make people sick. Not only physical health but also our mental health [6]. We need to make time to enjoy ourselves without caring about the outside world. Self love is the most important thing to be achieved.

Lastly, we put a button with a symbol of family. So the main purpose of this button is obviously to remind our users to spend their time with their family no matter how busy they are. After doing some research we found out that teenagers are most likely to ignore their family time and stick to their gadgets. As we all know how important it is to do family bonding, some people still did not pay too much attention to it [5]. It is important to do family activities such as picnics or simple talk in the evening so we can get close to each other and at the same time reduce stress. Devices like Hey Rhythm are not found in the market yet although we all know the importance of managing our time properly.

Hence, Hey Rhythm is created to remind people of the importance and the benefits when you know how to manage your time properly. This device can be used by anyone such as parents, teenagers and educators. For university or school, they can provide these devices to their students so they can learn about managing their time properly [8] and at the same time we can reduce the addiction toward gadgets.

CONCLUSION

In conclusion, we aim that our products, Hey Rhythm, will be commercialized soon thus becoming the products that will assist more and more people to come. Hey Rhythm will help to reduce addiction to gadgets that have been happening throughout the youth generation. We wanted to solve the eye problems at an early age that happens because of emission of blue light by gadgets 24 hours a day as they loved to be with their phones and laptops. We also wanted to help in making sure that the teenagers will be more disciplined in managing their time wisely [4]. This is because they are wasting too much time with their gadgets playing games and scrolling social media and thus forget to enjoy the beauty of the world.

Moreover, this product has been created to teach people how to manage their time especially the teenagers as they are lacking the skills of managing their time wisely [2]. Last but not least, we wanted the teenagers to have more time to spend directly with their family and friends, spend more time for reading to improve knowledge and reading habits [7]. This is because teenagers tend to spend most of their time on their gadgets, not towards their communications skills with their family and friends which are very crucial in daily lives. With the help of Hey Rhythm, people will be enjoying their full human potential everyday which leads to a healthy lifestyle and thus making the future of the globe to be brighter.

Therefore, we target that for the future planning, we will improve our products by the comments and critics of the people who are using this device. However, what comes to our minds is that we wanted our products to be commercialized to the entire globe with new features which is to make Hey Rhythm to be smart timer that can be connected with smart watches and maybe add some interesting features such as an Artificial Intelligence (AI) so that it can help in getting all the statistics of time that they used and even help in education problems by making it more interesting compared with traditional methods.

ACKNOWLEDGEMENT

The idea of developing Hey Rhythm starts from the team of researchers' observations on the need to provide a product that can help give a better and more meaningful life. However, efforts would not have produced results without a platform to further work and test on the idea. Therefore, we express our greatest appreciation and gratitude to our employer Centre of Foundation Studies, Universiti Teknologi MARA (UiTM) for organizing the International Innovation Competitions that provides a chance for our efforts on this innovation to be highlighted.

Besides that, Centre of Foundation Studies, UiTM also sponsored the participation of the research such that the monetary incentive provides motivation and eases the funds of research to present the idea to the general public. Appreciation is also extended to fellow colleagues, lecturers in Centre of Foundation Studies in UiTM, Dengkil Campus, Selangor who provided ideas and lend helping hands to develop the Hey Rhythm as well.

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Smart Ergonomic Pen

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ABSTRACT

The pen has become a very well-known writing tool up until now. The evolution of the pen over time demonstrates how vital this writing instrument is in everyday life. However, modern commercial pens appear to have problems as well. The problems that are caused by the pen include developing writer's callus, smearing of ink across the side of the palm, and contributing to plastic waste. Hence, the objective of this innovation is to create an ergonomic pen with erasable ink that has a non-slip and comfortable grip, a good weight balance, quick-drying ink and is durable. As this innovation is based on ergonomics, aspects such as shape, weight, grip, and ink flow are all taken into account to enhance effective handwriting. The ergonomic pen is long and thick, light, comfortable to hold, and has a ballpoint tip with low-viscosity ink. New features have also been introduced to this innovation to boost the novelty of this product. Erasable and refillable ink, a laser pointer, and an audio recorder are among the features. This product is targeted at office workers, people suffering from arthritis or finger joint discomfort, high school students, and university students. Therefore, it is expected that this innovation would make it easier for individuals to do their daily activities, particularly for students and office professionals who are used to writing with a pen almost all of the time.

Keywords: Smart ergonomic pen; erasable ink; audio recorder pen; writer's callus

INTRODUCTION

A pen is a writing or drawing tool that uses a coloured fluid such as ink to write or draw. Over time, the pen has evolved from quill pens, which had to be dipped into an inkwell regularly, to ballpoint pens, rollerball pens, fountain pens, and ceramic tip pens, all of which have ink reservoirs and do not require dipping in ink while writing [1].

While the pen has been shown to contribute to brain activity patterns associated with optimal learning through handwriting activity [2,3], the long-term usage of the pen causes unwanted problems. Firstly, due to its small grip size, it can develop a writer's callus. Calluses occur when skin creates a thick and hardened layer of dead skin cells to protect the underlying area of skin. The formation of callus happens when there is repeated pressure against the skin [4]. These bumps usually appear on the middle ring or ring fingers wherever the writing tool puts pressure against the hand. Even though these calluses may not appear to be harmful, they can cause occasional discomfort and painful episodes by extreme pressure of writing tools during prolonged writing such as during examinations. Next, due to its slow-drying ink, it can smear across the side of the palm and leave ink stains on the hand. Ink stains removal can be a tedious task at times especially when it stains clothes. Other than that, single-use pens contribute to plastic waste. This is because once the pen runs out of ink, it is worthless and there is no

other alternative except to discard it. No doubt throwing countless pens away leads to the accumulation of plastic trash in landfills, which eventually pollutes the environment [5].

Thus, we would like to suggest a solution to these problems which is an ergonomic pen with erasable and refillable ink. The goal of this innovation is to make a pen that has a non-slip and comfortable grip, a good weight balance, quick-drying ink, durable and multifunction.

INNOVATION DEVELOPMENT

Unlike ordinary pens, our ergonomic pen distinguishes itself by allowing users to use the gentlest grip possible and the least amount of pressure feasible when writing. Ergonomic factors like shape, weight, grip and ink flow are all considered in this innovation to effectively promote efficient handwriting skills [6,7]. There are also new enhancements that are added into this innovation like erasable and refillable ink, laser pointer, and recording function to make it multifunctional.

This ergonomic pen is long, balanced, and thick as these features make it easier to physically grasp. It also comes in a smooth curve figure to make it a more ideal ergonomic pen. An ideal pen should be light enough to grip comfortably yet hefty enough to write without exerting pressure. Thus, this ergonomic pen is tip-heavy as the weight will naturally push the tip down, whereas a top-heavy pen sways with each stroke, pushing the hand to grip harder to compensate. A good grip is also needed to assist relieve finger discomfort. Thus, instead of using slippery metal or plastic surfaces, this innovation comes with a circular rubber grip because it is gentler for fingertips to hold to. Lastly, the way the ink flows is also taken into account as good ink flow requires less exerted force. Consequently, it decreases tiredness as it prevents and reduces wrist and cramps. Thus, a smooth-flowing ballpoint tip with low-viscosity ink is used in this innovation as it offers readable, and more appealing handwriting. Furthermore, using oil-based ink, promotes smudge-proof handwriting, especially for left-handed users since this type of ink dries faster compared to other ink like water-based ink.

This innovation has also been enhanced with new features to increase the novelty of the product. The ink employed in this invention is erasable and refillable. This function makes this pen more practical than normal pens as it eliminates the need for users to purchase correction tape or liquid paper to cover up their mistakes while writing. In addition, it also has a laser pointer at the tip of the pen that allows the audience to be more focused on certain areas emphasized in the slides and can assist the audience to gain a better understanding of the issue being discussed. In addition, this ergonomic pen has a recording function. Since it features a built-in DSP noise reduction chip, the digital audio recorder can do HD remote recording while still providing good sound within a 10-meter range. This pen has a memory capacity of up to 16 GB.

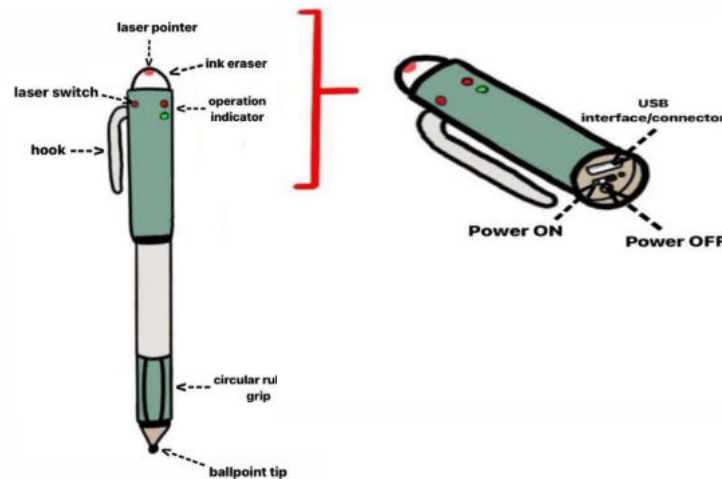


Figure 1: Innovation prototype with labels

This innovation is extremely user-friendly because it is simple to operate. When it comes to the erasable feature, users can erase the errors by rubbing the ink at the rear of the pen against the mistake on the paper, and it will vanish in seconds. After that, users simply need to press the laser switch button as indicated in Figure 1: to utilize the laser pointer. To use the recording feature, customers must first turn on the power ON button within the pen (as shown in Figure 2), after which the operation indicator will light up. The pen is recording when the red light is on, and it is not recording when the green light is on. Users will be able to play the recorded audio by connecting the USB interface/connector to a computer through a USB cable.

COMMERCIAL POTENTIAL

Firstly, in terms of the market potential, this pen can be used for all ages who are capable of writing and using any pen properly, however, this product is targeted to be an attraction among the young to adult between the age of 12 to 38. Nowadays, people around this age tend to do many presentations, thus our pen with a laser pointer enables users to present efficiently by allowing the audience to be more focused on certain points highlighted in the slides. Furthermore, since this pen includes a recording function, it is extremely beneficial for high school and university students who are discussing with their team members or listening to a brief lecture. Users may relisten to it afterward and still scribble down any vital information that they may have missed during the brief lecture or discussion.

Apart from that, individuals suffering from arthritis or chronic hand pain often have difficulties in writing for a lengthy period of time [8]. A rubber grip can potentially give comfort to individuals suffering from arthritis or finger joint discomfort by reducing repetitive pressure against the skin. Thus, this pen is a great investment for those who suffer from arthritis or chronic hand pain to get more work done in a more effective manner. Finally, this product is targeting users who want to buy quite expensive products but have the potential to be used for a really long time. Therefore, our product has erasable and refillable inks, which indicates that it is handier since users do not need to buy correction tape or liquid paper to cover their mistakes when writing. Eventually, this is a very reasonable bargain for these targeted users as users are able to save their money and they do not have to hassle with constantly buying it at the store. It is also good for the environment because there is no doubt that after these additional stationeries are finished, they will be thrown away in the trash can, which can lead to an accumulation of plastic waste in landfills and pollute our precious environment.

Table 1: Table of estimated cost

Item	Quantity	Price	Total
Silicone and anti-roll rubber grip	1	RM12.50	RM12.50
Ballpoint with low viscosity	1	RM10.00	RM10.00
12cm plastic ziplock bag	1	RM5.25	RM5.25
Audio recorder set	1	RM168.00	RM168.00
Erasable ink	1	RM4.20	RM4.20
Total Price			RM199.95

For this product, we are proposing to sell it for a price of RM 220 per pen. Thus, the expected profit margin is RM20.05.

CONCLUSION

Thus, the purpose of this innovation has been met, as the goal was to create a pen with a non-slip, and comfortable grip, which was accomplished by the use of a circular rubber grip to make it easier to handle the pen. In addition, the pen must have a proper weight balance, which can be achieved by using a tip-heavy design. It also features a quick-drying ink and a sturdy ballpoint tip.

Following the implementation of this invention, we discovered that our products may be improved to be multi-functioned by using future technologies that are far more advanced. Firstly, the pen which comes with a recording feature can be improvised by adding a microphone for dynamic noise cancellation, thus making it easier for the client to record because they will be able to hear well. The pen can also be used to add songs because it has the same feature as an MP3, thus the customers can listen to their favourite song by connecting their earphones to the pen. Additionally, the pen should be available in a variety of colors to attract customers of all ages. Lastly, in the future, the pen can be developed by providing a small space in the pen where customers can place memo notes for writing. This allows customers to make notes anywhere they want without having to worry about searching for papers to write.

Therefore, we hope that our innovation will make it easier for people to carry out their daily tasks, especially students and office workers who are accustomed to writing with a pen virtually all the time.

ACKNOWLEDGEMENT

First and foremost, we would like to express our gratitude to the Almighty for the blessing and strength to complete this innovation on "Smart Ergonomic Pen " for Creations de UiTM International Mega Innovation Carnival 2022, together despite being away from each other.

We would like to thank MARA University of Technology along with its strategic partner, Malaysia Innovation Foundation, and Pusat STEM Negara for conducting such a wonderful programme that only comes once in a lifetime. Besides, we also are extremely thankful to Ts. Najwa Rawaida Binti Ahmad @ Ahmad Fauzi for her briefing and guidance from the very beginning, as well as for providing necessary related information about the Creation de UiTM programme. Her willingness to share her vast knowledge helped us to understand this project and its manifestations in great depth and completed the assigned tasks on time.

Finally, we would like to extend our appreciation, particularly to our teammates for their full commitment. We appreciate everyone's assistance and effort to make this project successful.

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An Application for Students: Vector Scavenger Hunt

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ABSTRACT

This is the compilation of the introduction and innovation of Vector Scavenger Hunter. This will contribute to the understanding of an easier way to better understand vector topics. Concisely, this project occurred when the problems faced by students, lecturers, and their grading clearly could be seen through the phase of the pandemic. There is no other way to describe that the topic of vectors is quite confusing for students, especially for those who have lost interest in studying this syllabus. Perhaps the development of graphics, simple notes, a variety of answers, and different levels could pique the target group's interest. There are so many ideas we must emphasise in our prototype before we can succeed in declaring it as an app that can be used worldwide. Before we finalised the idea of this prototype, we already analysed and discussed the commercial potential for this innovation. We used the target of students and educators to thrive in this project, and certainly, we had to use some costly methods to succeed in this project. At the end of the discussion, we took this matter seriously in the hope of attracting the attention of others and organisations that could help us develop our project more.

Keywords: Vector; Vector Scavenger Hunt; students; prototype; development

INTRODUCTION

One of the most significant parts of most academic organisations striving to achieve their aims and objectives is innovation. It leads to a shift from old learning approaches to new and enhanced ones. All of these strategies will attempt to answer issues that lecturers are frequently asked about the worth of lecture outcomes and the services provided by these organisations. The necessity to develop attributes that encourage creativity is critical to an academic's success. Furthermore, a favourable learning environment in which such innovators might thrive is required. There is also a requirement for students to come up with approaches or effective methods for differentiating priorities when it comes to resource distribution. This study will focus on the issue of original models and theories of innovation, as well as their evolution. The consequences of the innovation process on students will also be discussed in the article.

Several problems occur when students try to learn and understand the topics of vectors. First and foremost, students face the challenge of understanding basic knowledge of vectors, which are magnitude and direction. They forget to analyse that a vector is a movement from one point to another where a vector quantity has both direction and magnitude. Secondly, problems here arise when students become unmotivated to study the vector-based syllabus because of the uninteresting graphics. This innovation not only introduces new graphics, but also new ways (route and level) to answer all of the questions. Last but not least, the sources of vector learning may be limited and the questions may also not be updated, so with our Vector Scavenger Hunt, it will ease the path to better understanding.

Our product, Vector Scavenger Hunt, is based on the treasure hunting game, but we integrated it into the learning process to help students gain a better understanding. This innovation was created using PowerPoint since it would be a user-friendly application. However, by utilising Power Point in the production of this project, development expenses may be decreased, allowing this product to reach the project's target market of students. We needed to widen the breadth and speculative nature of our ideas to attract the full attention of students, therefore we created this prototype using Microsoft PowerPoint to convey the specification and features of our product. Students lose interest when there are no simple notes; this prototype provides notes where students may reflect on each level and reach their mastery level of the topic. As previously said, this app we wish to develop is based on a treasure hunt game, thus the learning result style was preserved, but the benefits were that students were able to pique their interest in studying vectors in a novel way.

We can examine three mechanisms in order to understand the goals of these innovations. From the perspective of students, we try to pique their interest in studying vectors by using different styles of learning with the Vector Scavenger Hunt. Next, our objectives are to help lecturers and all educators in their teaching efforts. Thirdly, we look through the mechanism of a student's grade where these objectives are focused on to help them improve their grades. To improve it, we need a speedy way that is also interesting. As we know, we live in a digital era. By developing this feature, we take the advantages of a technologically based educational system and apply them to this feature, apply it as a prototype first, and if it gets the attention of others, we hope it can be developed and made into an app. As for Online Distance Learning (ODL) being held for the past two years, it is clear to us that innovation motivation occurs when educators face the hard time teaching students where all of them stay in different places. With these innovations, we hope they can improve the system of teaching and learning from both sides. Not just that, students also faced so many challenges in studying, understanding, and mastering this vector chapter. So, we hope that by developing this prototype of the Vector Scavenger Hunt, it can help more students and lecturers improve our educational system. This project was designed primarily for students like us, with the goal of reducing problems in the future.

INNOVATION DEVELOPMENT

Vector Scavenger Hunt is designed with PowerPoint as it will be a friendly users app. Nevertheless, by using PowerPoint in development of this project, development cost can be reduced so this product can reach the target market of this project which are students. When opening the app, students can choose the level of the game based on their knowledge. Notes are provided for them to reflect which levels are suitable for them and meet their level of mastery of the topic.

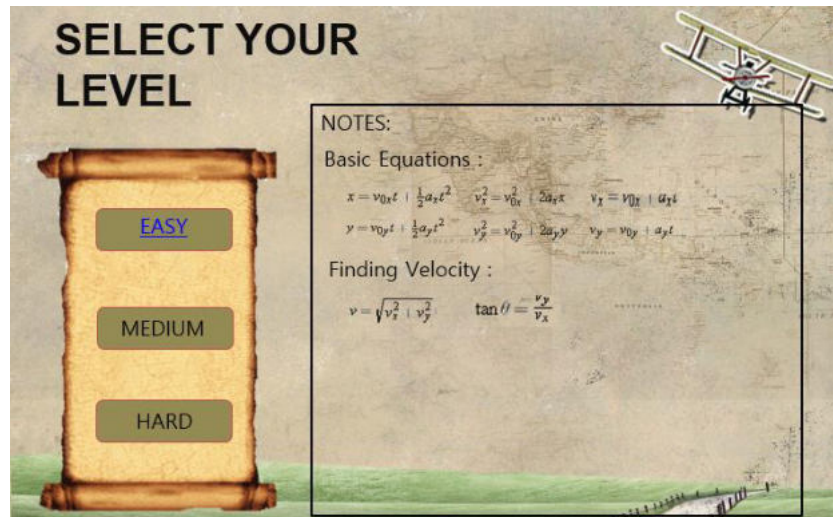


Figure 1: Part of the application that let users to choose the level

After clicking on the level, a map will appear. Students need to choose their route so, even at an easy level, they have four different routes with different arrangements of destinations. This is one of the uniqueness of this application, because it will help students to really master the vector topic step by step as they need to complete four different tasks to proceed to medium level. This technique is very important for students to understand the basic knowledge of vectors. It is because previous studies showed that most students did not master the vector because they were confused about the components and the vector itself. Students are prone to mix up the magnitude of each component and the magnitude of the vector [2].

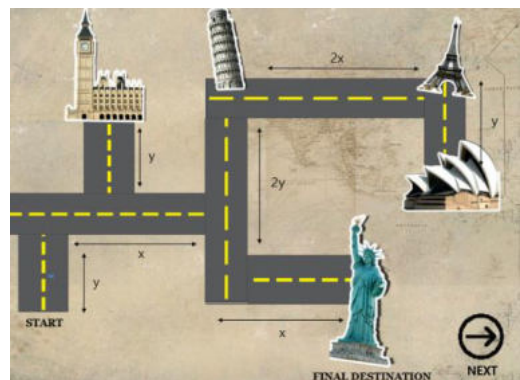


Figure 2: Map in easy level

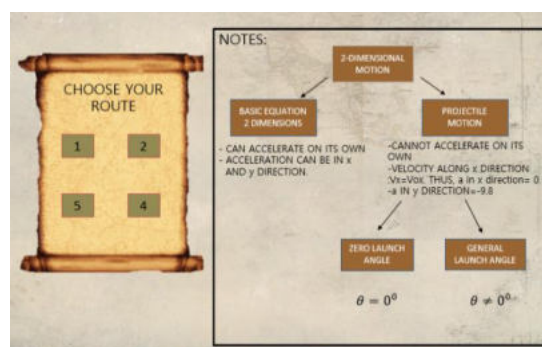


Figure 3: Four different routes in easy level

Next, clue will be provided to proceed for the next checkpoint. This clue is to make the game become more fun and can also increase some general knowledge. Right answer will bring students to the vector question.

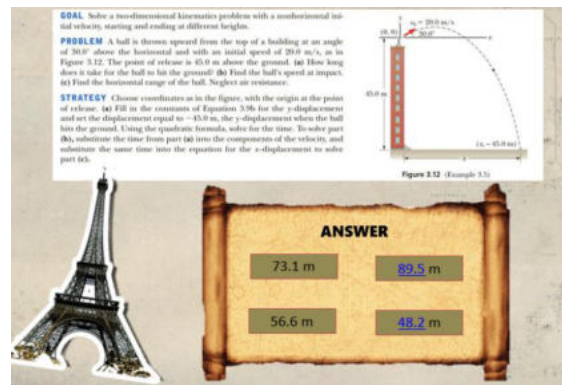


Figure 4: Clue for the next checkpoint



Figure 5: Vector question

Time is given to solve the problem but no punishment if the time is exceeded or if the students' answer is incorrect since the objective of this application is for students to do reinforcement, not assessment. When students are able to answer correctly, solutions with explanations will be provided for them to improve their understanding.

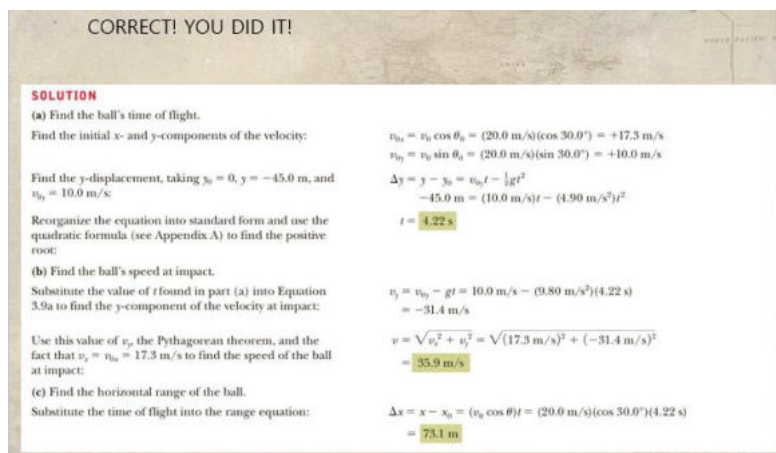


Figure 6: Solution and explanation

At the last checkpoint, they need to calculate the vector of their starting point and the final destination. The correct answer will lead to the treasure and one of treasure is a key to enter the next route or level.

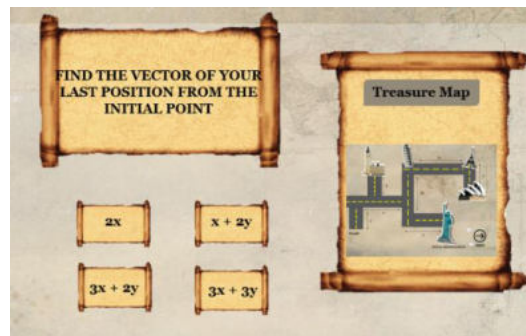


Figure 7: Final question

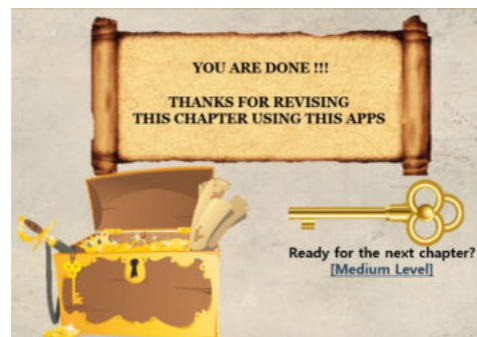


Figure 8: Victory

COMMERCIAL POTENTIAL

Vector is a very important topic to master in order to ace in Physics because the concept is going to be used in almost every other topic in Physics. However, sometimes classes can be quite boring and students cannot be able to focus on this topic, especially now with online classes. This will lead students to not be able to understand other topics in physics and will eventually put a grudge on Physics. Therefore, with this innovation, the problem can be overcome gradually. Students can use this application to practice their understanding in the topic vector. Teachers can also introduce this application to their students in class to make learning more fun.

Since we already have a prototype for this application, the only step that is left next is to publish it as an application on either Google Play or Apple Store. It can be downloaded in every mobile gadget and can also be searched on websites. This innovation can allow students to practice physics vector problems anywhere and anytime they want. This will reduce the stress level that students have while learning. We believe that this application will be received and welcomed well by our target audiences which are secondary school students, foundation and matriculation students, first year bachelor in physics, teachers, lecturers and even primary school students.

This application will cost \$25 or RM105.00 once to be published on Google Play Store as a registration fee, and will cost \$99 or RM416.00 yearly to be published on Apple Store [1]. Our main idea and purpose for developing this application is to help students who are struggling

with the topic vector, so this application can be downloaded freely by anyone on Google Play Store.

This innovation has been brought into other competitions and has won a gold award in AICD 2021, and a silver award in IIDEX 2021. It has also been acknowledged by MyIPO IP Online System under case number LY2021E03379, case type Copyright Voluntary Notification.



Figure 9: Related IPR

CONCLUSION

In summary, with this Vector Scavenger Hunt, students can slightly overcome their problems with the topic vector with a low stress level. This is because they can learn and practice the topic while playing a game that is similar to treasure hunting virtually. For future development, this application is imagined to be developed using a coding system for more smoothness while playing the game and also for more facilities like a timer, more hints, and flashcards to do some notes. In addition, this application can also be improvised by adding more topics related to physics such as Torque, Electric Charges, and Optics using a different approach. We hope that with this innovation, life as a student can be fun to remember because of the lack of stress.

ACKNOWLEDGEMENT

We are overwhelmed with humbleness to express our gratitude to all those who have assisted us in putting ideas in this project, which is much above the level of simplicity, into something solid. We would like to express a heartfelt gratitude to our supervisor, Madam Asyikin, for providing us with the fantastic opportunity to work on this wonderful project which is Vector Scavenger Hunt in Creations de UiTM 2022. This allowed us to do a lot of research and learn a lot of new things while completing this project. We owe her a debt of gratitude. We also would like to thank our family and friends because without the support and guidance from them, no endeavour at any level can be done satisfactorily. They provided us with various suggestions for making this project stand out.

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Improvement of Mulberry Yields with the Aid of *Bacillus salmalaya* Strain 139SI

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ABSTRACT

When considering the benefits and drawbacks of inorganic fertilizer, the impact on the environment is a major consideration. The production of inorganic nitrogen fertilizer necessitates great heat and pressure. Inorganic fertilizer has a direct impact on the environment in the area where it is applied. Inorganic nitrogen fertilizer is only used by around half of the plants in the region where it is utilized. Interested in *Bacillus salmalaya* strain 139SI, a new found research bacteria as the potential biofertilizer to increase the crop yield of mulberry saplings, the goal of this study is to assess the impact of *Bacillus salmalaya* strain 139SI inoculant on the height of the mulberry saplings, the number of leaves and eventually the yield. The results demonstrate that the inoculation of 10ml diluted *B. salmalaya* strain 139SI provides the most enhancement in terms of the quality and the condition of the plant in comparison with the control and inoculated 50ml diluted biofertilizer mulberry sapling. This product holds a great potential to be commercialized in a wide range of consumers, specifically those keen on agricultural activities, considering the advantages it holds. Overall, the results suggest that the application of *B. salmalaya* strain 139SI inoculant is effective for improving yield of mulberries.

Keywords: *Bacillus salmalaya*; biofertilizer; mulberry saplings

INTRODUCTION

When considering the benefits and drawbacks of inorganic fertilizer, the impact on the environment is a major consideration. The production of inorganic fertilizer necessitates great heat and pressure that has a direct impact on the environment in the area where it is applied. Inorganic fertilizer is only used by around half of the plants in the region where it is utilized and the rest are wasted and leached, especially nitrates and phosphates that can lead to eutrophication [1]. This experiment was conducted to assess the impact of *Bacillus salmalaya* strain 139SI inoculant on the number of leaves and the yield of mulberry plants. Fundamentally, the primary goal is to enhance the quality and the condition of the plant using this method. This study purposely used a bacterial strain as a fertilizer instead of the standard nitrogen and phosphorus containing fertilizer in order to compare between the effectiveness of using microbial fertilizer and inorganic fertilizer. Thus, the result displayed the advantages of the former, compared to the latter. Hence, the success of this study will offer us the opportunity to commercialize the use of *B. salmalaya* among smallholder farmers and the public. Though enhancing the plant nutrient uptake and increasing the crop yield are the prime objectives of this experiment, this innovation can also become a preventive measure in major environmental issues, mainly related to pollution in aquatic ecosystems [6]. By introducing microbial fertilizer to the farmers, the amount of inorganic nutrients lost to the waterways and atmosphere can be decreased due to plantation activities, thus preventing eutrophication of

water bodies. Therefore, we can conserve the aquatic ecosystem that will inevitably give a negative impact to humans.

INNOVATION DEVELOPMENT

The novelty and inventiveness behind this product lie on the component of the fertilizer which is the bacteria itself. Therefore, *Bacillus salmalaya* is introduced as an initiation to sustain eco-friendly agriculture [2]. It is a type of rhizobacteria, a living organism that will be used as a microbial fertilizer, [3] instead of inorganic fertilizer such as phosphorus and nitrogen and organic fertilizer like manure. As reported in a previous study, *B. salmalaya* enhances the nutrient in the soil naturally by synthesizing plant growth hormones that enhance root formation and development resulting in more water and nutrient uptake [4]. Furthermore, the plant can establish a symbiotic relationship with the bacteria enabling the formation of plant root nodules. The root nodules promote fixation of atmospheric nitrogen and convert it into an inorganic nitrogen compound which can be utilized by the plants. Interestingly it is a type of slow-releasing fertilizers that will ensure a continuous supply of nutrients for the plant [5]. This study started off by purchasing the *Bacillus salmalaya* strain fertilizer from the brand Superbacti via online shopping. The microbial fertilizer was then diluted with 1:100 ratios and incubated under room temperature for 2 days. Three mulberry plants were transferred into polybags and were labelled as control, 10ml, 50ml respectively. Lastly, a specific amount of *Bacillus salmalaya* was consistently added once a week onto the plants according to its label. The number of leaves for each plant was recorded and the data was collected once a week.

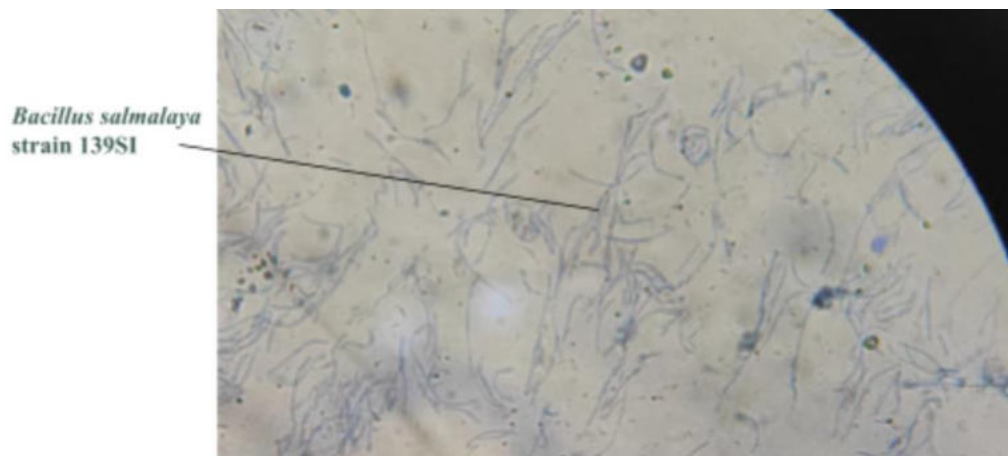


Figure 1: *B. salmalaya* strain 139SI sample observed under microscope



Figure 2: Three samples of experimented mulberry plants

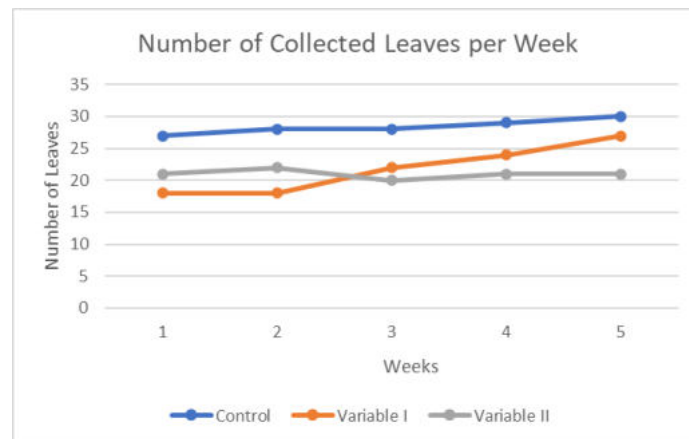


Figure 3: Data of experimental results from 3 mulberry saplings.

Table 1: Number of collected leaves per week

Plant	Amount of soil inoculant liquid (mL)	Number of leaf				
		week 1 25/1	week 2 1/2	week 3 8/2	week 4 15/2	week 5 22/2
Control	0	27	28	28	29	30
Variable I	10	18	18	22	24	27
Variable II	50	21	22	20	21	21

The results as below:

The first plant acts as a control whereby the plant is not treated with any inoculant liquid. The number of leaves increased from 27 in the first week to 30 leaves in the 6th week. The second plant which was treated with 10ml of inoculant liquid showed a significant rise in the number of leaves, from 18 leaves in week 1 to 27 leaves in week 5. The third plant which was treated with 50ml of inoculant liquid displayed no change in the number of leaves which was 21 from week 1 to week 5.

COMMERCIAL POTENTIAL

Previous study showed that the consumptions of microbial inoculant is capable to minimize the leaching of nutrients, thus providing sufficient nutrients for plant growth [3]. Besides, the use of microbial inoculant, *B. salmalaya* in this study shows a significant increase in the number of leaves which might promote to enlarge the number of yields (Table 1:). Healthy plant growth and increase in number of yield that were achieved with the application of microbial inoculants are important criteria in agriculture. Therefore, the main target is to introduce the effectiveness of *B. salmalaya* to agriculture entrepreneurs, aiming to enable them to improve the plant growth, increase the quantity of yield, henceforth gain more profit. Moreover, approaching the public by growing the public awareness about the benefits of *B. salmalaya* as environmental-friendly and deliver plant nutrients to plants in a more sustainable manner. The initiation by diluting and packaging this microbial fertilizer in a small container

turn it as a user-friendly and time saving product. This is suitable for family activities who are interested in gardening or any organizers that organize sustainable green programmes associated campaigns. Subsequently, healthy trees can be grown in the future and the ecosystem will be maintained.

CONCLUSION

The study that we have conducted evaluates the effectiveness of *Bacillus salmalaya*, a microbial fertilizer on plant growth. Specifically, our study shows the effect of manipulated variables through different amounts of *Bacillus salmalaya* given, towards the mulberry plant growth, measured by the number of new leaves produced. The result of the experiment displayed a positive outcome in the development of plants with the aid of *Bacillus salmalaya* in comparison with the control. This goes down to determine the optimal volume of the soil inoculant to be given to the mulberry plant. By comparing the remaining two samples, each is given 10ml and 50ml liquid of *Bacillus salmalaya* respectively, we concluded that the volume of 10ml is the optimal value as no leaves turned yellow and no white mold in soil detected. Therefore, the volume of 10ml is chosen to be commercialized as a product. The potential of this study can be broadened by investing further research into this strain to uncover more of its potential. It may as well be used in genetic engineering to transfer desirable genes to the selected plant such as high resistance to fungi and diseases. Thus, future development can be made in this project.

ACKNOWLEDGEMENT

We would like to thank the Head of Biology Department, CFS IIUM, Madam Kamaril Azlah Teruk, lecturers, Assistant Science Officers and students involved in the project.

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Aqua-Pine-Nics

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ABSTRACT

For ages, farmers used to burn agricultural wastes as the easiest way to discard the waste which one of the major causes for air pollution. The same concept is been adapted by pineapple plantation to dispose their wastes. The innovation of Aqua-pine-nics are to minimise waste and pollution produced from pineapple agriculture. Apart from that, Aqua-pine-nics can also be used as education medium and can minimise land use. Aqua-pine-nics is a combination of aquaponics and fishery. In order to reduce the waste of pineapple leaves, it will be further processed into dried pineapple leaf fibre (PALF) and pineapple charcoal. They can act as planting medium and water filter in the Aqua-pine-nics system, respectively. This innovation is targeted to be commercialised to school garden, people with limited land space, businessman and entrepreneur and teenagers, kids and elders. With the collaboration from Ministry of Agriculture and Food Industry of Malaysia, it is expected to make Aqua-pine-nics as one of the ways to increase food supplies in Malaysia and can reduce consumers' monthly spending.

Keywords: Aqua-pine-nics; aquaponics; pineapple agriculture; Pineapple Leaf Fibre (PALF); pineapple charcoal

INTRODUCTION

The pineapple (*Ananas comosus* L. Merr) is extensively spread in tropical places such as Malaysia, Thailand, Philippines, Brazil and Indonesia. Pineapple is consider as the the most popular exotic fruits in the world trade [1]. Every year, Malaysia exports about 20,000 tonnes of fresh pineapples. Among pineapple varieties that is planted in Malaysia are 'Moris', 'N36', 'Sarawak', 'Gandul', 'Yankee', 'Josapine', 'Maspine', and 'MD2' [2].

The wet hot weather in Malaysia allows pineapple farming to expand and boost the farmers' economy. However, after the fruits has been harvested, farmers tend to burn the pineapple leaves in open air. If this condition persists, severe air pollution will happen and can affect people and environment [3]. To encounter this problem, we suggest that the pineapple leaves should be processed to another useful products. Pineapple leaf fibre (PALF) provide long vegetable fibres which can be used in the manufacture of yarn, woven fabrics and non-woven mats [4]. Pineapple leaves can also be processed to produce charcoal (carbon filter) which is good at absorbing and filtering dirt and odour [5]. Therefore, the innovation of Aqua-pine-nics which utilizes the use of dried PALF and pineapple charcoal in standard aquaponic system to cope with these problems.

The objectives of this innovation are:

- i. To utilise the waste product of pineapple waste. Rather than simply throw away the pineapple wastes, it can be converted into more functional products which are dried PALF and pineapple charcoal.
- ii. To minimise air pollution from pineapple agriculture. by utilizing the leaves by turning it into useful aquaponics components.
- iii. To cut expenses for groceries by replacing aquaponic produces yields (vegetables and fish) as the wet product
- iv. To educate people about recycling and open their mind about reusing waste product.
- v. To minimise land use especially in limited land area.

INNOVATION DEVELOPMENT

Aqua-pine-nics consists of two components: aquaponic system and fish aquarium. This product uses aquaponics system as its basic structure with dried PALF as planting medium and pineapple charcoal as water filter. Dried PALF and charcoal are both made by pineapple leaves. For dried PALF, pineapple leaves are scrape using fork to obtain the fibre. The fibre then dried under the sun for two weeks until the colour changed to yellow-brown. The dried fibre is smashed until smooth and fine. Then, it is ready for use. For the charcoal, pineapple leaves are cut into smaller size and put into a closed aluminium container. Burn it for three to four hours and it is ready to be used.



Figure 1: Products of pineapple leaf (a) dried fibre and (b) pineapple charcoal.

The first step in creating this idea was by sketching a 2D diagram and later enhanced it into a 3D diagram. Finally, a prototype is successfully developed and was test-run to see the product effectiveness.

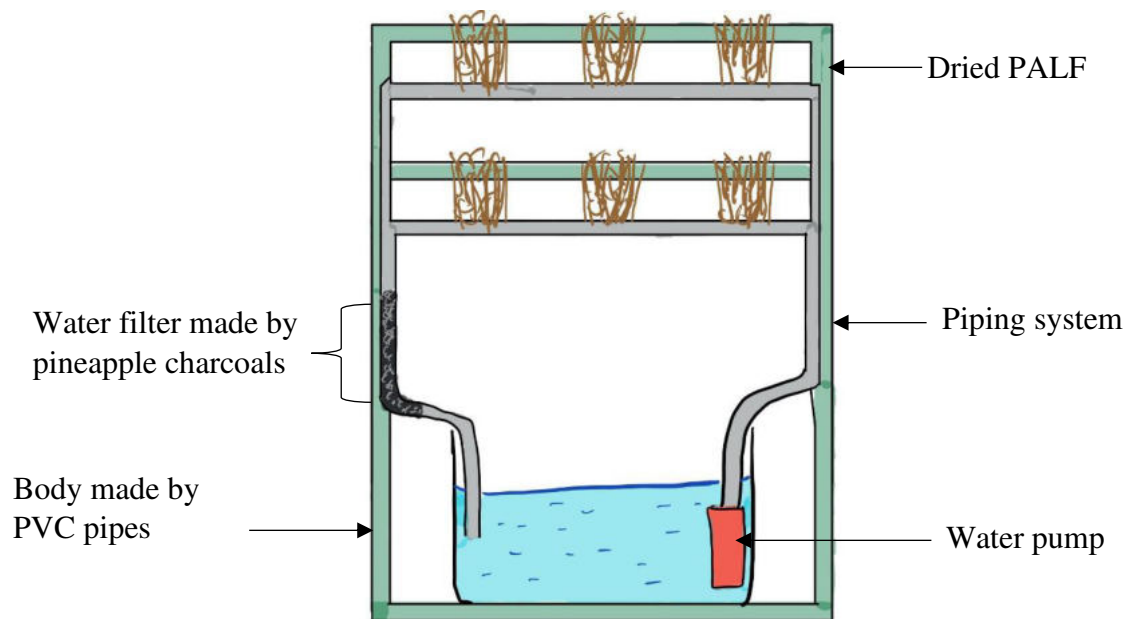


Figure 2: A 2D diagram of Aqua-pine-nics

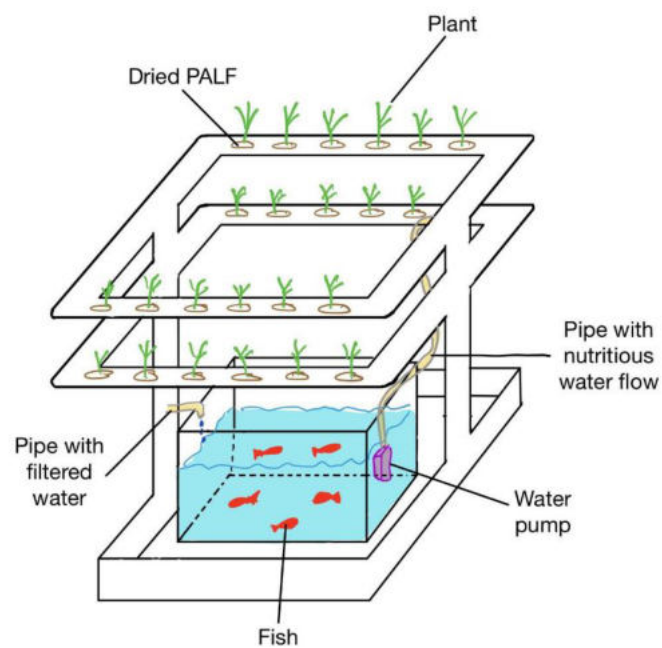


Figure 3: A 3D diagram of Aqua-pine-nics



Figure 4: Picture of parsley being planted using dried PALF



Figure 5: Picture of aquarium, fish, water pump and piping



Figure 6: Prototype of Aqua-pine-nic

As depicted in Figure 4, plant like parsley and Sissoo spinach are the most suitable to be planted in the planting medium [6]. Whereas the lower tank was filled with water and fish. Any type of fresh water fish can be used but we highly recommend to use catfish, as it can live in extreme and unstable water condition.

COMMERCIAL POTENTIAL

This product has very high marketability potential as it has various benefits especially for the consumers. Our Aqua-pine-nics project is suitable to be marketed worldwide because the pineapple fibre that is used as the planting medium is resistant to high and low temperatures and pressures [7]. Moreover, the total cost taken is not too high therefore it can be sold with an affordable price to the consumers. In addition, our product has been upgraded especially for its look and convenience. Aqua-pine-nics project will attract consumers to use it as a new alternative for planting plants environment friendly product. Aqua-pine-nics is targeted to be commercialised to school garden, people with limited land space, businessman and entrepreneur and teenagers, kids and elders.

The cost estimated for this project is around RM200 per unit. However, this product can be custom made based on the customer's budget or request. Since the budget of this product is adjustable, this product is definitely affordable for everyone regardless standard of living.

School Garden

Aqua-pine-nics is an interesting project and can influence students' ways of thinking. This is because aqua-pine-nics involve the cycle of living things between fish and plants and the use of processed pineapple agriculture waste product. Aqua-pine-nics can thus become an enjoyable and effective way for learners to study STEM content, and can also be used for teaching subjects such as business and economics, and for addressing issues like sustainable development, environmental science, agriculture, food systems, and health [8]. Aqua-pine-nic dimension is not typically big and does not take a lot of space. The structure is also admirable. Hence, it is a good investment for all school to have it.

People with Limited Land Space

In this era of urbanization, people living in cities usually live in flat and apartment, with limited land space. Those who live in apartment but keen to plant their own food can opt for this product as it can be a single or up to eight-story planting tube structure which does not consume a lot of space. Surely, this can save a lot of space yet providing large amount of yield [9]. The users can also cut off their grocery expenses by just harvesting Aqua-pine-nics yield as their food.

Businessman and Entrepreneurs

Large-scale aqua-pine-nics can give high profit because the minimum use of land, recycled resources and reusable planting medium. As mentioned previously, Aqua-pine-nics structure can have multi-storey to increase the production of yield. Natural fertilizers from fish also can cut the cost because the entrepreneurs don't have to rely on additional chemical fertilizers anymore. Dried PALF can be reused many times which reduce the overhead cost for aquaponics agriculture. The water is also recycled from fish to plant and plant to fish which can make the entrepreneur bill-independent. [10]

Teenagers, Elders and Kids

Aqua-pine-nics can also become someone's hobby and can teach us about discipline [11]. Aside from playing mobile phones, teenagers and kids should involve in this such activity. Elders also frequently get bored of not doing anything and Aqua-pine-nics may cope their boredom. Having Aqua-pine-nics at house balcony and observing the growth progress is very entertaining and can release stress. This will also train us to be more discipline since frequent observation is required to make sure the plants and fish are in good condition.

CONCLUSION

In summary, Aqua-pine-nics can minimise waste and pollution from pineapple agriculture. The users' monthly spending can also be cut off and Aqua-pine-nics is definitely a good educating medium for schools and universities. The usage of land for agriculture can also be reduced by using Aqua-pine-nics. Aqua-pine-nics can be further develop by making large scale of plantation which require more building material like pineapple leaves, PVC pipes, plant seeds and fresh water fish. Collaboration with Ministry of Agriculture and Food Industry will surely boost Aqua-pine-nics popularity among

Malaysian and become as one of the ways to increase food supplies in Malaysia. It is highly recommended for education sector to promote Aqua-pine-nics to the students to open their minds about creativity, innovation and 3R.

ACKNOWLEDEMENT

Firstly, we would like to express our gratitude to the organizer, UiTM for holding Creations de UiTM 2022 that we can join and gain new experiences. We would like to thank our lecturer, Madam Faiezah binti Abdullah as our advisor who helped us throughout the process of finishing this innovation project. The project cannot be completed without the effort and cooperation from our group members, Muhammad Khabir and Fatin Haziqah. We also like to thank our families for giving us support to finish this project. Lastly, sincerely thank you to all group members who never give up in order to complete this project. Again, thank you to everyone who was involved throughout the process in bringing this the end.

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Ultraviolet Shoe Dryer Box

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ABSTRACT

An Ultraviolet Shoe Dryer Box will help people solving their shoe problems in daily lives. Good shoes can protect the feet against any infections. When shoes are wet, it takes time and optimal temperature conditions to dry. Hence, this makes the quality of the shoes deteriorate and emit a bad odor as well as a breeding ground for microorganisms. The main objective of this innovation is providing the suitable optimal temperature on the shoes. Besides that, ensuring the durability of the shoes and help killing bacteria on the shoes. Our product is unique because it is developed by using the ultraviolet (UV) lamps. This shoe dryer supplies a medium for wet shoes through trapping the heat generated by ultra-violet light which is capable of being a drying agent. This product can penetrate the market as Malaysia is a country that has only two climates which are rainy and erratic heat. Therefore, it can contribute interesting ideas and open a new path in the field of science and technology related to the shoes while offering convenience to the community. As a result, the consumers will be more aware of the importance of taking care of shoes in daily life.

Keywords: Shoe box; dryer; storage; ultraviolet; convenience

INTRODUCTION

Shoes are a necessity in one's life. On a daily basis, shoes have become a necessity for all of us since it protects us from sharp or dirt when we walk. It also gives a main purpose as to provide friction between our feet and the ground so that we won't slip often. After some time, our shoes might get wet and dirty which might lead to foot problems or infections. In order to dry and clean those shoes, we need to use the right temperature and a certain period of time. This is because high heat can also damage the glue used to construct your shoes, which can deform your shoes or cause them to come apart. Shoe dryer becomes popular needed in people life nowadays. The existence of any product is due to its functionality of its product itself [1] therefore people will feel unpleasant when their shoes get wet on a cold or rainy days. Everybody who face it gets an inconvenience because with the condition of wet shoes for a long period of time, the shoes cannot be used for outing to town or vacation with family. As reviewed, many common shoe dryers available in the markets but they are multifunctional, bulky, expensive and need longer time to dry the shoes [2].

This paper focused on the design and development of the shoe dryer box by using ultraviolet light on it. Our study on this product based on the idea to make a simple device which is easy to use and could be stacked and stored nicely inside our homes and added as a simple decoration. Besides having individual ultra-violet (UV) lights inside every shoe box to provide the optimum temperature to dry our shoes, it can also kill various types of fungus and bacteria inside our shoes. As many years ago, (UV) light was known to display antimicrobial

effects [3]. The meaning of ultraviolet is beyond violet and it represents the light in electromagnetic radiation with its wavelength is shorter than visible light but longer than x-rays [4]. UVC consists of a range size between 100 to 280 nm [5] is broadly applied to decontaminate environmental surfaces [6]. This light was proven technology that has been killing mold, fungus, bacteria, and viruses. UV lights are very efficient and usually use a small amount of power to keep it up and running. Recently, a variety of modern products for shoe dryer cultivate in multiple engineering disciplines [7]. With the innovative idea, this study can help people to maintain the quality of shoes and be durable. Not only that, they can also clean their shoes at any time and save their time. Furthermore, wet shoes can lead to the breeding of bacteria that can produce unpleasant odors and cause various foot diseases.

The shoe box uses the same concept as a tanning-bath. The shoe box itself acts like a capsule to make sure it doesn't lose temperature provided by the UV lights. The technology used in our device is not very complex and is very easy to assemble. Basically, the drying process is directly expose under the sun which can damage the materials and fade it colours too [8]. Our product also does not require a large space to be placed in the house and are easy to manage. In conclusion, we were able to produce a product that can dry shoes and maintain their quality while killing bacteria on the shoes. Our study on this product confirms has a high potential innovation and offers advantages to attract the people. Furthermore, the importance of UV shoe dryer box highlights the harmony of shoe users.

INNOVATION DEVELOPMENT

The development of innovation from this study is to highlight the UV shoe dryer box can benefit all communities and has great potential in today's market. This shoe dryer box consists of several parts such as a plastic shoebox, 2 ultra-light (UV) lamps along with wires and switches and nets. This plastic shoe box becomes a medium for wet shoes as well as trapping the heat generated by ultra-light (UV) light which is capable of being a drying agent. This plastic shoebox is equipped with 2 sets of ultra-light (UV) lights to produce optimal thermal energy while allowing wet shoes to dry in a short time. The function of the net in this innovation is to be the base to the wet shoe so that the entire surface of the shoe can be dried. This net also facilitates the flow of water from the wet shoes. Based on the diagram, the measurements of our project are as follows: the height of 13 cm, the length of 32 cm, the width of 22 cm and the weight is 1 kg. Our innovation study is designed on a rectangular shape due to easiness for any type of shoe to fit into it. Moreover, the design is aimed to facilitate each user where the product is easy to organize and store anywhere. It also does not use a lot of energy to produce the heat because the UV Light that we are use is from LEDs sources. LEDs emit all their light at the front surface of the device and heat at the back surface. Not only that, this UV lights are capable to produce more power than usual because we are using the least amount of resistance in the wire which would increase the voltage and the current of the wire. Theoretically, it applies the lower value of resistance in the wire, the more power will be produces in the circuit. Therefore, more heat will be produced by UV Light to dry the shoes.



Figure 1: 3D Landscape

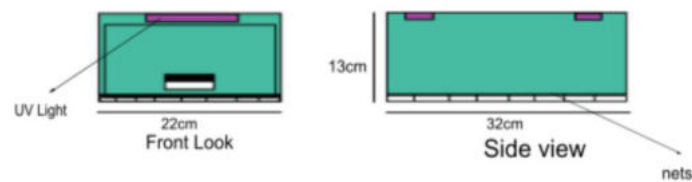


Figure 2: Front and Site View

COMMERCIAL POTENTIAL

This study is very relevant to our society that applies technology in daily life. With our innovative idea of UV Shoe Dryer Box, this can help the community to maintain the quality of shoes and be durable. Not only that, people can also clean their shoes at any time and save their time. The use of Ultraviolet (UV) light in killing germs is one of the methods that can be used to kill bacteria and germs. Arguably, the most important benefit of UV light disinfection is that it's non-toxic. Unlike harsh chemicals that are sometimes used in cleaning and sanitization products, UV light is environmentally friendly. With this innovation, society can be spared from any unwanted diseases. The product we innovate is also quite small and can include a pair of shoes, so it is easy to carry anywhere, whether on vacation or out for work. Shoe lovers are very worried about the quality and condition of their shoes to be easily damaged as well as being a breeding ground for bacteria after washing because it takes a relatively long time to dry. The weather is also unpredictable not only in our country in Malaysia, but other countries are also experiencing similar things. So, people have difficulty drying shoes or clothes that have been washed, especially during the monsoon season. Therefore, this innovation has great potential to grow more advanced because it can help people to solve their shoe problem since at least every person has a pair of shoes. On the other hands, this study contributes in the field of science and technology by giving awareness regarding to the shoes. The idea is also very suitable to be developed and make in-depth research to ensure the safety and comfort of users. This is very important because nowadays people are very inclined to use high -tech materials in their daily lives because of the various benefits that can be obtained.

Table 1: Specification of Ultraviolet Shoe Dryer Box

Parameters	Specification
Materials	Plastic
Size	(32cm x 13cm x 22cm)
Shoe Space (Quantity)	One Pair at Any One Time
Power	120V AC Household Outlet
Weight	1 kg
Dry Time	3 to 4 Hours
Temperature	Optimum Temperature at 40 °C

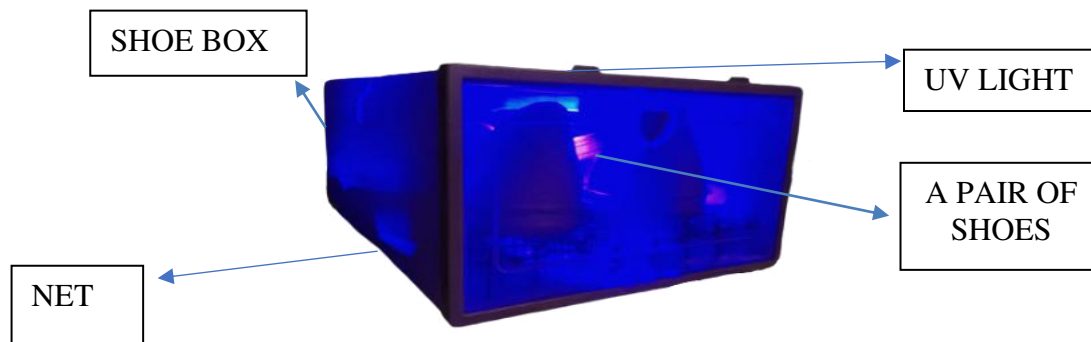


Figure 3: Innovation Prototype

CONCLUSION

Drying of the shoes on a high temperature and at short time can damage the shoe and troublesome the people. The shoe dryer is a budget, low-cost and reasonable designed to convenience the use of it. Anyone who use the shoe dryer will competent to dry their shoes at specific time. This study has accomplished all of our intended objectives. As conclusion, this project has proven that it could dry shoes in a short period of time while killing various types of fungus and bacteria which contributes to all sorts of foot problems. This dryer is ready to be used everywhere to help people in a few hard situations to dry their shoes. In the future, here are some suggestions to enhance this dryer innovations to become more effective and multifunction. One of them are putting up magnets to the shoe boxes so that it can be stacked up without easily being trampled over. Since magnets could easily act like a wire. The stacked shoe boxes can now just connect to one another with just using a single power source. This gives us the flexibility to stack how many shoe boxes we want. It will also give an aesthetic look as it does not need any wire to connect to one another. Furthermore, by adding some features on it such as a self-automated timer and temperature can perform perfect dryer on their shoes through adjusting it automatically time and its temperature.

ACKNOWLEDGEMENT

First and foremost, we would like to express our heartfelt gratitude and appreciation to Madam Nur'Ain Binti Hamdan, our beloved physics lecturer, for providing us with this opportunity to demonstrate our abilities through this Creation de UiTM on a topic of our choosing. We sincerely appreciate her unwavering devotion and tireless efforts in assisting us in fully comprehending and completing this project. We are glad to mention that we were able to complete this task effectively thanks to her constant advice. Not to mention, even though some of us are far apart, we would want to express our gratitude and recognition to everyone of our wonderful teammates who are contributing to this project. Henceforth, owing to their sincere works and efforts in making this project not just effective, but also great, we were able to complete it successfully. Lastly, I would also like to thanks our university which is Pusat Asasi UiTM Cawangan Selangor Kampus Dengkil by holding the competition which is Creations de UiTM in conjunction with Fiesta de Asasi and Asasi Open Day, CREATIONS de UITM. We were given the opportunity to join, compete and showcase our product in this international level competition.

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Water Sprinkler

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ABSTRACT

Plants need water to grow. Plants are about 80-95% water and need water for multiple reasons as they grow, including photosynthesis, cooling, and transporting minerals and nutrients from the soil and into the plant. Without water, we can't grow plants, including fruits, vegetables, and grains. Agriculture is the world's greatest consumer of our Water resources. Globally about 70% of human water use is for irrigation of crops. Therefore, the watering plant is a must since water is an essential input into the photosynthesis reaction. However, relying on a human to water plants is not efficient since humans are busy due to several factors such as work and so on. Thus, automatic water sprinklers have been developed to help to save time watering their plants without using any human interaction.

Keywords: Photosynthesis; agriculture; human interaction

INTRODUCTION

People frequently forget to water their plants due to busy schedules, which impedes their healthy growth. Farmers also find it difficult to manually water their fields and provide an accurate amount of water for healthy plant growth. Due to water scarcity, water management has become a major challenge, as manual irrigation wastes water. A sprinkler system is a device that distributes water in a spray to irrigate a lawn or garden in a residential setting. Sprinklers can be extremely large, like the irrigation systems used by professional farmers, or they can be relatively small, like the typical lawn or garden watering sprinklers and fire suppression systems [1]. There are many automatic water starters that are currently available in the market however they have several disadvantages [2]. This system is less pricey and affordable than other systems, it also saves labour time because the work is done automatically.

The main reason for this project is mainly to help people save their time without requiring any human energy to water their plants. Usually, farmers must manually turn on and off the machine, and plants are frequently over-irrigated because the temperature of the soil is not monitored. Automated watering systems are efficient because they automatically turn on and off based on the temperature of the soil. It also encourages farmers to produce more agricultural products like vegetables and fruits for the consumer. Nowadays, crop yields gained by farmers are decreasing. This may happen due to a lack of discipline in themselves or a shortage of manpower to manually water the plants. Therefore, the presence of this product it may help increase the income rate of agriculture products. With that, it can also help the company gain more income.

INNOVATION DEVELOPMENT

Utilizing ARDUINO IDE software, we are able to program ARDUINO in such a way that it irrigates the plants based on the input of temperature content given by the soil temperature sensor. The product will function with the help of the temperature sensor. When the temperature detected is below 20°C, the red LED will light up indicating that the water sprinkler is off, and the servo motor will remain at its original position to close the head of the water hose. Then, if the temperature is above 20°C which is above the optimum temperature for the soil the green led will light up and the servo motor will turn 90 degrees to open the head of the water hose and the dc motor will continuously rotate 360 degrees.

For the safety features, we add the ultrasonic sensor for the motion detector. If the position of the object is less than 1m away, the piezo will produce a high-pitched sound to alert anyone near it. And if the distance between the person and the ultrasonic sensor is further than 1m the piezo will not produce any sound.

COMMERCIAL POTENTIAL

In order to make sure that our product can be environmental and friendliness, this water sprinkler product does not harm the environment while providing plenty of benefits. This water sprinkler was designed in a small and minimalist style. It also does not need a big construction and by right does not damage the environment for installation. Next, the use of solar panels as its source of power can save the power source energy. It is because solar panels are renewable energy.

Usually, the plants will be watered on a sunny day, so solar energy is very suitable to be used for our product to function. This water sprinkler is really needed especially for the companies that run a big agriculture business. They can save the limited human energy and time for watering the plant. For small companies, it is also very recommended because this product is DIY friendly to install easily. Nowadays, COVID-19 viruses affect humans by limiting their contact in public places. Many people cannot come to their workplace due to the virus and close contact. So, this water sprinkler is useful to help the plants keep in maximum good condition. Hence, it can become a high demand product in the agricultural industry as this is the local product.

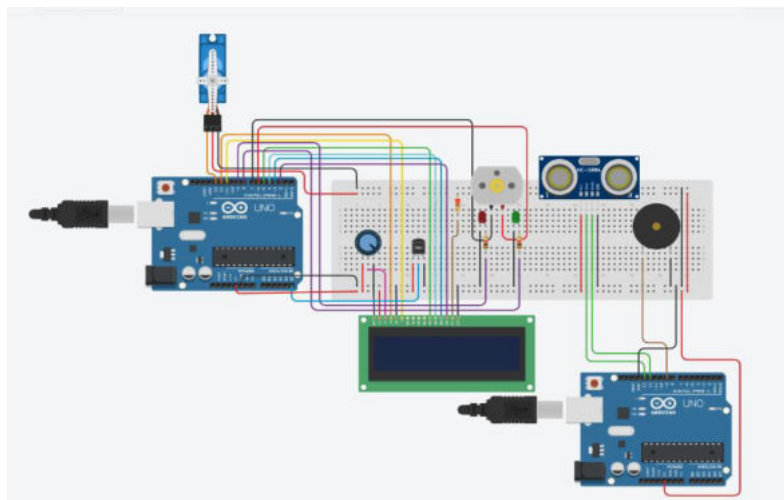


Figure 1: Water Sprinkler prototype

CONCLUSION

In conclusion, things become more efficient day by day, supposedly this product can be the main use for the agriculture sector to help people save their time without requiring any human energy to water their plants. On the other hand, this product also can encourage the farmer to produce more products in agriculture like vegetables and fruits for clients to make it easier to make up some new local food or product for our own country without depending on imported products. Last but not least, water sprinklers can gain more income for their company and increase their economic potential in the future. In the future, some components in the circuit of the Arduino need to be added to detect smoke when having a wildfire in the building for instance so that the water can clear the fire instead of having rescue from the fireman to come and clear the fire. Apart from that, the infirmity that this product totally depends on the water as the main resource to run the sprinkler that comes from our water tank. So, some improvements that matter such as the storage to keep the water as another alternate way to run this product when having a natural disaster in the future.

ACKNOWLEDGEMENT

We cannot express enough thanks to our sponsor in this competition for their support and encouragement: Pusat Asasi UiTM Dengkil. We offer our sincere appreciation for the learning opportunities provided by our committee.

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Smart Thermobox

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ABSTRACT

Smart Thermo Box is a normal portable delivery box that has two compartments, one for hot food and another one for cold food. Customers who order food via online delivery always complain that their food turns out bad when it arrives at them, be it hot noodle soup or ice cream. They demand improvement on the delivery services to satisfy their needs. Smart ThermoBox ensures that hot food stays hot and cold food stays cold. Besides, it maintains the edibility, quality and flavour of the food and the beverages. The function is to store hot food such as rice, soup and fries. It also functions as cold food storage to prevent ice cream from melting and a cake's shape from drooping. Smart ThermoBox has many benefits which are multifunction user, tear-resistant, waterproof and easy to carry as a backpack. The Smart ThermoBox is designed exclusively for storing food and keeping it hot or cool, preserving the flavour and preventing spoilage. This product is commercialised as a local brand for many useful peoples such as students' life, housewives, workers and restaurant that provide delivery services. Because of its convenience for customers, the fast-food sector has been steadily expanding.

Keywords: ThermoBox; smart; backpack; multifunction; waterproof

INTRODUCTION

Everyone may have experienced ordering food online via FoodPanda, Grab Food or McDelivery. Some customers may get disappointed after seeing their food come in a bad condition. Ice cream turns melted, the hot mushroom soup turns cold and the crispy chicken burger turns soggy. Although it was not the food seller's fault, they would sometimes still be the one to blame and the customers would leave bad reviews on their products. On a past decade, a market for ready to cook meals becomes visible and popular in North America due to the high demand for convenience in meal preparation [1]. Generally, ready to cook meals are delivered to homes or offices by using domestic delivery services hence insulated boxes are required to keep the food safety and quality during non-refrigerated food delivering [2].

Besides online food delivery, camping lovers also encountered some problems where they had no source of food or insufficient food supply during the camping. Even if they bring lots of food, all of it would turn bad and soggy if it does not keep at its optimum temperature. A third of the world's fresh food was reported are wasted because of the storage and transportation at improper temperatures [3,4]. A solution of this issues is offering the proper use of cold chain in transportation to ensure food safety and its quality as well [5,6]. As reviewed, previous study shown the heat transfer models by using insulated box were developed at a different design and materials for food transportation [7].

A product named Smart ThermoBox is created to help people overcome these problems. Students, food delivery riders, camping lovers and anyone. With ThermoBox, customers can order cold and hot meals without worrying about their food and drinks getting bad during the delivery process. It is also useful for students who want to bring food from their home to the college or vice versa. Camping can sometimes take a few days and it will be more enjoyable if they bring Smart ThermoBox along with them since they can save their time on making food or reheat the food. Smart ThermoBox is a multifunctional device that can help satisfy everyone's needs. Due to the current pandemic season, people find it hard to get to feed themselves, hence they order food online. Even though Smart ThermoBox gives more benefits to food riders, it also gives equal benefits to anyone who wants to keep their food or drinks warm or cold. Be it students, housewives, office workers, contractors, campers, anyone!

INNOVATION DEVELOPMENT

A portable thermal bag for containing food products, such as pizza or fried chicken. The bag has panels on the top and bottom and is closed on both sides and also at the rear end. The bag was divided into two sections which are part to keep the food cold and part to keep the food hot. The bag has an opening at the front to permit the insertion and removal of a food product. There is an outer cover layer and an inner cover layer on the top and bottom panels, and an electrical resistance wire between the cover layers. To keep the food product warm, the resistance wires may be plugged into the cigarette lighter of a delivery vehicle so that the bag stays heated to the point of actual destination. The bag's inner and outer sheets are made out of Nylon woven fabric which makes the bag durable, flexible, lightweight and easy to clean. In the hot section, the heating device with heating elements is provided in both the top and bottom panels. The heating device is a vital part of the bag and is designed to not interfere with the insertion and removal of the food product. For safety purposes, a thermal fuse is preferred to be installed inside the bag to prevent overheating. The thermofuse will break the circuit in case there is an accidental overheating of the heating wire and thereby protecting the bag against damage or fire. The reason why polyurethane foam is used is due to its thermal properties. Connector is adapted to be coupled to a mating connector on a power cord that has a plug on the other end to plug into a delivery vehicle's cigarette lighter outlet. In the cold section, the base part for the cold section is made out of a rectangular polystyrene foam which to keep the heat from absorbing to the box and keep coldness in the box. The foil will be the exterior for the cold section because the foil will reflect the light and heat from coming through the box.

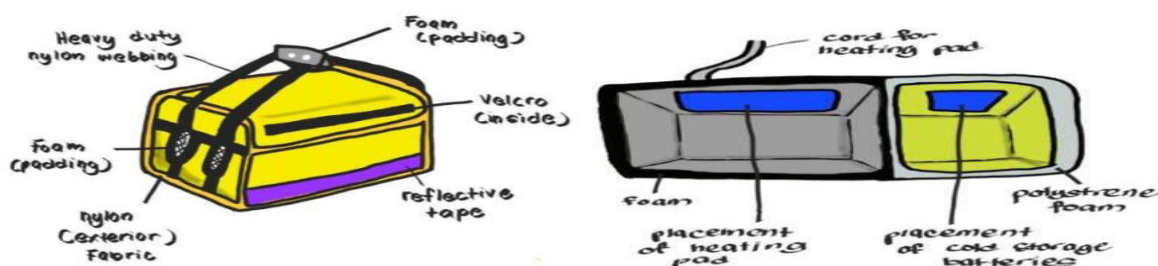


Figure 1: Prototype of Innovation

COMMERCIAL POTENTIAL

As the name implies, this Smart ThermoBox is designed exclusively for storing food and keeping it hot or cool, preserving the flavour and preventing spoilage. This product is commercialised as a local brand for many useful peoples such as students' life, housewives, workers and restaurant that provide delivery services. Because of its convenience for customers, the fast-food sector has been steadily expanding. To broaden their customer base, several fast-food restaurants provide delivery services. It's a brilliant way to grow business because more consumers are ordering food from delivery services online. There are a variety of delivery boxes on the market right now. The bulk of them, on the other hand, struggle to keep the meal heated and avoid condensation [8]. To accommodate the expanding market for quick food delivery, this Smart ThermoBox is developed to achieve the needs of those services. This product also can be beneficial in the industrial expansion as the more local product is released to the market and can compete with other brands. The Smart ThermoBox can be commercialised, promoted and sell via the online platform. There are many different social networking sites, and they come in several different forms, with a variety of functions that were famous among the user such as Shoppe online store, Facebook marketplace and Instagram feeds. Social media marketing is a fast-expanding trend that allows firms to effortlessly reach out to targeted clients. Customers also will have unrestricted access to information about the product without the need for human participation.

Table 1: Product Specification

Components	Product specifications	Elaboration
Exterior material of the body	Nylon	Protective shield against harsh weather conditions.
Interior material of the body	Vinyl laminated	Water-resistant, Thermal insulator.
Insulation material of the body	Polyurethane foam	Thermal insulator, Durable, not prone to trapping odours.
Width of bag	40cm	Accommodate a large number of food containers. Storage of large beverage. Strong and sturdy structure.
Length of bag	48cm	
Height of bag	32cm	
Mass of bag	1.36kg	Lightweight to avoid burdening the driver.
Size of pockets	24cm × 20cm	To store the personal belongings of the driver.
Size of divider	40cm × 30cm	To partition food and beverage.
Material of cold section	Polystyrene foam	Thermal insulator, lightweight.
Size for cold batteries	6cm x 6cm	Release dry ice to keep the coldness.
The fabric of adjustable straps	Heavy-duty nylon webbing and foam	Minimize the physical effort and discomfort of the driver.

The material used to close the bag	Velcro	Accessible, Secure, Low costing.
Size of the heating pad	30cm ×40cm ×1cm	Ensure clients receive their food as fresh and warm as it left the kitchen.
Maximum temperature of the heating pad	80° C	Optimal temperature range for food delivery.
The voltage of the heating pad	220 V	Efficient to maintain food temperature. Prevent overheating of bag.
The power of the heating pad	20W	

CONCLUSION

All in all, Smart ThermoBox is a worthwhile investment as it can be used for a long time. It is not only multi-use; it is also tear-resistant. Since it is made up of nylon, vinyl, foil and foam, it is tough enough to support the weight of food loaded in. People also need not worry about the drinks spilling out from the bottles and absorbing into the box as the Smart ThermoBox is waterproof. The nylon woven fabric makes the box's surface easy to clean and flexible. However, the Smart ThermoBox can be improved by lowering the density to make it lighter. Now, people do not have to worry about traffic jams, illegal or difficult parking during daily hours and reduction of parking fines as food can be sent anytime, regardless of the situation given. For food riders, this innovation will be super beneficial to them as it lowers their burden and worries a lot since customers always complain about their food's condition and else. Moreover, for people other than food riders such as students and housewives, this innovation could help them save their time from reheating food or freezing drinks and they can take their time finishing their food slowly without having to rush. To conclude, Smart ThermoBox is convenient to everyone and is guaranteed to satisfy most people's needs and overcome their struggle.

ACKNOWLEDGEMENT

First and foremost, we would like to convey our special thanks of gratitude and appreciation to our beloved teacher, Madam Nur 'Ain Hamdan, who gave us this golden opportunity to prove ourselves at the International Mega Innovation Carnival 2022 with a specific topic of our own, a Smart ThermoBox. This project allowed us to do a lot of research and learnt many things. Secondly, we would like to express our gratitude and recognition to each of our wonderful teammates who are working on this project with us. Despite that, we completed it successfully due to their sincere contributions and efforts in doing this project. Hence, we could safely say we could not have come this far if one of the teammates had been missing. Last but not least, any endeavour at any level could not have been done without the continuous support and guidance from our family. We are incredibly grateful for their love, prayers and understanding throughout the whole process of this project.

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PenShield

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ABSTRACT

Even if our nation is a superpower and has developed economically, there are still many prevalent crimes that continue to occur against teenagers and students in our society and are especially destructive. With the assistance of our device "PenShield," crimes against teenagers and students may be put a stop. This gadget is a safety precaution, intended specifically for teenagers and students in distress. This self-defence safety protection tool shaped is designed in the form of a two-sided marker pen and is meant for use during an assault. It is incredibly lightweight and portable, but also extremely sturdy and resistant to breakage. This tool has an alarm, an electric shock, and a foldable knife. This PenShield is wirelessly enabled as the battery voltage is utilised to replace the current supply. PenShield may prove to be highly beneficial for teenagers and students who are in risk and want assistance in combating crimes. To conclude, the major purpose of this safety equipment is to shield teenagers and children, who are often targeted and assaulted by criminals.

Keywords: Safety; weapon; safeguard; security; harassment

INTRODUCTION

Nowadays, teenagers and kids has become the target of sexual assault, robbery, and burglary which are common crimes that keep occurring in our country. Whenever they are going out or going somewhere, they will feel not safe and worry about their safety. On the other hand, it also occurs when they are walking alone or driving alone somewhere. Robbery cases are one of the top crimes in Malaysia. Typically, when this occurred, women were unable to defend themselves against the robbers and snatchers, and they were also injured because of their struggle with the robbers, with some of them nearly dying as a result [1].

In this contemporary era, they create a home security system well knows as a security alarm which can only offer a modern convenience or automatic security that is only available for home and building not for the individual person. Moreover, the home security system is only useful for home and building to protect the places from the robbers. Home security alarm is not portable as it cannot move to anywhere at any time. Besides that, the home security alarm nowadays is heavy due to its big size. It usually comes in the form of a rectangle-shaped alarm that is large enough for people to carry. The body of a home security alarm system is typically made of steel. Steel is not light enough for humans to handle. Aside from that, imagine having this huge heavy alarm just to keep safe if this security alarm can be used for personal desire? Requiring a backpack to put this kind of alarm just makes it more complicated.

In this case, we create a PenShield gadget well known as a weapon of 2-sided marker which can protect ourselves from danger and easily to bring anywhere with us without being suspicious to anyone [2]. It is extremely light and portable, but it is also extremely strong and resistant to breakage. A PenShield marker has an alarm, an electric shock, and a foldable knife which suitable to make ourselves feel protected wherever we go [3]. This gadget has its own functionalities for everyday safety and real emergencies and making it the ultimate tool for everyone. Therefore, this device can ensure more safety to children and teenagers as their safeguard whenever they are alone.

This gadget provides a current supply for alarm use, to create a loud sound whenever there's have a disturbance from creepy person. It is preferable to use a battery, so it becomes a reusable gadget, and it is benefit from buying another weapon. Furthermore, using a battery will provide the required voltage to trigger the alarm. It will allow the current in the circuit to flow, which will then trigger the speaker. The warning would immediately sound unexpectedly, distracting everyone nearby. As a result of the electric current produced when the button is pushed, the electrical shock current may be triggered [4]. On the other side, a foldable knife can help us to scare away the criminals.

INNOVATION DEVELOPMENT

Kidnapping and abduction have been the world's biggest concerns over the past few years. Worse, this crime seems to be unstoppable [1].

This PenShield is designed as one of the Attack Self Defense Safety Protection tools. As children and teenagers are the ones mainly affected by kidnapping, abduction and robbery, this safety protection tool is shaped like a two-sided marker pen so that it does not catch the attackers' or intruders' attention. Since it is shaped like any other pens and markers, no one will believe that this small thing could be the reason someone is safe from being a victim of a crime. Moreover, it will just look like any other markers in their pencil case.

Only high-quality materials are being used to make the PenShield. Instead of using aluminium or Zamac, the case is made up of ABS plastic (Acrylonitrile butadiene styrene). ABS plastic is chosen because it is very light and easy to bring anywhere and anytime. Although it is light, ABS plastic is also known for its stiffness, so it is hard and does not easily break [5]. Other than that, the melting point of this material is high [5]. These characteristics are very important to make sure that the PenShield can be used for a long time without the user having to buy a new one frequently. The most crucial thing is that ABS plastic contains no harmful substances such as carcinogens. Thus, PenShield is safe to be used by everyone. In order to save the environment, we also take the recyclability of the material into consideration. ABS plastic is the best option as it can be recycled [6].

PenShield has multiple features. The first feature of the PenShield is that one end of it has an alarm that can be controlled by the red button on the PenShield body. The buttons are protected by a cap to avoid the user from pushing the button accidentally. When pushed, the alarm will produce a very noisy and loud sound of approximately 130db. This loud sound will attract people in the surroundings to put their focus on the victims. So, the attackers or intruders will not dare to come close or else they could be caught. To activate the alarm, all the users need to do is push the red button. The switch in the circuit will be closed and the electric current will flow. Thus, the speakers will activate producing the loud, noisy sound.

Secondly, PenShield has another button which is the green button. The green button functions to deliver an electric shock to the attackers. Basically, it acts as a taser. By pressing the green button, the electric current will pass through the same circuit as the alarms. It will also produce an electric shock sound that will scare the attackers. When the electrified prongs touches a person, it will deliver a painful shock. 25 volts of electric shock is enough to be effective [4]. Resistors in the circuit are used to reduce, control and limit current flow so that if there is excessive current flow, the resistor will automatically limit it back to normal.

The third feature of PenShield is it has a folding knife at the other end of the ‘marker pen’. To protect the user from cutting themselves, it is closed and protected with a cap. If the alarm and taser do not work to scare the attackers, a folding knife will come in handy. It can be used to hurt the attackers enough until they could not go further into hurting the victims anymore. Not only that, but this folding knife can also act as a survival tool to cut ropes or to cut cooking ingredients when they forget to bring a knife to camping, for example.

This PenShield is wireless so that the users do not have to plug it everytime. So, the current supply is replaced with the voltage from the battery. The battery used to create this self-defense tool is the AG13 button battery [7]. It is a small battery so that it fits inside the shape of the marker pen body. Using a battery is better than direct current because the users do not need to bring a power bank to activate the alarm. It will be a nightmare if the safety tool won’t work when something bad happens to the victim. Moreover, the cost to replace the worn-out battery is way cheaper because it does not need to be changed frequently.

PenShield is not just limited to children or teenagers in school but people of all age no matter the gender can always have it in their stationary box, purse, car and many more. The existing safety tools in the market are hard to bring anywhere because the users have to carry more than one tool. With PenShield, alarm, tasers and a folding knife are already assembled into one product, so it is very convenient for them to carry.

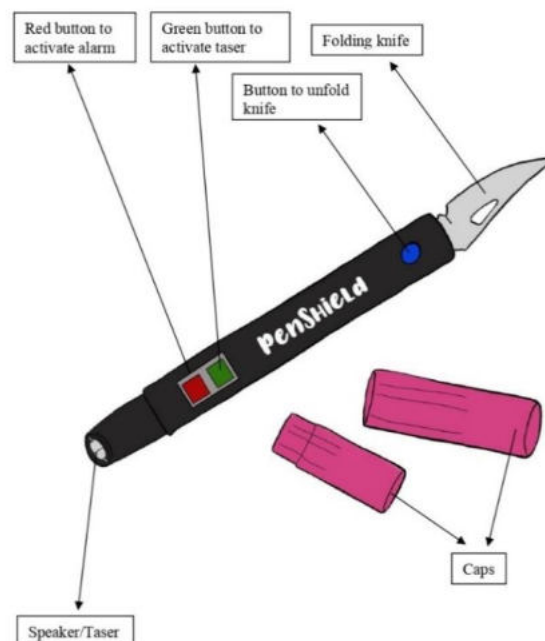


Figure 1: Assemble of the PenShield

COMMERCIAL POTENTIAL

As technology advances at a rapid pace, its life cycle tends to shorten, and the importance of successful commercialization of produced technology grows. Over the last few years, kidnapping and abduction have been the world's top concerns. Worse, it appears that this crime is inexorable. This PenShield is intended to be used as part of an attack self-defence safety protection system. This safety protection equipment is shaped like a two-sided marker pen to avoid attracting the attention of attackers or intruders. No one will think that this small item, which looks like any other pen or marker, is the reason someone is secure from becoming a victim of crime. Furthermore, it will appear to be identical to any other marker in their pencil case.

A normal marker will be modified by applying a physics concept in which the marker will be installed with a simple circuit that will be connected to an alarm system. This alarm system will alert everyone if a person encounters a dangerous situation. This product also uses a small battery which is the AG13 button battery [7]. Because the worn-out battery does not need to be replaced regularly, the expense of replacing it is significantly lower. This modified marker uses ABS plastic as its body. ABS plastic is free of carcinogens and other hazardous elements [6]. As a result, PenShield is suitable for use by anyone. In order to save the environment, the material's recyclability was taken into consideration. The best alternative is ABS plastic, which can be recycled.

Existing safety gadgets on the market are difficult to transport since users must carry many tools. PenShield combines an alarm, tasers, and a folding knife into one package, making it extremely simple to carry. Penshield's primary target audience is children and teenagers, since we are committed to promoting and expanding their rights, including the right to safety for children and teenagers, through the development of this product. One of the eight major human rights challenges we've identified for our company is harassment. Children and teenagers have the right to be free of violence, harassment, and discrimination, and reducing the barriers that keep them from achieving their full potential as individuals and contributors to work, communities, and economies can help them do so. Children and teenagers are encouraged to promote and purchase this product because it can help them protect themselves from danger. No one will suspect this Penshield if it is kept in a student's backpack, pencil case, or even pocket. Other than that, this Penshield can be used by women specifically as women are weaker than men physically. The World Health Organization estimates that one in every three women (35%) has experienced physical and/or sexual intimate relationship violence or non-partner sexual violence at some point in their lives [8]. We think that by inventing this product, women will feel safer knowing that there is a tool that can help them avoid being wounded in potentially risky situations.

Penshield, as we all know, has a lot of features. One of its ends, for example, contains an alarm that may be controlled by a specific button. It also features another button that, when hit, can administer an electric shock, and the Penshield's other end contains a folding knife that can be used to defend yourself or in emergency situations.

Table 1: Budgets and Costings

ITEMS	QUANTITY	PRICE, RM
ABS plastic (Acrylonitrile butadiene styrene)	1	6.00
Alarm	1	2.56
Speaker	1	1.63
Cap	2	5.22
Wire	1	2.13
Battery	2	1.00
Switch	2	1.16
Diode	1	1.74
Resistor	3	3.78
Transistor	2	0.60
Capacitor	1	2.00
Folded knife	1	2.50
Total		30.32

Retail Price

Considering 10% of profit for each Penshield

$$(10\% \times \text{RM } 30.32) + \text{RM } 30.32 = \text{RM } 33.35$$

Margin

Selling price = total cost + profit

$$\text{RM } 33.35 = \text{RM } 30.32 + \text{RM } 33.35x$$

$$x = 0.0908 \text{ @ } 9.08\%$$

CONCLUSION

Our primary goal is to reduce the crime rate in Malaysia. Based on the statistics provided by the Department of Statistics Malaysia, violent and property crime cases have decreased by 21.4% in 2020 to 65,623 from 83,456 in the previous year [1]. This is due to the Movement Control Order (MCO) enforced by the government to prevent the COVID-19 virus from spreading. Although it may seem like good news to the citizens of Malaysia, everyone should still be careful and take precautions everywhere they go. We believe that the crime rate will start to increase since there is no more MCO. Many people lost their jobs and some of them would do anything just to get some money to eat. This is the reason why we decided to create this product that can help people to at least try to protect themselves if they get trapped in emergency situations. Some people might not have the strength or skills in martial art, so they could not use their will to fight against the assailant.

This is why we decided to create the PenShield to help people to protect themselves anywhere and anytime. People especially children, teenagers and women will feel less scared to go out alone as they know that they can fight back if anything happens to them.

The product that we created can be improvised more in the future. This can be done by adding more useful features to the PenShield. For instance, a flashlight or a built-in pepper spray. A flashlight can help the users to look in the dark while a pepper spray can be used to stop a threat temporarily so that the users can escape during that period of time.

ACKNOWLEDGEMENT

First and foremost, we would like to convey our heartfelt gratitude for the financial support provided by the Centre of Foundation Studies, UiTM Dengkil. Without the funding assistance of the Centre of Foundation Studies, our work would never have progressed this far. Once again, we would like to express our gratitude to the Centre of Foundation Studies for their assistance. Additionally, we appreciate the chance to work on this project provided by the Centre of Foundation Studies. This would be very beneficial not only for the development of adolescents and children, but also for the long-term development of the whole country.

Following that, we would want to express our deepest appreciation to Dr. Siti Aisyah Zawawi, our supervisor, for allowing us to work on this project. We have invested a great deal of time and effort in this project. However, without her support and counsel, this endeavour would not have been feasible. We are extremely appreciative of Dr. Siti Aisyah Zawawi's guidance and supervision. We would want to express our gratitude to her for providing us with a clear guidance throughout consultations.

Next, we would like to extend our gratitude to all of our group members, Mia Sophia, Nur Athirah Delaila, Nur Insyirah, and Syasha Alya, for their invaluable cooperation and encouragement in finishing this project. Without the efforts and collaboration of our group members, we would be unable to complete this project.

Lastly, we would want to take this opportunity to say a big thank to everyone who has aided us and has given us their time and attention throughout this endeavour.

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Smart Rehal

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ABSTRACT

Rehal was created for Muslims to place the Al-Quran which is the holy book for Muslims. This rehal is often used by Muslims around the world, regardless of race, rank and skin color (Samad et al., 2018, p. 36). In general, these rehal are designed in the same size and from the same material. Based on our study, we have identified the problems that are often faced by these rehal users such as lighting problems and discomfort. Therefore, we have made some modifications to the common rehal to address the problem such as adjustable height, portable lamp and small storage slot to keep their items neatly. Our customised rehal has a number of unique advantages, including the ability to overcome users' clouded eyesight while reading any book or Quran in the dark, adjusting facilities are available on the rehal to comfort the users and any valuable thing may be managed by storing it in the available storage space. As a result, customers do not have to be concerned about the state of their items while utilising the service. Finally, the ease that this invention may provide to Muslims is remarkable, and it will undoubtedly improve the everyday lives of individuals who desire to recite the Quran throughout the day. Smart Rehal will not only make it simpler for students to study, but it will also make it even easier for people to study anywhere.

Keywords: Smart Rehal; rehal; innovation

INTRODUCTION

Al-Quran which is a book for Muslims is a miracle and a gift that was revealed by Allah S.W.T to Prophet Muhammad. The Qur'an is a guide and light for human beings to return to the right path, which is the path of Allah. The Quran has many advantages if Muslims read it, among them is Allah S.W.T. elevate the dignity of the readers of the Qur'an. There is a hadith from Umar Bin Al-Khattab r.a. That Prophet Muhammad s.a.w. said: "Indeed, Allah raises the dignity of some groups and lowers the dignity of others because of the Qur'an". (This hadith of Umar bin Al-Khattab was recorded by Imam Muslim in Sahih Muslim). By reading the Qur'an, a person will get peace of mind and also get intercession in the hereafter. A hadith is also narrated by Barra 'bin 'Azib r.a.: "A man recited Surah Al-Kahfi and by his side was a horse tied with two ropes, then the clouds in the sky began to protect him and got closer, and his horse began to move away from him. When in the morning he went to see the Prophet Muhammad s.a.w. and narrated the event then he said: That (sakinah) peace that came down due to the recitation of the Qur'an ". (Hadith Barra' r.a. bin 'Azib r.a. This was recorded by Imam Bukhari in Sahih Bukhari, Kitab Fadha'il Al-Quran, Chapter Fadhlul Surah Al-Kahfi, Had hadith No. 5011). With this, we as a group unanimously propose a new innovation to be used as a facility for Muslims to read the Quran that is Smart Rehal.

Thus, we have divided the tasks evenly among the group members to facilitate the work to complete this paper. Using ‘Smart Rehal’ can help us make it easier to read books or the Al-Quran easily anywhere. In addition, this rehal can also be used as a learning place for students in school.

PROBLEMS

- i. Users who find that there are vision problems such as blurring in the writing in the Qur'an and need to adjust the height of the rehal to the appropriate height.
- ii. Can use rehal in a dark place if there is any problem of sudden electrical outage and so on.
- iii. Consumers feel less comfortable to place valuables in open places such as mobile phones, wallets and others.

OBJECTIVE

- i. Every user can use the rehal with full comfort with the existing adjustment facility.
- ii. Users can read any scientific source by opening the small light found on the rehal.
- iii. Users also have the opportunity to use the storage slot to store any important notes.

MARKET POTENTIAL

This modified rehal can overcome the problem of blurred vision of users while reading any book or Quran in the dark because there are special small lights provided. Therefore, the health of the consumer's eyes remains awake without receiving any adverse effects as a result of reading written material in the dark, as the saying goes ‘prevention is better than cure’. In addition, with the availability of adjustment facilities on the rehal, every group regardless of age can make the best use of the rehal. In addition, each item of value can be handled by storing it in the storage space provided. As a result, consumers do not have to worry about the condition of their goods while using rehal.

If we look from a different perspective, the benefits that have been listed above will certainly bring lucrative benefits for each consumer and in turn, successfully maintain the sustainability of society and not pollute the environment.

Table 1: Comparison of normal rehal and Smart Rehal

Normal rehal	Smart Rehal
Fixed rehal altitude	Can be adjusted according to the appropriate position level according to comfort
Can't use rehal in dim areas	Can turn on small lights to illuminate the learning surrounding
It is difficult to store small items	Successfully store small items more efficiently and safely

Table 2: Cost of Smart Rehal Price and Budget Benefits

TYPE	QUANTITY	PRICE (RM)
Wood 390 mm x 278 mm x 10 mm (surface)	1	15
Wood 300 mm x 20 mm x 50 mm (legs)	4	12
Screw	8	5
Total Price		32
Selling Price		40
Profit		8

*The final price does not include the cost of wages and shipping costs.



Figure 1: Design of Rehal renovation

Figure 1 shows an overview of a rehal product that has been modified based on our idea.



Figure 2: Labelled diagrams



Figure 3: Rehal rear view



Figure 4: Folded rehal state

Figure 4 shows the rehal condition when folded. Its dimensions are approximately 390 mm x 281 mm x 30 mm.

CONCLUSION

In conclusion, we as a group would like to state that we are confident that our innovation will bring many benefits to Muslims. The convenience that we can convey to Muslims through this innovation is incredible and we will definitely facilitate the daily life of people who want to recite the Quran throughout the day. Not only will Smart Rehal make it easier for students, Smart Rehal will definitely make it easier for students to study anywhere. Although there are many shortcomings in our project, we will try our best to improve our innovation if it gets the desired response.

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SMART TOILET

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ABSTRACT

Toilets are crucial for the health development of people, not to mention children. This is sanitation, where there are facilities and services for safe disposal of human urine and faeces including maintaining hygiene through services such as garbage collection and wash water disposal. The project is conducted so that people will be given access to comfortable, hygienic and safe toilet systems. Thus, a toilet system where hygiene and safety are prioritised could be built while also not compromising the overall comfortability of the toilet system itself. To achieve that, three main features were introduced. Firstly, to achieve a hygienic toilet, a No-hands needed system is introduced so that no physical interaction is conducted. Secondly, to make it more comfortable, auto-flushing is enabled so that the user will not have a hard time flushing the toilet. Lastly, to maintain safety, a fire hazard system is created to prevent any fire hazards from occurring. All of these features are created using Tinker CAD. The commercial potential of this product is due to the high demand in the market and fast development of infrastructure. In conclusion, this invention checks all the boxes required in gaining peoples' attraction which are safety, hygiene and comfort.

Keywords: Arduino; Internet of Things (IoTs); healthy development

INTRODUCTION

In Southeast Asia (SEA), the majority of people there did not really have a chance to have a fully-functional toilet system that is both comfortable and safe. This is added to the fact that the number of hazardous cases occurring in toilets were increasing. As a result, a variety of functionalities have been compiled to be included as primary features in the product which are *Auto-Flushing System*, *"No Hands-On Needed" System* and *Integrated Fire Hazard System*. These inventions were gathered and combined them into a single system. Not only does the invention boast many unique features, its features are also well-integrated in a system, which in whole elevates the experience of using the toilet to a whole new level.

INNOVATION DEVELOPMENT

Firstly, the majority of the people in SEA had never been given a chance to use a safe, modern and comfortable toilet system. Thus, several functions are compiled to be integrated into the product as main features. First of it is an Auto-Flashing system. Next, we also added a "No-Hands Needed" system due to the fact that the pandemic is still around. Lastly, a final main feature is added based on our recent experience in public toilets. Once in a public toilet, someone irresponsible decided to smoke in the congested cubicle, causing a massive fume of smoke to rise from the small cubicle. This caused severe discomfort to the others using the

public toilet. Thus, we wondered what we could do to discourage such acts in public places. We named the last feature as an “Integrated Fire Hazard System”. So, that is where we got the inspiration to innovate on a product that can tick all the boxes. Due to the fine addition of features in the product, water spillage can be prevented, causing it to not become slippery and essentially turns into a dry toilet. All these features can essentially be found in various other products, but never together in a single invention, integrated in each-others’ programs. The exclusivity of this product is also highlighted by the fact that the device itself is very small and portable, resulting in an easier way of installation.

1.1 No Hands-On Needed

Since the pandemic is still around, physical interactions should always be monitored as it would decrease the spread of the virus. Based on an article released on the study on how toilet flushes spread viruses like SARS-CoV-2. The article mentioned that they spread through tiny droplets of water or aerosols [2]. A flushing toilet generates a cloud of thousands of aerosol droplets that rises about a meter into the air if the lid is up. The aerosol droplets may provide the means for the virus to move from one place to another. Thus, it is clear that by limiting the distance and physical interactions in public toilets, the spreading of the coronavirus may be prevented.

1.2 Auto-Flush

It is an automatic system where no physical force is needed to flush the toilet. This feature is helpful for the elderlies as flushing does not require any force and it is easy to reach. This feature is made possible by using several wave sensors that act as the sensors which detect the waving hand of a person. Based on a report by the Malaysian National Health and Morbidity Survey (NHMS), 15% of adults over the age of 60 had fallen at least once over 12 months [3]. One in two suffered injuries, while one in five were hospitalized. Thus, by implying this feature, it will contribute to lowering the percentage of victims in the future.

1.3 Integrated Fire Hazard System

This system consists of several actions that work together, creating a programme which reacts to each other to prevent any Fire Hazard occurring in the toilet. It is also capable of alerting the surrounding and the authorities of any potential hazard from smoke. This program was solely created to discourage people from smoking in toilet cubicles, which can lead to fire-breakouts and foul-smelling smoke in public toilet cubicles.

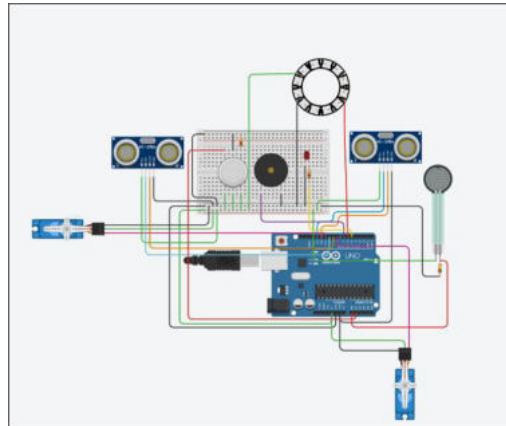


Figure 1: Innovation Conceptual Framework

COMMERCIAL POTENTIAL

1.1 High Demand in Market

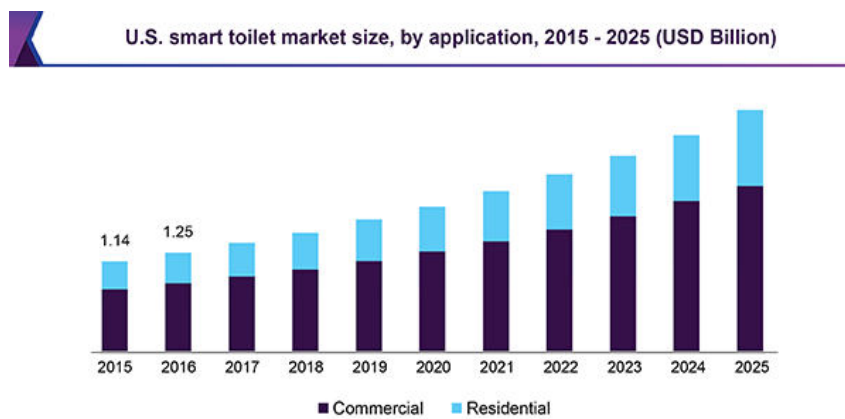


Figure 2: Smart toilet market size (2015 - 2025)

In recent years, the market has recorded a significant growth in the smart toilet market. According to a study conducted in 2018, it is estimated that the global smart toilet market size was valued at USD 6.4 billion [4]. The rising demand for sanitary hygiene products is expected to remain a major factor for the market growth of smart toilets in the coming years. Added to the fact that due to the pandemic, the demand for sanitary products had skyrocketed and will continue to increase in the coming years. It had been observed that the global sanitary ware market was expected to increase by more than twofold from 2018 to 2025.



Figure 3: Global sanitary ware market

1.2 Fast development of infrastructure

The fast-paced development of infrastructure can also aid us in commercialising our invention. This is due to the fact that in urbanised states such as Penang, Selangor and Johor, high rise buildings were being built faster than we could count. As a result, modern toilet makers are in high demand [1]. Because if the buildings themselves are modern, the toilets should be as well. Thus, we firmly believe that our product holds a major advantage over our competitors.

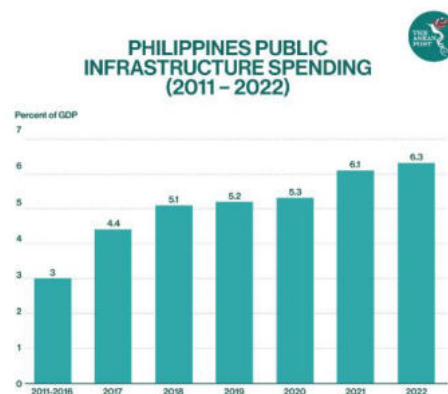


Figure 4: Philippines public infrastructure spending (2011-2022)

CONCLUSION

Lastly, in conclusion, the toilet can be practically-used by all people because it is not very complicated to use. The whole experience of using the toilet also will be more comfortable and can be useful to stop the spread of COVID-19 because of ‘hands-free’ features. Then, the safety hazard will be useful for people to avoid incidents that happen in the toilet. We really hope this concept can be adopted by the companies in the future.

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Ease Your Study (EYSY) app

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ABSTRACT

EYSY is an app that has been working for, aiming to enhance the productivity of the users which includes students, teachers and can also be parents. EYSY is a short form of 'Ease Your Study'. In today's modern world, more people prefer to study through technology rather than traditional methods. As for this, we need to download a number of apps to help us with our studies, such as Canva, CamScanner, and Slidesgo. Our phone storage easily becomes insufficient after we install all of the apps. Furthermore, some people are unfamiliar with instructional software and applications. As a result, this EYSY that we have invented can help them with their education because it has all of the necessary study materials. Our initial goal in designing EYSY was to establish a platform that included everything we needed to study only in one application. We are aiming for three categories in this innovation: primary school, secondary school, and tertiary education. EYSY has four main parts which are Education, Study, English Tools and teaching. Each part has its own features. In conclusion, this app definitely can help the users throughout their studying process.

Keywords: Productivity; application; education; technology; study

INTRODUCTION

A mobile application, or commonly known as an app, is a computer programme or software application that runs on a mobile device such a phone, tablet, or smartwatch. Apps were designed to aid productivity in areas such as email, calendars, and contact databases, but public demand prompted rapid expansion into other areas such as mobile games, factory automation, GPS and location-based services, order tracking, and ticket purchases, resulting in millions of apps now available to be used by the people.

In the modern world, more people choose to study through technology rather than conventional methods. Furthermore, due to a prior pandemic COVID-19, people especially students had to attend school lessons from home. This EYSY app is a productivity app which can be used by students, teachers and may also include parents. As today's world requires us to make use of online platforms, EYSY app is the one that we are working for, aiming to promote a better education platform, throughout the studying process. The problem arises as usually, huge storage is required in order for them to install all apps to study. Next, the lack of exposure to educational software and application may lead them becoming clueless on using online as a platform of studying. Also, the troublesome that one has to face to install the applications separately somehow are making things become unorganized.

By having EYSY, it will help to overcome the problems as people just need to install one app, which EYSY app, and they are ready to go. EYSY helps the users to complete their work nor assignments without stress. The features in the app are well-organized and also have a

beautiful background which definitely will attract the users and motivate them in doing their tasks. EYSY app is an app which also act as a site and platform which includes all the study materials or apps that students and teachers require. Moreover, EYSY app definitely get to save more time for the users as they no longer have to burden themselves on finding stuff for their work purposes. One can easily access to any apps they want through this EYSY app.

APPENDIX

INNOVATION DEVELOPMENT

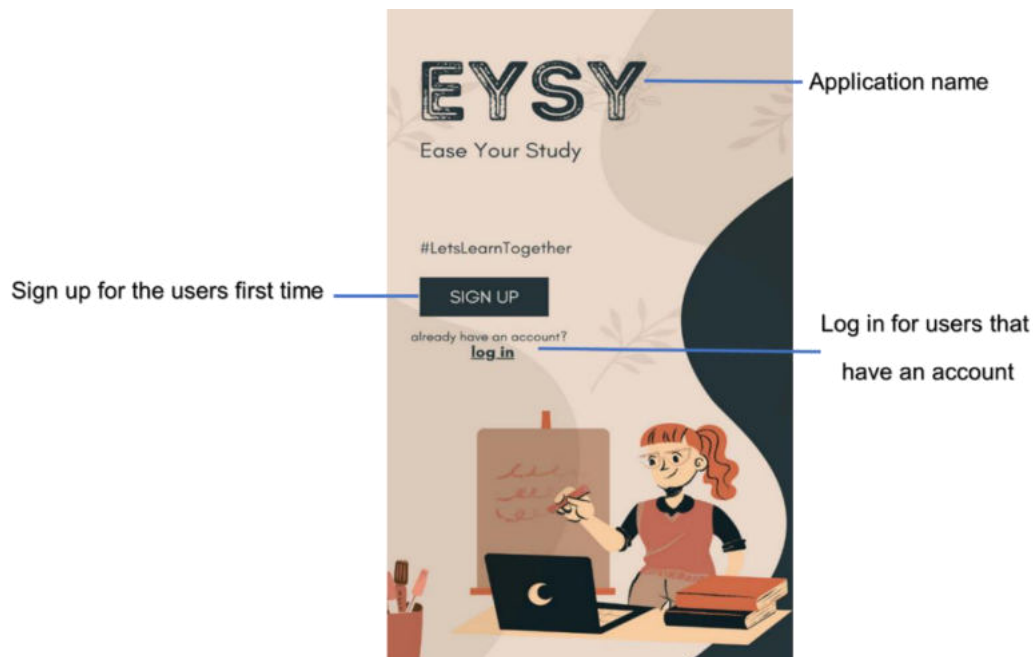


Figure 1: Application front page

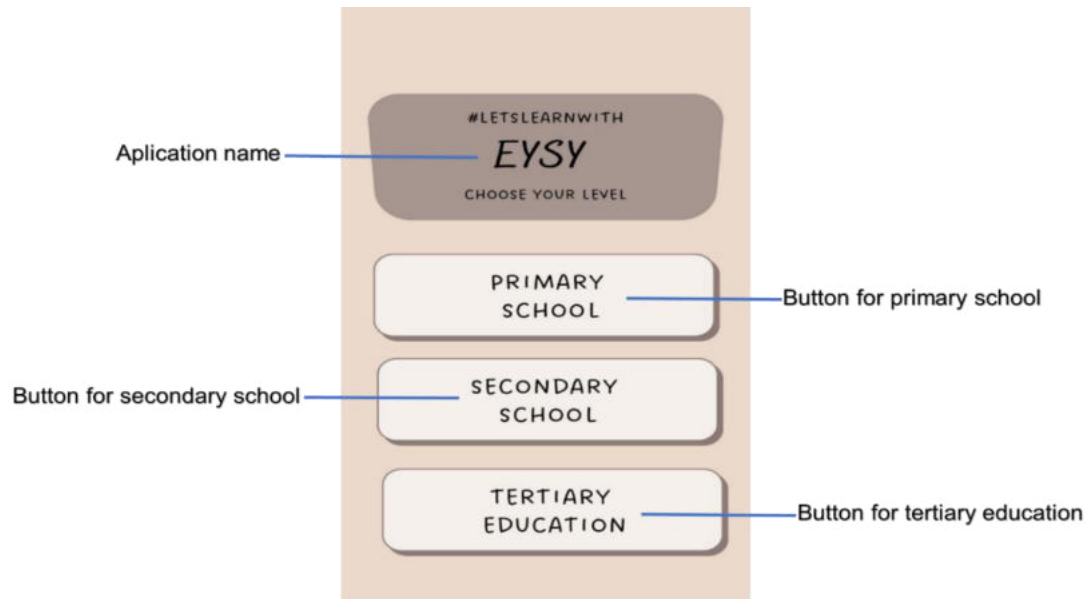


Figure 2: Application second page

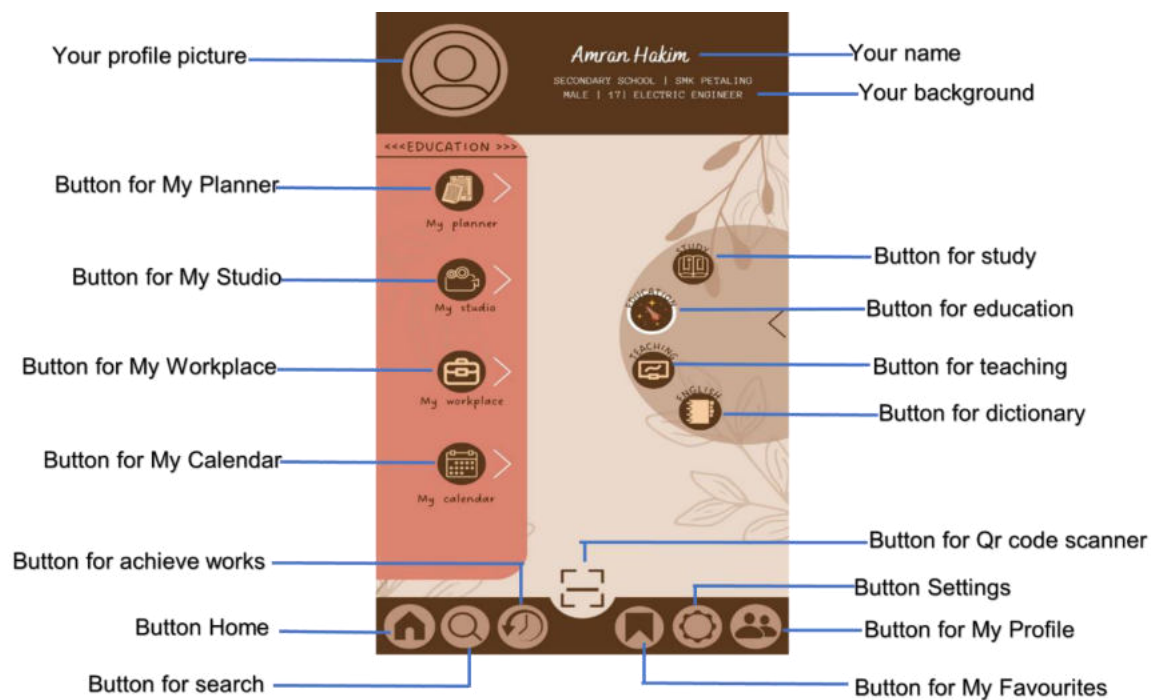


Figure 3: Application third page

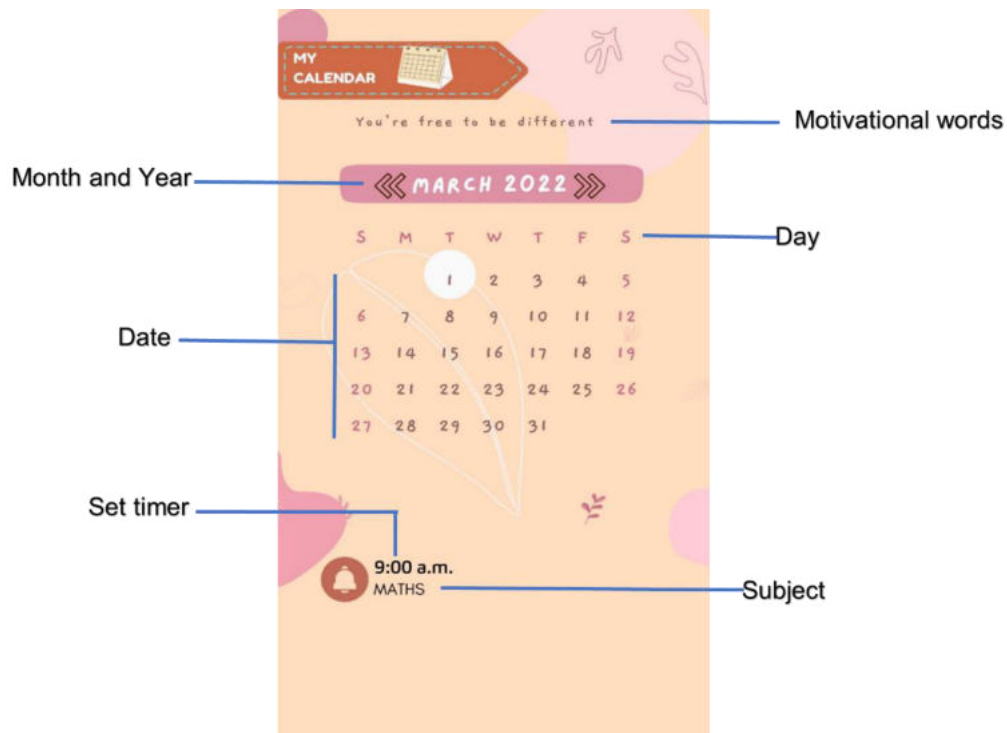


Figure 4: My Calendar page

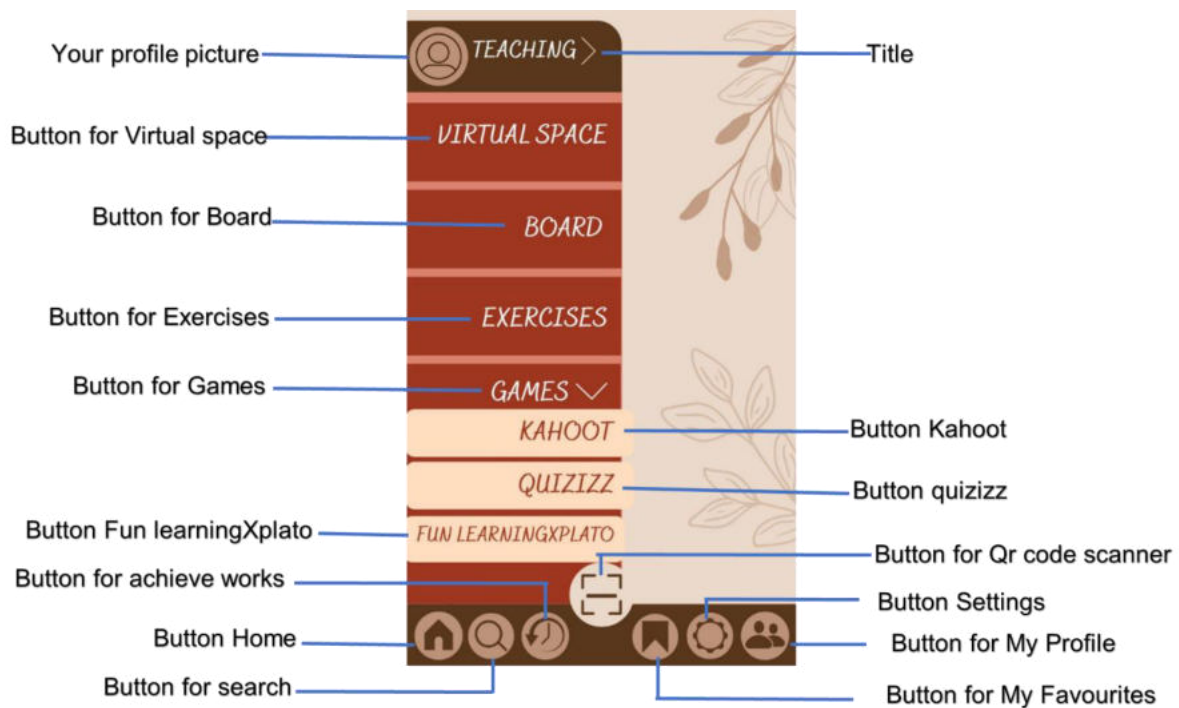


Figure 5: Teaching page

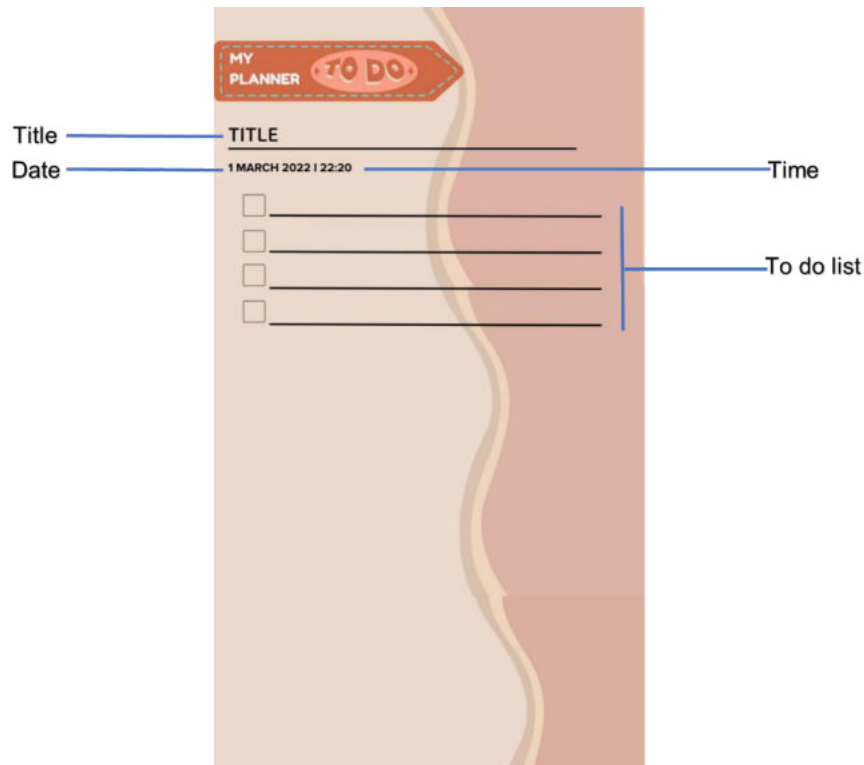


Figure 6: My Planner page for teachers

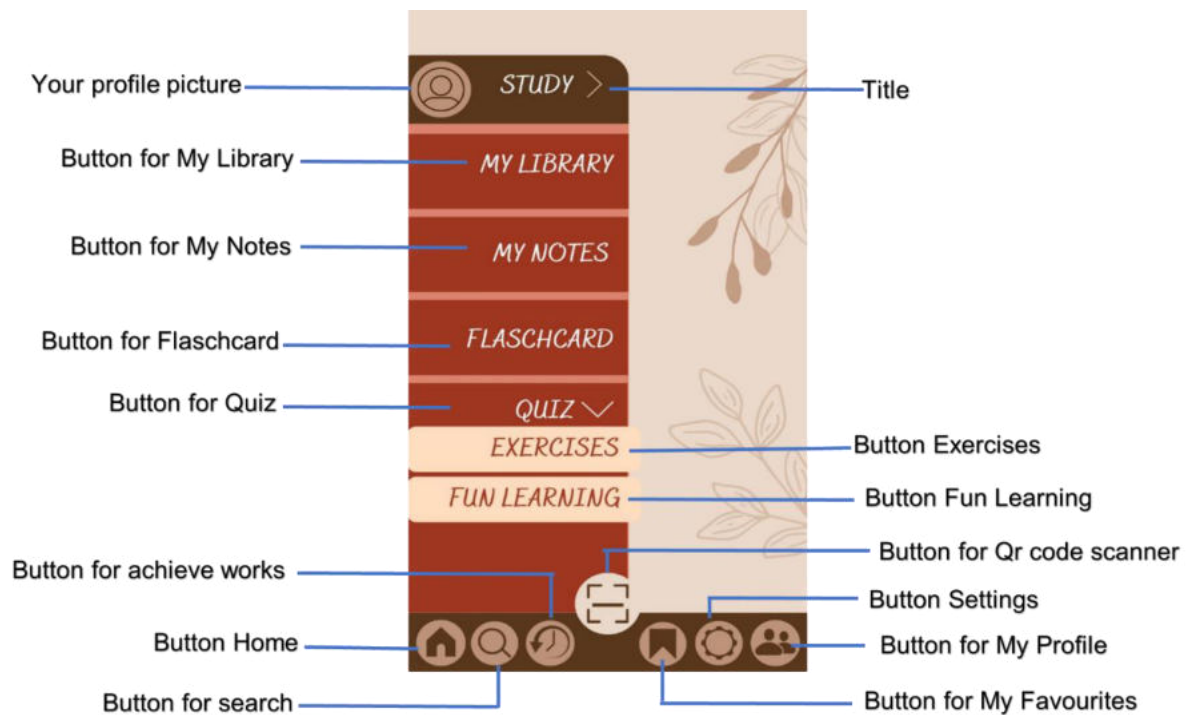


Figure 7: Study page

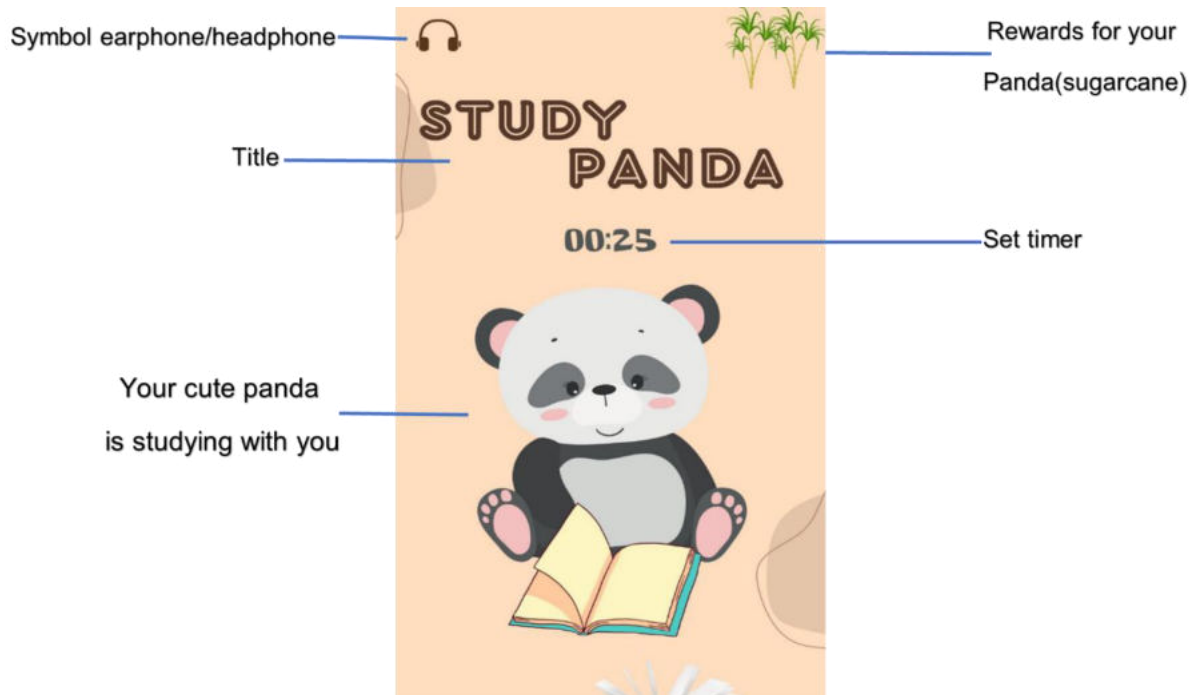


Figure 8: “Study with Panda” page

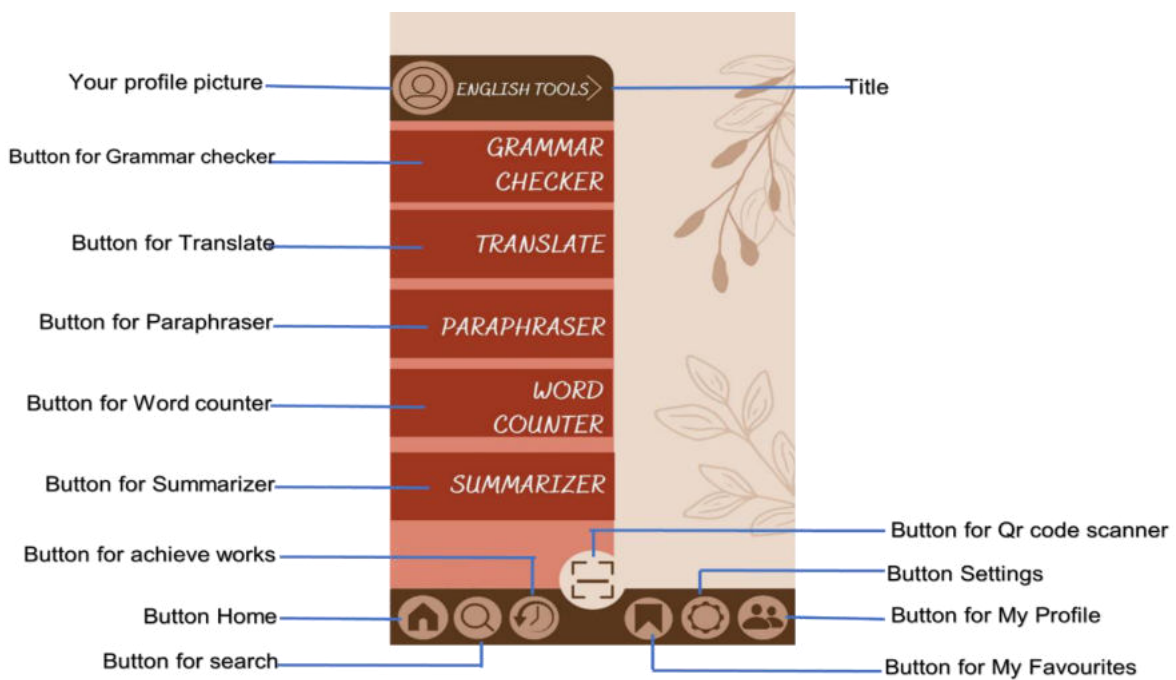


Figure 9: English Tools page

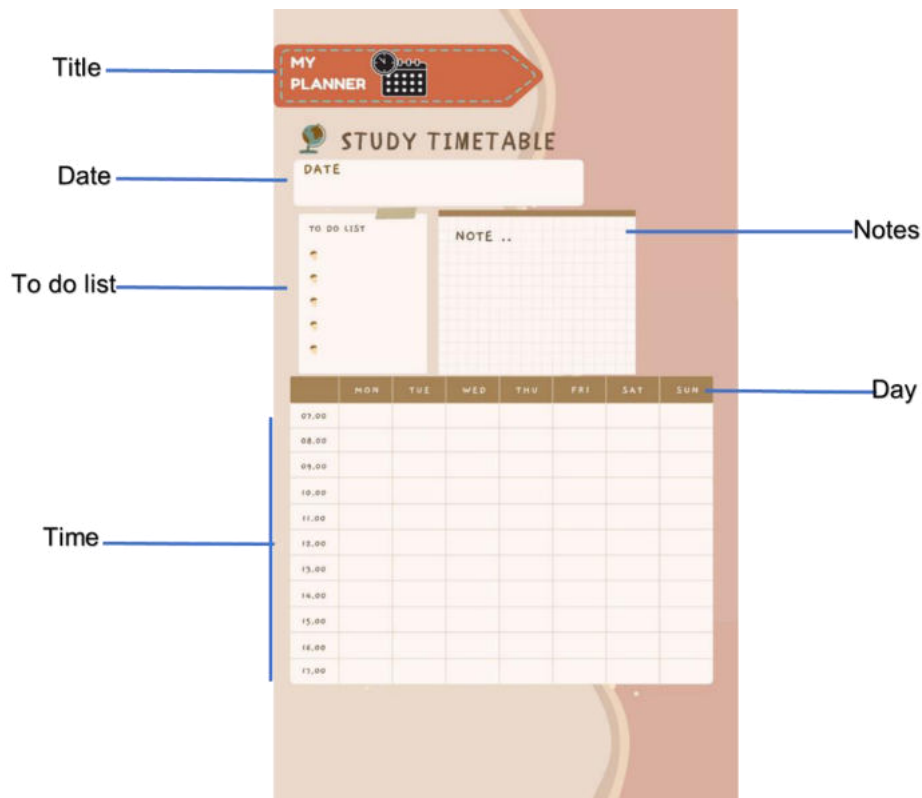


Figure 10: My Planner page for students

COMMERCIAL POTENTIAL

As mentioned above, most people prefer to use modern technology rather than traditional learning style. Especially during the pandemic COVID-19, most students need to study at home instead of study at school. Due to this, students need to use productivity applications and studying aid applications to maintain their motivation and ease their learning process. Mobile technology has arisen the popularity nowadays, and has become an important tool in the teaching and learning process (Hashim, H., 2018). However, there are some problems they face in this situation, firstly, because of the need to install some applications to help in their studies, all the applications installed use a huge storage in their device that can cause their device cannot run smoothly, either smartphone, tablet or laptop. Next, another problem is lack of exposure to educational software and learning applications. As we know, not all people are born with a silver spoon in their mouth and some of them have little knowledge about Information Technology (IT) and applications. Hence, due to the lack of exposure, they do not have opportunities and knowledge about software and applications that can be used in education.

EYSY is invented to help them resolve these problems and at the same time, give plenty of benefits to users. A huge storage usage problem due to the installation of a vast of applications can be solved with EYSY application as EYSY is a productivity application that assemble all the learn applications into one app only. Users can find all features and tools they need to use during their learning process in EYSY apps. All users no need to worries, as this application will always be updated from time to time. Furthermore, EYSY is a problem solver for the lack of exposure to educational software and applications as EYSY has all the applications and software in one app and EYSY itself can introduce all the applications to the user.

The invention of EYSY absolutely contributes a huge benefit to new knowledge, technology, environment and society. In EYSY, we have some features and applications that can be used to unleash the editing skills, which is the 'My Studios' part, in which users have a chance to learn more about editing skills by using Canva, Capcut, InShot, Filmora and more. Not only that, users can use this application to write notes or mind maps using the template given. This totally helps them to write notes as we know that not all people are able to write a good note. All these features totally help them to gain new knowledge and make them used to using the technology they have. Regarding the contribution to the environment, the usage of the papers, and all the materials for taking notes and all the books can be cut off as EYSY has some features and applications that were created exclusively for note taking. EYSY also provides e-books for teachers and students to use during the learning process. Users do not need to waste their money to buy a lot of books that are harder to bring anywhere, at the same time can lessen the usage of papers and at once contribute to the environment. The main purpose of the invention of EYSY certainly to contribute something to the society, in part of education and skill development. All educators and students from all levels are our main target and we believe that EYSY is worth to use and perfectly helps them to stay productive in their study journey. Our society's future depends on youngsters nowadays. We need to overcome the technology illiteracy among today's generation to have a better future.

EYSY is open to everyone. In account to the target market of EYSY application most of them is a student, the price to register the account is RM 4.50 only per year. Users just need to register once a year and they are able to use all tools and features in EYSY without any circumstances.

CONCLUSION

In conclusion, we truly believe that our EYSY app will give numerous benefits to the users. EYSY is easily accessible and free for all and very suitable for everyone including the teachers. EYSY app also helps to save more time for the users as it includes all necessary materials needed in just one app. EYSY is such an organized app which will definitely help the users in achieving their targets to the highest potential. Our future recommendation is EYSY app will be able to fulfil everyone's needs especially regarding education.

ACKNOWLEDGEMENT

A highly appreciation we bid to the organizers, Pusat Asasi UiTM Cawangan Selangor Kampus Dengkil for giving us the chance to participate in this prestigious competition.

Thank you to Pusat Asasi UiTM Cawangan Selangor Kampus Dengkil for the sponsorship provided to our team. We truly appreciate it.

Thank you to our lovely advisor, Madam Asyikin binti Ahmad Nazri for her kind help and advices which motivates us to complete our project.

To the whole team members which includes Alya Sarah, Hani Khalilah, Nur Adlin Munirah and Nur Alya Maisarah for their endless efforts in completing ours'.

Last but not least, to everyone who keeps supporting us up to this point.

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RIVER CLEANER SAVER

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ABSTRACT

Our main objectives creating this product is to prevent and reduce water pollution, create a conducive and effective environment and to make the community realise how important it is to maintain environmental sustainability. As we all realise, the quality of the water used is obviously worsening as it becomes heavily polluted. Every day, we observe a lot of waste being dumped into rivers, seas, and other water bodies. In Malaysia, we also can see that more than ten rivers are in critical condition. For instance, the Klang River, Sungai Tebrau, Kuantan River, Skudai river and Perak River. An inefficient waste management system that we usually see on the market today has a lot of deficiencies and may add to the community's environmental damage. Therefore, we would like to introduce our product RIVER CLEANER SAVER which is unlike any other product on the market. Our product is designed in a medium-size, portable and user-friendly. It also requires less time and energy. RIVER CLEANER SAVER can measure the water quality level. If the water quality worsens, our product will release a water treatment disinfectant solution to prevent algae blooming and to maintain a lower level of BOD in the water. Non-Governmental Organisations (NGOs) and Government Organisation (GO) are our targets that we would like to introduce our innovative designs. With the worldwide use of River Cleaner Saver, we can reduce and prevent the main problem, that is water pollution.

Keywords: River cleaner saver; rivers; water pollution; water quality

INTRODUCTION

Water is essential for all life forms to exist. Water is vital for agriculture, manufacturing, fishing, and tourism, among other things, in addition to domestic purposes. The clean water supply has declined as the world's population, urbanisation, and industrialisation have increased. The quality of the water used is obviously worsening as it becomes heavily polluted. The resulting water pollution is a serious threat to the well-being of both the Earth and its population.

Every day, we observe a lot of waste being dumped into rivers, seas, and other water bodies. Unfortunately, no significant action has been made to prevent this from happening. The majority of the waste thrown away is made up of non-biodegradable materials that cannot be broken down by the action of living organisms. This will result in a high level of Biochemical Oxygen Demand (BOD) in the water, which will eventually affect the water quality. Obviously, this condition will create an unhygienic and nonconductive environment, particularly for aquatic life as well as for us.

PROBLEM STATEMENT

In developing countries, waste dumps are harming the environment. Improper waste disposal has a negative environmental impact that may be seen all over the developing globe. Due to a lack of proper planning and funding, the waste management scenario is becoming worse day by day, especially when it comes to the river or any water sources. [1]

In Malaysia, we also can see that more than ten rivers are in critical condition. For instance, the Klang River, Sungai Tebrau, Kuantan River, Skudai river and Perak River. The major factors all these rivers are polluted are because industrial discharge, improper sewage treatment, residential discharge, land development, and soil erosion. Water pollution definitely affects a lot of people, especially fishermen, indigenous communities, and individuals who rely on these places for a living, as well as the country's economic resources. Waste that is disposed of or flushed into drainage systems and rivers causes several negative impacts on humans and the environment, such as [2]:

Spread of water-borne diseases such as cholera, diarrhoea, and typhoid fever. Resulting in waste accumulation along river courses and drainages

Water pollution due to high Biochemical Oxygen Demand (BOD) level in water which will cause less dissolved oxygen present for the aerobic animals like fishes and other aquatic ecosystems. As a result, aquatic organisms become stressed, suffocate, and die.

- Drainage blockage
- Infrastructural degradation
- Land pollution
- Flooding
- Erosion

An inefficient waste management system, such as the river cleaner seen on the market today, can only be utilised on a large regional scale, is costly, takes much time, requires a lot of energy, and can only be managed by professionals, may add to the community's environmental damage. Solid waste management systems are critical for managing all initiatives to reduce negative impacts, particularly on health, the environment, and the economy. Therefore, we would like to introduce our product RIVER CLEANER SAVER which is unlike any other product on the market. [1,2]

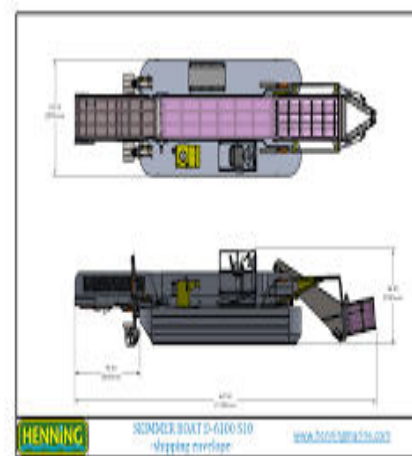
Our innovative product is designed in a medium-size and is portable, making it useful and convenient to clean any area that we choose. Our product is also simple to use and can be utilised by anyone, and it requires less time and energy. RIVER CLEANER SAVER can also measure the water quality level, which is a unique function of this product. If the water quality worsens due to a high level of BOD, our product will release a water treatment disinfectant solution to prevent algae blooming and to maintain a lower level of BOD in the water.

OBJECTIVES

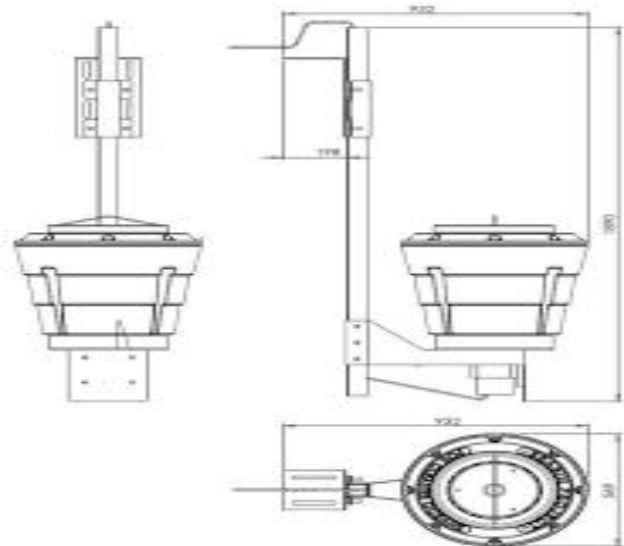
By referring to our innovation proposal, our main objectives creating this product is to prevent and reduce water pollution mainly in the domestic area such as residential areas. By creating this product, we can create a conducive and effective environment that can be beneficial to all of us. Aside from that, by developing this product, the community will understand and realise how important it is to maintain environmental sustainability in order to create a stable and systematic ecosystem. Hence, we can show the community that scientific innovation and technology can be used to raise awareness.

INNOVATION DEVELOPMENT

Examples of trash skimmers that are already on the market.



Figures 1 and 2: A trash skimmer boat for large scale cleaning



Figures 3 and 4: A Seabin V5 project

PROTOTYPE

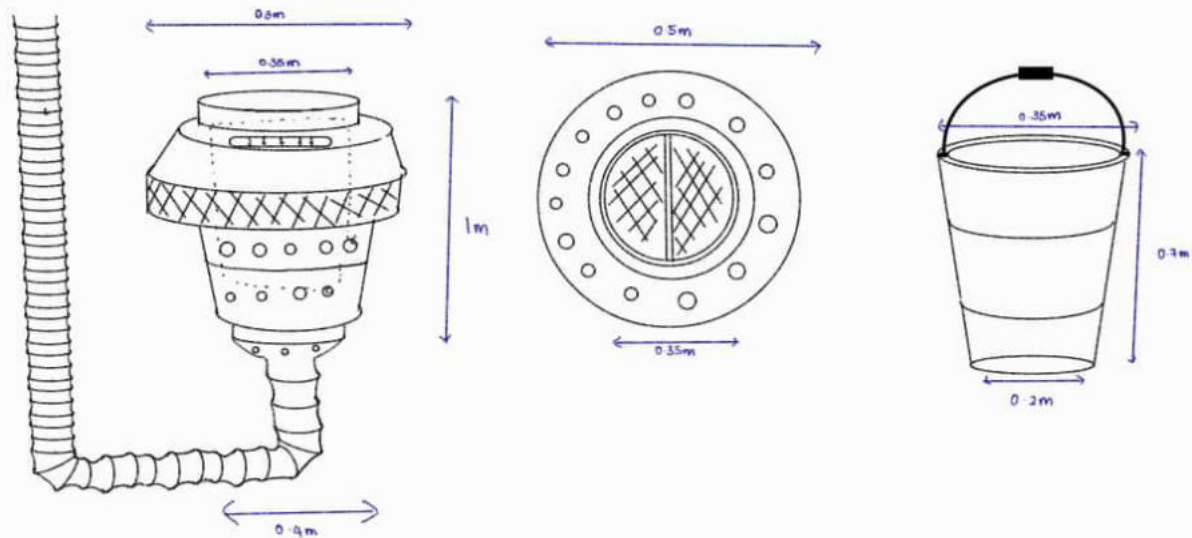


Figure 5: Top and side views of the prototype sketch of the RIVER CLEANER SAVER project

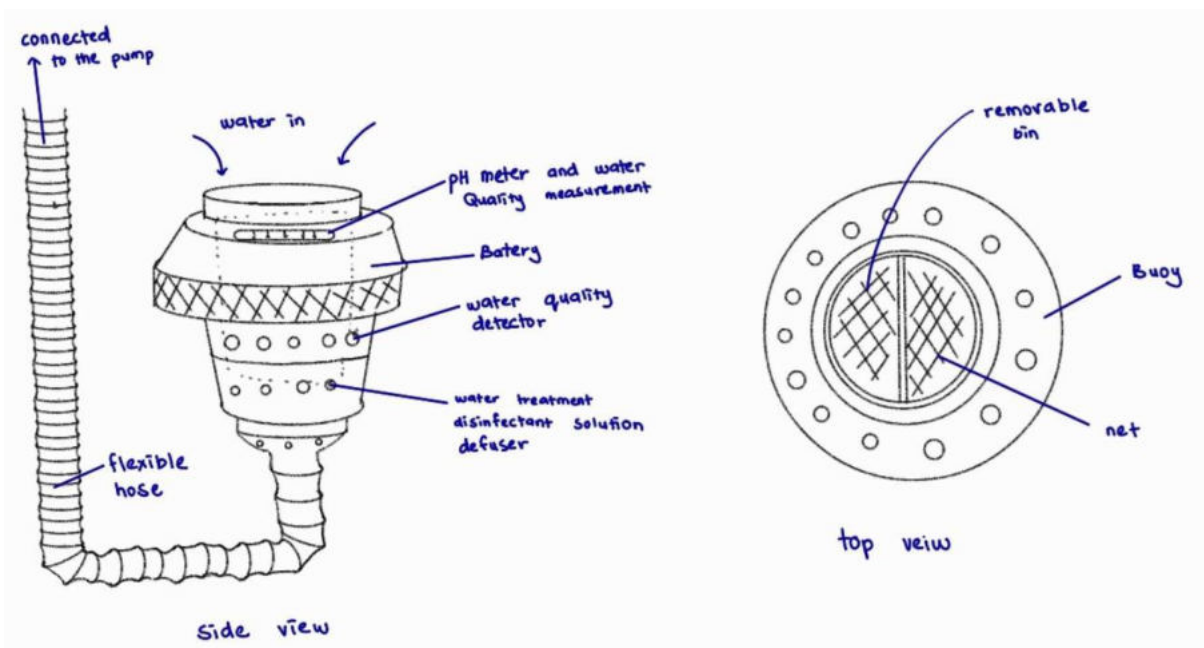


Figure 6: Main components of RIVER CLEANER SAVER

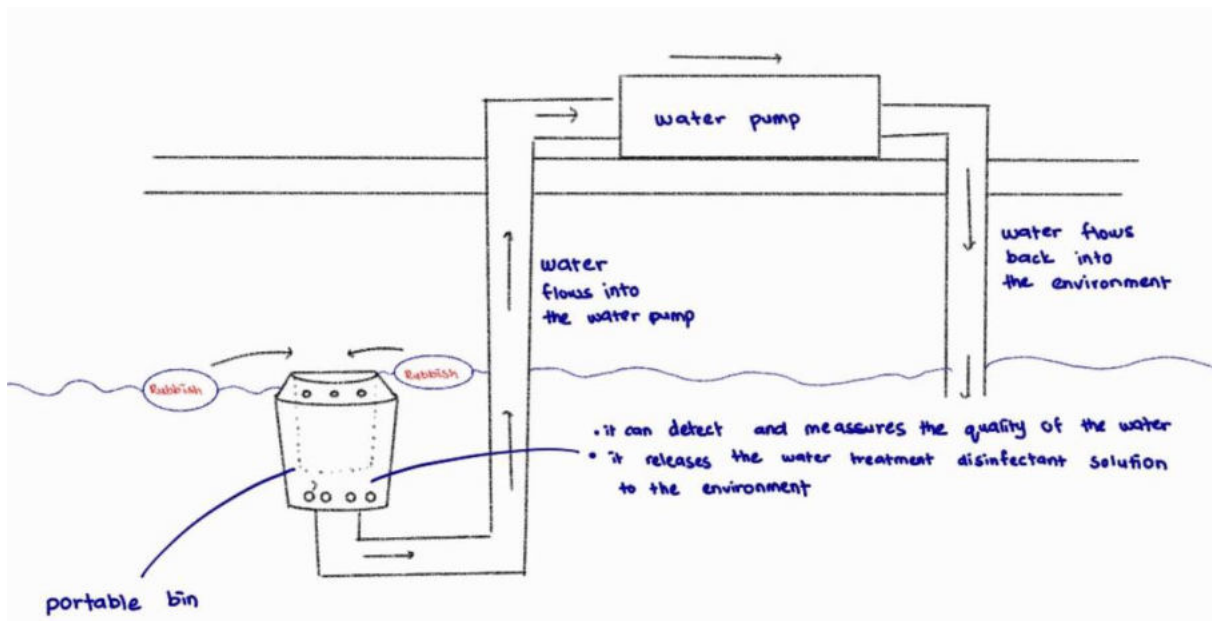


Figure 7: Prototype sketch of the entire project

INVENTIVE FEATURES OF THE PRODUCTS

RIVER CLEANER SAVER is an innovation that aims to save aquatic and marine life by cleaning the water surface from non-biodegradable wastes that are capable of harming the environment below. There are numerous features that are offered by RIVER CLEANER SAVER such as its ability to clean the debris floats thoroughly as it is manoeuvrable due to its small size and its portability. Not only that, although it is complex and small, it can accommodate trash weighing almost 15 kilograms for one cleaning. This semi-automatic cleaning does not require a lot of manpower and professional manpower to manoeuvre the cleaning process. This easy-to-remove and disposable garbage collection basket make it easy for users to clean without the help of skilled people as it is user-friendly. Not to forget the main special feature that is not available in any river and sea cleaning device on the market is the ability of this device to measure the health status and quality value of the surrounding water and be able to balance the water quality to water quality suitable for life and reproduction of aquatic life below it. Therefore, bad microorganisms can not spread to infect the life in it and the rapid growth of algae can be avoided. In this way, directly the ecosystem of the river or any water reservoir has a balanced ecosystem and is able to continue its sustainability.

COMMERCIAL POTENTIAL

The public is aware of the problem of garbage overflow that pollutes the environment, yet there are only a few parties that take steps to ensure garbage is not polluting and damaging water ecosystems. With that, the design of this RIVER CLEANER SAVER can be used to solve the infamous problem. The design is originally innovated from the SEABIN V5, but now augmented with a water pH detector, usually called pH metre to measure the acidity and alkalinity levels of lakes and rivers. With the addition of such design, not only the problem of garbage in the river can be solved, even the microorganisms causing reduction of water quality can also be handled. Therefore, this innovative material can address the problem of river pollution at the same time improving the quality of river water.

RIVER CLEANER SAVER can contribute to the latest knowledge and technology by opening the minds of everyone to the importance of clean river water which is the source of water supply to the local and wildlife. RIVER CLEANER SAVER only takes low cost and does not require too sophisticated technology to be owned by each area to ensure that the garbage in the river can be disposed of in the right way. Not only that, the government can also introduce this innovative material to the community, especially students to raise awareness on the importance of cleanliness of the river

Furthermore, RIVER CLEANER SAVER can contribute to environmental sustainability through materials required to produce it where the inside and outside of its body is made of recycled plastic to support the recycling program re-running all this time. In addition, this innovative tool will not threaten the safety of aquatic life in rivers or lakes as it only floats on the surface of the water to suck garbage into it. Next, the RIVER CLEANER SAVER is also equipped with a water pH measuring device to identify the level of acidity and alkalinity of the river water before chemicals are sprayed out of its body to stabilise the pH of the river water suitable for aquatic life.

Our innovative design, the RIVER CLEANER SAVER, can provide solutions to users and is able to compress up to 15kg of waste in the lake or river. It moves up and down with the tide to collect all the floating garbage effortlessly. Water is sucked in from the surface and through a catch bag inside, with a submersible water pump capable of displacing 25,000 LPH (litres per hour), plugged directly into the outlet. The water is then pumped back into the sea leaving debris trapped in catch bags for proper disposal. In addition, pH metre mounted on the side of RIVER CLEANER SAVER can detect the level of alkalinity and acidity of water to then secrete a chemical substance into the water to neutralise the water to prevent the growth of microorganisms that threaten the cleanliness and quality of the river.

Product Targets:

1) Non-Governmental Organisation (NGO)

Non-Governmental Organisations or better known as NGOs are the first target that we would like to introduce to them regarding our innovations. Most non-governmental organisations in Malaysia are "non-profit organisations" active in volunteering to help the community clean up local areas. However, they do not have a cost-effective way to clean up river areas, so our innovative design RIVER CLEANER SAVER can help them to reduce the costs of cleaning and labour.

2) Government Organisation (GO)

Government Organisation is our second target that we would like to introduce our innovative designs. Government Organisations are fully funded by the government and have a diverse medium to promote RIVER CLEANER SAVER. In addition, government companies are also able to introduce this innovative design to the general public in the country and abroad. With this, the environmentally friendly product can be used widely hence improving the quality of the environment, especially river areas.

Table 1: Materials of the product

No.	Items	Images	Quantity	Price per unit(RM)	Overall Price (RM)
1.	Catch Bag		2	9.00	18.00
2.	Filter Bag		1	6.00	6.00
3.	Water Pump		1	32.30	32.30
4.	pH Stabiliser		2	83.00	166.00
5.	Flexible hose		1	30.00	30.00

*Price for other items such as electrical wires, pH metres and others: RM693.10

Total cost: RM 945. 40

The proposed sale price is RM1500.00

Gross Profit Margin = ((Revenue - COGS) / Revenue) × 100

= ((RM1500 - RM 945.40)/ RM1500) × 100

= 37%

CONCLUSION

With the worldwide use of River Cleaner Saver, we can reduce and prevent the main problem, which is water pollution. Our rivers are one of the most important things to keep living, not only for the aquatic life but also for some groups of people like fishermen and indigenous communities. That's why we need to keep rivers as clean as possible and protect the creature who lives in it. We can use this technology, RIVER CLEANER SAVER, to help make the water on the Earth's surface especially rivers and lakes more livable and safe habitat for all marine life.

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Canela Soap

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ABSTRACT

Soap generally seems to be an alkaline substance that was designed to eliminate germs on our skin while also assisting in the regulation of our skin's pH level. Unfortunately, many soaps on the market today have serious environmental impacts. As they contain artificial compounds that are toxic to our ecosystem, such as Sodium Laureth Sulfate (SLES) and Sodium Lauryl Sulfate (SLS), which can irritate skin and are harmful to sensitive skin. As a result, natural components should be the primary focus of soap producing, rather than artificial goods that are hazardous to the environment and the skin. The goal of this product is to create a soap that primarily employs cinnamon, a natural substance, as a basic ingredient to help combat germs on hands while also preventing irritation and preserving the environment. In Portuguese, the term canela means cinnamon, which is one of the essential parts in this creation. Canela soap ultimately obtains the final product, which has the ideal alkaline level of 8 pH and suitable to be used for all types of skin. Also, Canela Soap can help reduce pollution as it is a biodegradable soap made by waste products which is used cooking oil using basic saponification methods and will not cause pollution to the environment. Canela Soap has also successfully made a commercial appearance by releasing the first product to random customers to test its alkaline level towards different types of skin. The majority of the customers liked the natural smell that Canela Soap produces, and the majority of the skin types, including sensitive skin types, did not have allergy symptoms. To summarize, Canela Soap is a natural product made with the main ingredient Cinnamon as a basis to make a safe soap product that may serve as a model to this soap-making industry.

Keywords: Soap; biodegradable

INTRODUCTION

Food waste, plastic, paper, and old metal items are examples of domestic garbage discarded from residential regions. Failure to manage proper household waste will result in pollution owing to wastewater emissions from home sinks, as well as fat, oil, and grease content, entering the drainage system without any filtration procedure. The goal of this innovation project is to investigate the possibility for used cooking oil to be recycled through the making of soap made specifically from used cooking oil using the saponification process, as well as to minimise the amount of used oil that needs to be removed at home.

The fundamental technique of saponification can be used to make biodegradable soap while also lowering human reliance on commercially available synthetic soap. At the same time, the reuse of spent oil will make the process of removing oil applied at home easier. As a result,

the results demonstrate that the amount of applied cooking oil that is removed in the sink or trash cans has lowered by 60%.

Daily essentials such as detergent soap and dishwashing soap no longer need to be purchased since the soap can be made at home due to the invention of Canela Soap, which has a dual-function feature.

The ability to reuse used oil has been demonstrated by the technique of manufacturing soap at home from spent oil utilising the saponification process.

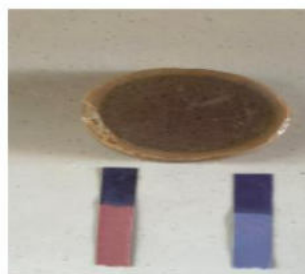
Canela Soap manufacturing test run of 5 series of test runs reduced the quantity of cooking oil accumulated by 800 ml, indicating that used oil should be reused to avoid imprudent removal of used oil by irresponsible users.

INNOVATION DEVELOPMENT

Canela Soap has already completed six trials in order to arrive at the final product, which focuses on the effect and replicability efficiency of Canela Soap. The first experiment was to determine the base recipe for Canela Soap, the second experiment was to determine which natural ingredient is best for the end product. The third experiment was to determine whether or not food colouring should be used in the final product, the fourth experiment was to determine what size and shape are most practical for consumers, and the fifth experiment was to determine the final test product that should be released to consumers. Finally, a sixth experiment is being conducted to test if Canela Soap can be replicated with the same alkaline pH before the final product is released.



From left to right experiment 1 until experiment 5. pH value first.



Experiment 6th that focuses on the over shape.



The process of making Canela Soap with used oil.

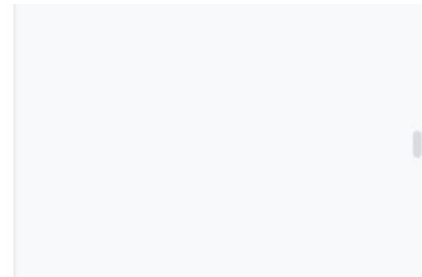
COMMERCIAL POTENTIAL

Canela Soap has the potential for being one of the local products that can help with environmental problems such as the unstable pH level of river water that if we don't treat it is gonna affect the marine life that we consume on a daily basis. The saponification process is

gonna help with reducing used oil that if going out of control gonna affect the sewer systems with grease.

Table 1: Financial budget for Canela Soap

Ingredients:	Price per gram (RM)
Used Cooking Oil	-
NaOH	2.00
Extract Lemon	0.20
Oat	0.50
Cinnamon powder	0.50
Total per batch Canela Soap	3.20



The recipe of Canela Soap is:

- 5 g of sodium hydroxide
- 100 ml water
- 250 ml Used oil
- 100 ml lemon extract
- 11g oat
- 6 g Cinnamon powder

The apparatus used is:

- Used plastic containers
- Filter
- Gloves
- Disruptor
- Plastic bottle

Equations

1 batch of Canela Soap = 18 unit of Canela Soap

Price Per Soap = Total per batch Canela Soap

Unit of Canela Soap

Price Per Soap = RM3.20/18

= RM 0.18

Break Event Point = Unit to be produced/total price

= 18/0.18

= 100 units

This equation shows that to achieve break-even point for Canela Soap unit to be produced should be 100 units of Canela Soap. This shows that Canela Soaps are practical and can be made at home with a small capital and used oil. Despite, being eco-friendly to the environment, Canela Soap also can generate some side income for those who need some financial needs.

CONCLUSION

To conclude, Canela Soaps are one and only soap products that can help the environment and decline the graph of allergy that others are faced with. It helps with reducing the allergy and at the same time helping to reduce the pH level of the water that have been polluted by others artificial industrial Soap

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Multipurpose Tasbih

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ABSTRACT

The purpose of the idea for us to create this project is because we found that many Muslims today are often careless with matters related to the world and often give the reason that it is difficult to remember the number of prayers and remembrance recited and they are busy so always late- miss prayers. In addition, Muslims at the end of this age also prefer to listen to songs rather than the holy verses of the Quran on the grounds that it is difficult to download surahs. We have decided to innovate '*Multipurpose Tasbih*' which has various functions such as counting zikir recitations, tasbih and selawat, helping to find the direction of Qibla, a clock that reminds us of prayer times as well as an audio player that recites selected surahs. The objective of our innovation is to make it easier for Muslims to take our innovation tools everywhere as well as use them everywhere and help overcome problems such as late prayers, forgetting zikr count, difficult to download selected surahs and wrong Qibla direction. . The process of developing the innovation is by adding a digital compass, an audio player that has been downloaded with selected surahs as well as a digital clock that reminds of the prayer times on the '*Tasbih Counter*'. Tools with one different function are combined into one tool that has multiple functions. We expect the commercial potential of our innovation project to be highly profitable and sold in stores as well as in online businesses as it is a very useful tool for all Muslims. We hope that our innovation project can help and facilitate Muslims to worship more sincerely and be able to fulfill all the commands of God.

Keywords: Careless; worship; functions

INTRODUCTION

In life in this era of globalization, there are many tools created to help and facilitate human beings. For example, digital tasbih was created to make it easier for Muslims to count zikir recitations and is very practical to take anywhere due to its small size. In addition, the compass was created to help Muslims find the direction of Qibla when they want to perform prayers and gadgets that play surahs in the Quran like an audio player. Our idea was to create a tool called '*Multipurpose Tasbih*'. '*Multipurpose Tasbih*' is a tool that combines various functions such as counting the recitation of tasbih and zikir, helping to find the direction of Qibla, azan speaker and recitation of selected surahs as well as a clock that reminds the time of prayer.

The purpose of this idea is because we find that some people feel that carrying digital prayer beads, compasses and audio player gadgets (surahs) separately is difficult. This is because, they are likely to lose the equipment or leave it everywhere due to forgetfulness. In addition, there are parties who often have a reason to recite dhikr because they often forget the dhikr count and always pray at the end of the time due to forgetfulness. This can be avoided

when they use our innovative idea which not only helps to calculate the dhikr count, but can even use it to remind the time of prayer.

Our main objective in innovating '*Multipurpose Tasbih*' is to overcome reasons such as lazy dhikr because they always forget the dhikr count, wrong the direction of Qibla, rarely listen to the holy verses of the Quran and prayers at the end of time. Our innovative idea can also help the elderly to recite dhikr without forgetting their dhikr count as well as help remind them of prayer times and help them listen to the holy verses of the Quran with just the press of a button. In addition, this idea can also help travelers to find the direction of Qibla when they perform prayers in places that do not provide the direction of Qibla. Preserving the religion is one of the demands of the maqasid Syariah. Therefore, we hope that our idea of innovation can prevent Muslims from abandoning the commandments of Allah.

INNOVATION DEVELOPMENT



Figure 1:

Based on the picture above, this digital rosary can only function specifically for the calculation of rosary only. This product is proven to be usable for all ages and ergonomics where it is easy to use anywhere. Unfortunately, this product has only one function.

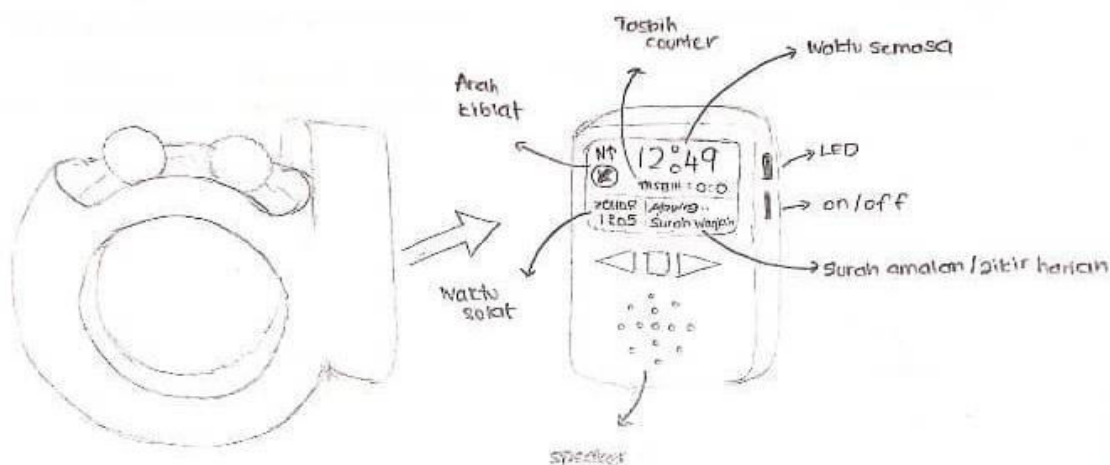


Figure 2:

Compared to our products, there are various functions available along with digital rosary calculation. Among the functions that have been combined are the digital clock function, call to prayer and prayer time, Qibla direction, LED light function for easy viewing at night. With the various combinations of functions along with the calculation of the digital rosary, as Muslims in this modern age, our worship process will be easier.

For example, the combination of prayer times, digital clocks and call to prayer helps us to prepare and move to prepare ourselves to face the One God. In addition, the direction of Qibla can help find the direction of Qibla, especially for travelers. The practice surahs provided also help for us to always remember Him in any situation. The use of a rosary shaped like a wheel can facilitate the worship of our rosary, the shape of which is taken as an example from traditional rosary beads.

MARKET POTENTIAL/ COMMERCIAL VALUE

Digital tasbih is now very much needed by every Muslim. Digital tasbih has many benefits that can be seen because it has the potential to be the hottest sale because digital tasbih today is quite good in the application of existing strategies. Especially in the implementation of strategies on digital rosary products. In addition, there are several things to consider before implementing product marketing strategies. It is a combination of four aspects commonly known as the 'Marketing Mix' which consists of product, price, distribution and promotion. Today, digital prayer beads have achieved more production than traditional prayer beads used in the past. The production of digital prayer beads is focused on everyone because it can facilitate the work and please everyone who wants to worship Allah SWT. This tasbih also contains the current time, tasbih counter, Qibla direction, led lights, prayer times and azan speakers. It is clear that digital tasbih simplifies the affairs of Muslims without requiring a lot of cost to buy other tools because in this tasbih already contains various tools that are needed by every Muslim. By using digital tasbih we will always remember to worship God because digital rosaries are issued in a form that is easy and light to carry. The market is focused primarily on older people as they only need to put digital rosaries on their fingers without complicating to carry long rosaries. For example, if a person wants to travel far, they only need a digital rosary that is small in size and easy to use while traveling and in any situation.

Based on the capital spent to create digital prayer beads, the price offered is very cheap compared to prayer beads offered by other markets. The price offered is worth eighty -nine ringgit only. Although the price offered is cheap, quality is also very much emphasized before creating this digital rosary so that this rosary can be used for a long time. have enough money to buy it. The profit rate earned for each unit produced is as much as 20% of the sales revenue.

CONCLUSION

Islam is a simple religion and does not bother its followers. Therefore, we came up with the innovation of our creation which is '*Multipurpose Tasbih*'. Our objective is achieved when consumers who buy our products can perform acts of worship no matter where they are because it is light and easy to carry. Furthermore, our innovations have special functions that can help users to perform worship regardless of time. '*Multipurpose Tasbih*' can solve the problem of users who want to find the direction of Qibla and know the time of prayer when they go out traveling. Their affairs will be easier and there will be no more reason for them to leave prayers. In addition, users can achieve their daily zikir target with the 'tasbih counter'. They can also add to their rewards by listening to selected

surahs that we include in our innovations in their spare time. This can encourage them to always remember God regardless of when and where they are.

After researching the innovations we have produced, we want to make improvements to those innovations. This is because, we want to renew its special functions that are able to provide many benefits to users. We suggest to add daily prayers that can be practiced by the user on a daily basis. For example, prayer after prayer, prayer for breaking fast, prayer to start a journey and more. To make it easier for users to find the prayers they want, we will arrange the prayers by category to make it easier for users to find the prayers they want. We are aware that not everyone memorizes these daily prayers, so we want to provide a solution to today's society so that they can practice the daily prayers in their lives. Therefore, we would like to make improvements in the future by adding a daily prayer reading function to our innovation. We hope that those who use this *'Multipurpose Tasbih'* can help the community in improving the quality of their worship from time to time and obtain the pleasure of Allah SWT.

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Vector Board Game

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ABSTRACT

By years our next generations seem to avoid pure subjects especially physics. This is due to the complexity and tedious working solution that might be difficult to understand. The main idea of this project is to strengthen the vector concept among the students from secondary school to pre-university students and attract them to learn physics in a more interesting and leisurely way. As we all know, understanding the fundamental topic of physics like forces, motion and kinematics quantities require the basic concept of vectors, especially when answering the problem-solving question. Therefore, students need to have a really good understanding of the concept so that they will be able to get good grades. Most of the students are actually have some difficulties in learning vector concepts. The ability to solve vector will assist the students to score more in most of the topics as half of the syllabus requires vector in solving the problems. As vector is very important and gives a huge impact on the students' performance, creating a simple and low-cost game will be able to attract students to learn physics in a more interesting way. They will not be ranked based on their achievement, but rather they will be guided to solve the problems. This innovation which is Vector Board Game that consists of vectors board, rubber line that comes along with question cards, chance cards and fates cards will guarantee the students to enjoy and understand vector more. Not only that, but they also can learn and play together with their friends as this game requires the students to play in a group of 3-4 members. Thus, it provides a platform for the students to improve their knowledge of physics. Other than that, this innovation could help change their perspective towards physics subject as they would enjoy the learning process independently which does not require assistance from the teachers or lecturers all the time. This innovation is a good step to attract more Science and Technology students, especially those who study physics and will guarantee a good commercial factor in the market as it can also be used for secondary school as well as foundation or matriculation level and STPM.

Keywords: Physics; Vector Board Game; students; innovation

INTRODUCTION

Physics is the branch of sciences that requires the learners to master the fundamental concept and consumption of formulas otherwise they can not solve the problems related to daily life. As we know, the basic concept of physics such as force and motion requires the usage of vectors because there are two elements that are crucial in vectors such as magnitude and direction. Although undergraduate students' experiences with the concept of a vector varied, students still have difficulties in understanding and using vectors in various situations. (Oh Hoon Kwon,2011)

Many students found this as a burden because of difficulties in understanding them but it may change the perceptions of students that learning vector is quite fun and appealing when they find out that the concepts are very understandable. The ability of students to possess the skills of vector can assist them to identify the main problem of the other branches of physics concept because physics relies on vector and results in them achieving an excellent grade in examinations. Vector Board Game is an interactive board game that allows the students or player to learn physics in such a fun way. This innovation is not only for fun but it also maintains the education aspect especially the theory that students have learned in vector topic. Nowadays, students require modern solutions to solve modern problems due to an education system that is very challenging to adapt to. Students found that reading textbooks are so boring and wasting time eventually they become dizzy and fall asleep.

On the other hand, students also need something fun but challenging to play with their friends. Hence, our innovations might help a lot of students to have a better understanding and inculcate them to love physics once they try our product because playing board game indeed helps a lot in their studies. In addition, based on the research board games yield so many benefits to the students. The benefits are playing board games will increase brain function, reduce stress, enhance creativity and self-confidence as well as strengthen the relationship with their friends as they have to play this particular game together. We believe students not only can improve their understanding of vector topic but they can reduce their stress and have fun with their friends during leisure time. Other than that, games and simulations show mixed effects across a number of sectors, such as student performance, engagement, and learning motivation (Dimitrios Vlachopoulos, Agoritsa Makri, 2017). This proves games will also improve students' performance in their studies, especially in physics.

Hence, the main objectives of this innovation are-

- To enhance the understanding of students towards vector topic
- To provide a funnier and more effective way for students to learn vector
- To make it easier for educators to teach by making it as a learning aid
- To attract students to learn physics even during leisure time

INNOVATION DEVELOPMENT

This vector kit innovation is full of useful and bright compartments to ease the process of learning vectors in a more fun and attractive way. Firstly, the board itself has uniform grids of boxes. This is to make sure the vectors represented by rubber bands match the coordinates, length and unit. It is also to make sure the rubber band used as the vectors look tidier and does not collide with another vector. Meanwhile, the rubber bands representing the vectors have distinct colours to tell them apart. In general, vectors come from two continuous lines in terms of x and y , and the line from the beginning of the first line to the end of the second line is called the resultant vector. So, the first line and the second line have different colours while the resultant vector is the mixture of both colours. For example, if the first line is red and the second line is blue, the resultant vector is a mixture of red and blue rubber bands. This is to make students and whoever uses the vector kit able to visualize the vector easily and efficiently and to tell the vectors' parts apart.

Besides that, this vector kit has a set of cards to be used for the minigame of the kit. The cards have three colours, which are green, yellow and red. The colours represent the difficulty of the questions given for the students to solve. The higher the difficulty of the question, the higher the marks given to the students. This vector kit is helpful to students because running a game involving questions with different difficulty levels makes the process of learning more challenging and fun. Plus, answering difficult questions makes students able to answer more questions with the same level of difficulty in the examination since the visualization of the rubber bands makes it easier to answer questions. It enhances the skills of the student to answer any tough questions related to the topic. The cards also have two features which are 'CHANCE' and 'FATE'. Some question cards are randomly labeled with 'CHANCE' with an envelope image or 'FATE' with a bird image. If the student takes the 'CHANCE' card, he or she is going to take the CHANCE card, same goes for the FATE card. The CHANCE and FATE are applied after answering the questions.

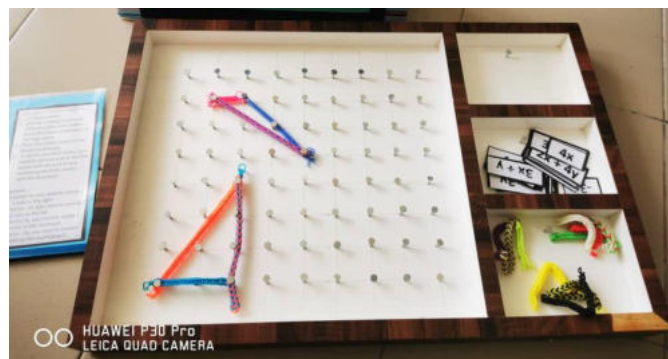


Figure 1: Innovation Prototype



Figure 2: Chance and Fate Card

COMMERCIAL POTENTIAL

Vector board games are very satisfying and enjoyable, especially for the audiences that are still in school or youth because they can address the related problems regarding physics. New knowledge and skills are gained from this board game such as solving-problems skills that require students to think faster to complete the whole mission by answering questions that involve calculation. The questions consist of three levels of difficulties for instance, easy, medium and hard. For our market needs, our target audience precisely to the students that study in science courses that have physics that are a very compulsory subject to score. It is an honour for us if the Physics Department buys this innovation and uses it as a medium of learning so it can attract more students to have a better understanding of the fundamental concept of the

Physics vector during the class period. Next, potential markets, our next-level targeting market might be at Petrosains which is a discovery centre with many science workshops available. Vector board games are suitable for people aged 16 and above.

Students are easily bored during the class because what the lecturer or teacher taught during class might be not understandable in view of the fact that most of them feel that physics is too challenging and they might simply give up because they can't grab the key concepts. This will lead them to a negative impact once they feel unmotivated to study. So, the students need something fun but challenging to play with their friends, thus it can help them to pay attention and stay focused on the subject. There is also evidence discovered by experts that said the game allows students to stay focused well enough to learn better and significantly improve students performance of results (Lepper and Cordova, 1992). There is one board of game and game cards with particular questions depending on the difficulty level. The total of the game is RM45 based on the quality of the board, the number of nails and what it is made of, the material of, rubber band and paper. One board can be played with four people. For the promotion, It can be made during the Science Carnival but depends on the percentage of the discount. For certain people, for instance, Physics lecturers and physics staff that use this game as a platform of learning can receive special discounts as they will use this game during class. The platforms that we can advertise our product on are Facebook, Instagram, Twitter, Shopee and Lazada. The suitable marketing place can be run at bookstores, Universities and Secondary schools because the majority of the audience comprises students that are involved in learning of science subjects and also particular lecturers that teach physics.

CONCLUSION

The main objectives of this innovation are-

- To enhance the understanding of students towards vector topic
- To provide a funnier and more effective way for students to learn vector
- To make it easier for educators to teach by making it as a learning aid
- To attract students to learn physics even during leisure time

In conclusion, this vector board game helped students to give further understanding of vectors through fun ways. The approach used to tackle youngsters' attentions through vector kits as game board is an effective and creative idea. The game board also can be used as a teaching tool and learning aid to help students reach a full understanding in vectors coinciding with the Teaching and Learning of the 21st Century. Students can fill their leisure time to learn physics in relaxing and fun ways, specifically vector topic. The improvement that can be made for future development and improvement is we can develop an application that can be played by using electronic gadgets and online worldwide. Other than that, for future recommendations we hope that the game can be commercialized as a main learning tool to teach students about vectors in easy ways.

ACKNOWLEDGEMENT

First and foremost, praise and thanks to Allah SWT, the Almighty for His showers of blessings throughout our innovation project until we successfully completed this innovation to the end.

In completing this innovation project, a lot of people have shown their unwavering support towards us, both directly and indirectly. We are extremely grateful that we were

able to finish our innovation project on time. Therefore, we would like to express our gratitude to Universiti Teknologi Mara (UiTM) for sponsoring us to join Creations de UiTM 2022. Next, we also like to express our deepest gratitude to our advisor, Madam Nur Asyikin Binti Ahmad Nazri. Her constant advice and guidance have been extremely beneficial to us when writing the report. We could not have completed this innovation without her help. We would also like to thank our parents and classmates for their encouragement and advice which has been a lot of help in the process of completing this project. Their words of encouragement inspire us to keep going.

Last but not least, without the effort and cooperation of our group members, Syahrizzat, Amir, Danial, and Syukrat this innovation project will not be completed.

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CATEGORY D
School

LKiZY

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ABSTRACT

LKiZy is a drawing board and T ruler that is innovated so that it can be folded in half. LKiZy drawing boards provide storage space for T ruler, set square, compass, pencils and eraser. When opened, the board becomes a normal size to place on A3 size paper and pupils can draw on it as usual. This innovation is produced to overcome the issues faced by students when using conventional equipment, namely a set of heavy drawing boards, difficult to carry when riding a motorcycle, students have to carry two bags and no storage for LK bags makes the classroom look untidy. Objective for this study is to develop LKiZy for Engineering Drawing and Graphic Technical Communication subjects for form 4 and form 5 students, designed LKiZy using materials from PVC Foam Board and plywood and to evaluate the applicability of LKiZy based on students' perceptions. The design of this study used a quasi -experimental method of unequal control group using a questionnaire instrument by applying pre and post-tests in looking at the equivalence of the use of conventional board and LKiZy set. A total of 111 samples involved in this study consisted of students from Sekolah Menengah Teknik Tuanku Jaafar, Kolej Vokasional Ampangan, Sekolah Menengah Kebangsaan Senawang, and Sekolah Menengah Kebangsaan Mambau representing the subjects of Technical Communication Graphics and Engineering Drawing. The findings of the study show that LKiZy has a high usability based on the perceptions of students. The analysis shows that LKiZy is more organized, tidy, preserves set square and T ruler and it saves time. Through a joint venture with Meranti Marshall Furniture Sdn. Bhd., LKiZy will be produced with mass production and will be disseminated through the youtube application and included in the STEP (School Transformation e-Platform) application as a medium for online sales.

Keywords: Lukisan kejuruteraan; grafik komunikasi teknikal; asas lukisan kejuruteraan; LK; GKT

INTRODUCTION

Lukisan Kejuruteraan (LK) is one of the elective subjects offered for form four and form five students in the Secondary School Standard Curriculum (KSSM). This subject is designed based on the National Education Philosophy which is to create Malaysians who are balanced in terms of intellectual, emotional, spiritual and physical development [1]. The purpose of this education is to produce a professional and semi -professional workforce in the field of engineering [2]. LK is fundamental in all engineering field designs. It serves as a language of communication and communicator of information to those involved in the field of engineering [3]. Lukisan Kejuruteraan (LK) is a subject that requires students to use specialized drawing equipment such as drawing board, set square and T ruler. Engineering drawing is a standard drawing that requires the painter to draw using manual tools such as drawing board, compass, set square and T ruler [4].

However, based on the initial survey that has been done there are some issues or problems faced by students when using this equipment, including heavy drawing board set, difficult to carry when riding a motorcycle, students have to carry two bags, namely school bags and LK bags and there is no storage place for LK bags causing the classroom to look untidy. Conventionally, the T ruler is placed inside the drawing board in the middle but it does not protect the T head causing it to be easily bumped, dropped or broken. While a set square that is not stored properly causes easy to flake at the corners. So, an idea arose to develop a set of drawing boards called LKiZy. LKiZy is an abbreviation of the word LK (Engineering Drawing) and iZy from the word easy. LKiZy is a drawing board innovation that is innovated so that it can be folded in half and in the folded state, this board provides storage space for T rulers that also can be folded in half, set square, compass, pencils and erasers. The Objective of this study is to develop LKiZy for Engineering Drawing and Graphic Technical Communication subjects for form 4 and form 5 students, designed LKiZy using materials from PVC Foam Board and plywood, and evaluate the applicability of LKiZy based on students' perceptions. The base of the board uses PVC Foam Board material. This material is chosen because it is light, strong, durable and can be machined [5]. Plywood is used as the surface or LKiZy board. Plywood is a generic term for wood composite board, which consists of at least three layers of glued wood [6]. The T ruler still uses the same material as the existing material, which is acrylic. Acrylic is a transparent polymer plastic in the form of a sheet that is usually used as a substitute for glass [7].

INNOVATION DEVELOPMENT

- a) LKiZy is sketched in advance to determine the size and appearance of the actual product.
- b) Materials from PVC Foam Board and plywood are chosen to replace drawing boards because they are lightweight and can be machined. LKiZy is a drawing board slightly larger in size than A4 which is 22.5cm x 32.5cm. Since this innovation can be folded in half, then there are two pieces of PVC Foam Board and plywood used.
- c) Then LKiZy is drawn in AutoCAD software to get a more accurate picture of the product (refer to figure 1).

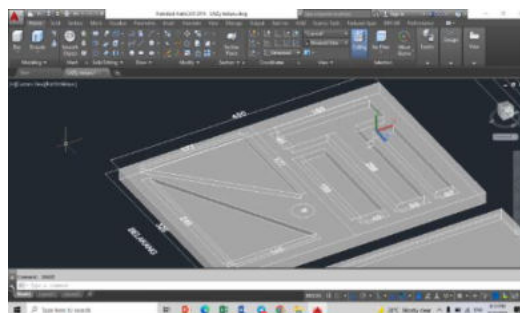


Figure 1: AutoCAD 3D Drawing

- d) After that, programming using Cimatron software was done to obtain the programming code on the CNC machine (refer to figure 2).

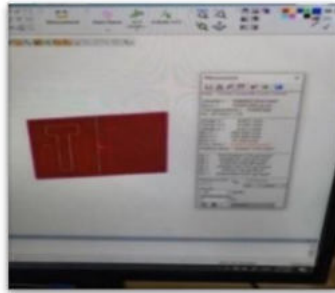


Figure 2: Programming in Cimatron Software

- e) Then the completed programming will go through a simulation process on the same software (refer to figures 3).

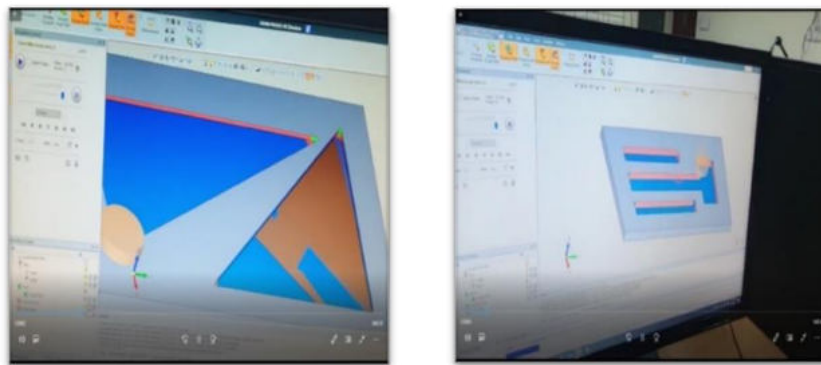


Figure 3: Simulation in Cimatron Software

- f) After that, the generated programming code will be programmed into a CNC machine (refer to figure 4a1) and the product undergoes a cutting process to completion (refer to figure 4a2).



Figure 4a1: Entering the CNC code



Figure 4a2: Final product

Through the innovation of a drawing board that can be folded into two and equipment stored in the board, then LKiZy can be directly put in a school bag (refer to figure 5) further saving storage space and making the classroom look neat



Figure 5: Transformation from conventional board to LKiZy and can be directly put in a school bag

RESULTS OF THE STUDY

The results of the study depend on the variables used. It is divided into three parts, Easy (User Friendly), Materials and Use/Effectiveness. The instrument used in this study was a questionnaire form. The purpose of this questionnaire is to obtain information related to the analysis of the use of conventional drawing board for pre -test and the use of LKiZy for post -test in Sekolah Menengah Teknik Tuanku Jaafar, Kolej Vokasional, Sekolah Menengah Kebangsaan Mambau dan Sekolah Menengah Kebangsaan Senawang. The research instrument was built based on the ability checklist that was modified by the researcher based on the objectives and research questions to be studied.

Samples

A total of 111 samples consisting of 60 Form 5 students from Tuanku Jaafar Technical Secondary School represented the subject of Engineering Drawing, 15 samples from Kolej Vokasional Ampangan, Construction Technology Course represented the subject of Engineering Drawing and 18 samples from Sekolah Menengah Kebangsaan Senawang and 18 sample from Sekolah Menengah Kebangsaan Mambau representing the subject of Technical Communication Graphics was distributed questionnaire form.

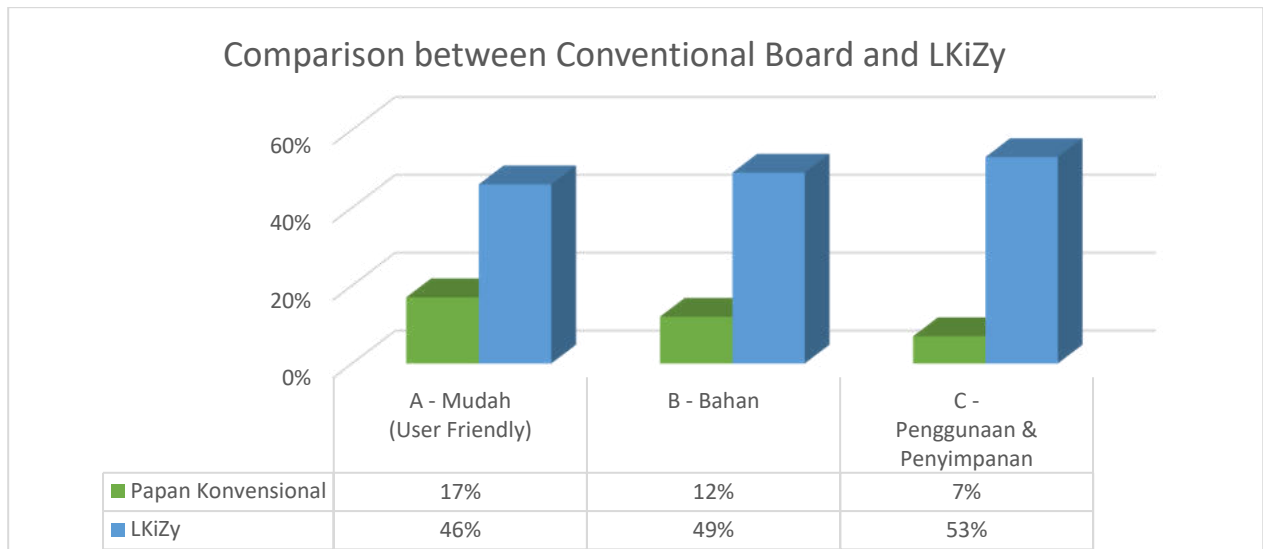


Figure 6: Comparison between Conventional Board and LKiZy

Based on the comparison graph on figure 6, of the use of conventional boards and LKiZy, the results of the analysis showed that 46% of the students stated LKiZy is easy to store, carry and use. 49% of students stated the materials for LKiZy are easy to find, cheap and light. However, 53% of the students stated that LKiZy is more organized, not easy to leave at home, tidy and help maintaining a set and a T ruler and it saves time.

COMMERCIAL POTENTIAL

In terms of the commercial aspect, all form four and form five students majoring in engineering will take and study LK subjects. The number of students taking LK is almost 250 for one technical school in Seremban each year. There are 9 Technical school, 71 Vocational College, also from Polytechnic, Community College, Mara College and lots more taking engineering drawing subjects.

On 28 September 2021, SMTTJ had a discussion with the Director, Marketing Executive and Design Engineer of Meranti Marshall Furniture Sdn. Bhd. In their factory. Through the discussion, Meranti Marshall Furniture Sdn. Bhd. in collaboration with Koperasi Sekolah Menengah Teknik Tuanku Jaafar (SMTTJ) agreed to produce product samples according to the characteristics discussed and to be the main manufacturer to produce LKiZy products in large quantities according to current requirements (refer figure 7).

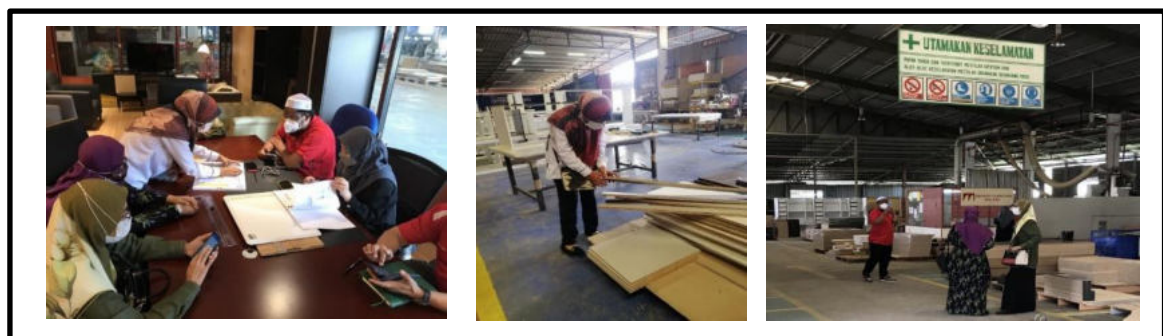


Figure 7: Discussion sample of LKiZy with Meranti Marshall Furniture Sdn.Bhd.

Through a joint venture with Meranti Marshall Furniture Sdn. Bhd., LKiZy will be produced with mass production and will be disseminated through the youtube application and included in the STEP (School Transformation e-Platform) application as a medium for online sales. LKiZy through MyIPO Melaka has obtained the copyright to protect the idea and the exclusive right to produce the product (refer to appendix A). Copyright is an exclusive right granted by law for a certain period of time to the creator of a work to control the use of their work, copyright protection in Malaysia is based on the Copyright Act 1987 [8].

CONCLUSION

Based on the findings of the study, it was found that LKiZy has a high usability based on students' perceptions. The development of LKiZy which is designed from PVC Foam board and plywood materials has resulted in a set of drawing boards that is more compact and easier to carry to school. Thus, LKiZy can be used and marketed to all Sekolah Menengah Teknik that offer Lukisan Kejuruteraan subjects. In fact, the use of LKiZy can also be extended to Vocational Colleges and Mainstream Schools for students who take Lukisan Kejuruteraan and Grafik Komunikasi Teknikal subjects. Many responded positively and asked where LKiZy could be purchased, so with the encouraging response, LKiZy is expected to be marketed throughout Malaysia and change the use of existing conventional boards.

ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to Pn. Zulbaydah, all my colleague, as well as our principal Pn. Hj. Minah, who gave us the golden opportunity, support and encouragement throughout this wonderful project called LKiZy, to Koperasi SMTTJ, En. Zuhairi From Jabatan Pendidikan Negeri Sembilan, Syarikat Meranti Marshall, En. Hanzolah From Kolej Vokasional Ampangan and whoever involved in this project.

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APPENDIX A



AKTA HAK CIPTA 1987
PERATURAN-PERATURAN HAK CIPTA (PEMBERITAHUAN SUKARELA) 2012
SIJIL PEMBERITAHUAN HAK CIPTA
[Subperaturan 8(2)]

No. Pemberitahuan : CRLY2021M03743
Tajuk Karya : LKIZY
Jenis Karya : SASTERA
Tarikh Permohonan : 28 SEPTEMBER 2021

Saya dengan ini mengesahkan di bawah Akta Hak Cipta 1987 [Akta 332] dan Peraturan-Peraturan Hak Cipta (Pemberitahuan Sukarela) 2012 bahawa karya hak cipta dengan No. Pemberitahuan seperti di atas bagi pemohon **SAKINAH BINTI MUHAMMAD HANIP (840911055398)** sebagai **PEMUNYA** dan **SAKINAH BINTI MUHAMMAD HANIP (840911055398)** sebagai **PENCIPTA** telah didaftarkan ke dalam Daftar Hak Cipta menurut seksyen 26B Akta Hak Cipta 1987 [Akta 332].



ZULKARNAIN MUHAMMAD
TIMBALAN PENGAWAL HAK CIPTA
MALAYSIA



(Agensi di bawah Kementerian Perdagangan Dalam Negeri dan Hal Ehwal Pengguna)



All in All Flip Book in Flip Classroom (AiA FB)

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ABSTRACT

There is a need to pay attention to reading skills to improve and encourage slow learners to engage and be responsible for their own learning. Many studies have shown that flip books are capable of helping students improve their reading skills. However, the existing flip books do not emphasize reading skills. In addition, the flip books have failed to sustain students' attention in learning because they are not empowered with powerful reading elements such as challenges, opportunities, stimulants, narrative and design. These issues indirectly have limited active participation of pupils. Thus, in this research, All in All Flip Book (AiA FB) were developed to improve slow learners reading skills, increase participation, and increase interest in reading literacy. The respondents in this study were selected based on purposeful sampling whereby 60 students with reading problems. were grouped as the control and experimental groups. Data were collected through pre-test and post-test, and observation and questionnaire were included for the experimental group. The results, showed that the mean value of the post test for experimental group was 57.37 whereas the control group had 25.47. In addition, the results of the validated observations found that the students from the experimental group were actively involved and enthusiastic during the process of learning to read. Findings from the questionnaire proved that the students were interested in reading literacy and showed that the AiA FB were effective in helping slow learners master reading skills. The findings have proven that this interactive game can be used as a main tool to learn reading literacy for slow learners who are experiencing complications in acquiring the reading skills.

Keywords: Reading Literacy; slow learners; flip book; participation

INTRODUCTION

Pupils in primary schools experience various problems in reading skills such as inability to pronounce letters, syllables and word reading. One of the reasons is the lack of technological learning materials for reading literacy, especially in the form of books, namely electronic books. Problems in electronic books also cause reading literacy among special rehabilitation students remains unresolved (Zahara Aziz et al., 2011). The existing electronic books do not focus on its learning objective which is reading literacy. Furthermore, the existing commercial e-books for reading literacy are no longer suitable for students because the language and content are difficult for students to understand and there is no combination of old learning or experience with new students being ignored is also a failure in e-books for reading literacy. The learning content in electronic books is also not coordinated with the reading literacy syllabus determined by the MOE. Deficiencies in electronic books result in special rehabilitation students not being actively involved in learning. Therefore, this study was conducted to develop an electronic book entitled GALUS LULUS for special rehabilitation students based on constructivist learning theory. This study was also conducted to improve the achievement of special rehabilitation students in reading literacy. Researchers will also study the effect of electronic books on

students' involvement in learning and facilitation as well as students' interest in reading literacy. Therefore, the use of electronic books GALUS LULUS is expected to overcome reading problems among special rehabilitation students. In short, GALUS LULUS is an electronic book for Reading Literacy. GALUS LULUS allows students to build a broad knowledge content. GALUS LULUS also provides full involvement and makes students as productive citizens.

INNOVATION OBJECTIVES:

AiA FB is built to improve:

Reading skills

Increase participation

Increase interest in reading literacy

UNIQUENESS OF AIA FB:

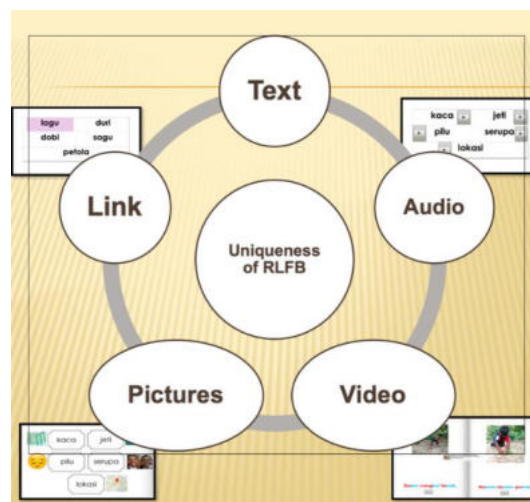


Figure 1:

AUTHENTICITY:

- No e-Books are available based on the latest Reading Literacy syllabus.
- This AiA FB 100% enables the concept of self-learning.
- Integrate the theory of Constructivism

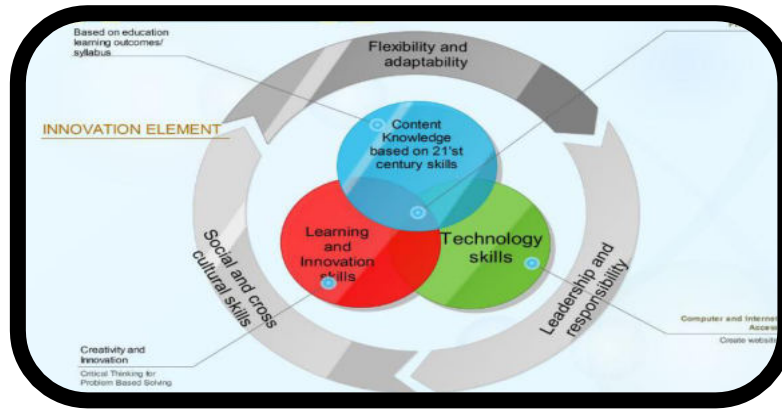


Figure 2:

METHOD OF USE

- i. AiA FB has various sources such as text, pictures, audio (student's own voice), video (student's own video) and links (youtube @ google image).
- ii. The teacher will ask the students to read the words or sentences found in the AiA FB. Pupils with reading literacy learning difficulties need guidance.
- iii. Pupils will press the audio icon next to the word or sentence. Pupils will follow the pronunciation of the word or read the sentence from the voice recording in the audio.
- iv. Pupils can also click on the word (there is a link) to be read to view the picture or video. Then students will understand the meaning of the words to be read.
- v. Pupils can repeat audio, video, links until they can read correctly.
- vi. If there is an internet problem, students can still use the audio, video and pictures provided in the AiA FB. Only links will not work.

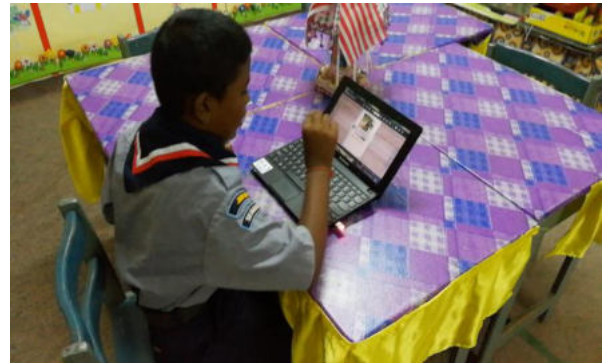


Figure 3: Use of AiA FB in National Schools, Tamil and Chinese Schools

EFFECTIVENESS OF INNOVATION

The Pre and Post Test scores for the Control Group (students using existing e-books) and Treatment (students using AiA FB) are shown in Table 1.

Table 1: Pre and Post Test Scores of Control and Treatment Groups

Control Group					Treatment Group				
Student	Pre test	Post Test	Difference		Student	Pre test	Post Test	Difference	
	M	M	P/N	M		M	M	P/N	M
K1	10	18	+	8	R1	5	46	+	38
K2	5	23	+	18	R2	3	38	+	37
K3	10	22	+	12	R3	3	36	+	33
K4	13	28	+	15	R4	5	40	+	35
K5	8	13	+	5	R5	18	65	+	37
K6	14	39	+	25	R6	23	75	+	52
K7	11	20	+	9	R7	25	73	+	48
K8	14	27	+	13	R8	23	75	+	52

K9	30	43	+	13	R9	10	60	+	50
K10	33	43	+	10	R10	8	53	+	45
K11	18	23	+	5	R11	3	28	+	25
K12	18	28	+	10	R12	12	55	+	43
K13	13	20	+	7	R13	14	65	+	51
K14	12	20	+	8	R14	30	73	+	43
K15	12	15	+	3	R15	23	78	+	45
Min	14.7333	25.4667			Min	13.6000	57.3667		

THE POTENTIAL FOR DISSEMINATION EXTENDS TO OTHER

- Telegram: Cikgu Gopal's Sharing Material
- Facebook: Tcher Collection
- UTM: Colloquium with Muhammadiyah Purworkerto University
- JPN Melaka: Seminar (Best Practices)
- JPN Johor: Seminar (Best Practices)
- Yayasan Inovasi Malaysia: Inclusive Innovation Challenge Competition

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Biodegradable Eco-Polybag (BE-P)

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ABSTRACT

"Wherever there is a packaged product, there is packaging waste". Packaging waste that is a synthetic foam has created an increasingly significant problem to the environment. Natural rubber which is latex and eggshell has been selected as the main ingredient in making biodegradable foam. Eggshells are crushed into powder using a blender. Eggshells are inserted into latex and poured into the desired mold. The bubbly foam is preserved in a hot air oven at a temperature of 105 °C for 2 hours. Foam has been removed from the mold and thoroughly washed with distilled water to remove the excess non-reacting material. Preserved foam was dried in the oven at 80 °C for 8 hours. Soil planting tests and natural weathering tests have been done to prove the biodegradability of our foam products and compare them with synthetic foam. After 6 months, we observed our samples using a scanning electron microscope (SEM). Natural weathering tests show there is a formation of cracks and reproduction. While testing planting in the soil, there are signs of fungal growth on the surface of foam products. However, there are no signs of the existence of microbes on synthetic foam.

Keywords: Foam; biodegradable; scanning electron microscope

INTRODUCTION

Packaging plays an important role in every human's daily life on Earth. "Where there is a package of products, there must be parcel residue". Package waste has dramatically increased the rate of environmental damage and has caused significant financial problems to the public. The variety of materials used for packaging and the number of natural resources needed to produce these packages has had a detrimental impact on the environment. There are two types of foam that are commonly used in the packaging which are polyurethane foam and polyethylene foam.

The purpose of using foam in the packaging is to absorb vibration, protect the packaging of the goods from damage. Usually, plain packaging is delivered with plastering, legumes and bubble packaging. However, if the packaged item is a very sensitive item, reusable packaging manufacturers should be used. In the use of reusable packaging products, plastering, legumes and bubble packaging are usually replaced with durable foam such as polyurethane foam and polyethylene foam.

Polyurethane foam is an open-celled substance capable of absorbing liquid. This sponge foam can be used for lightweight items that are easy to scratch such as televisions and computers. Polyethylene foam (PE) is more rigid compared to polyurethane foam. This foam is a closed-celled substance that is not capable of absorbing liquid. This foam has almost identical characteristics to plastering, however this foam will not break if flexed, as opposed to a plastering that is easily broken if flexed.

Polyethylene foam is easier to flex than plastering. Many packaging designers prefer to use this polyethylene foam due to its non-absorbing properties and is easily flexed.

However, these two foams cannot be reused and cannot be biodegradable due to the second component of these foams that are not environmentally friendly. Over the past two decades, the number of synthetic polymers produced has increased due to developments in science and technology. The recycled yield for packaging is 40.9% better than other plastic applications. The overall recycling rate reached 31.1% in 2016. Packaging hereby increases the average recycling rate for all plastics across Europe, EPRO said. Plastic packaging materials are the highest increase in waste from 2005-2018. These wastes will definitely end up in municipal landfills. In the meantime, chemicals such as plastic from packaging materials will cause environmental pollution that will affect the life of every life in the world. As such, the public's awareness of environmental pollution by this waste is now placed by reusable and biodegradable foam for packaging.

This biodegradable foam includes two important components, namely animal-based eggshells and natural rubber from plants. Eggshells are available from restaurants, domestic waste and factories. While natural rubber can be easily taken from rubber trees. These composites can be produced using non-toxic and biodegradable natural materials. Among the uniqueness of foam produced are;

1. Possess such unique characteristics, high mechanical strength, flexibility, stretching and low heat formation
2. To assist in the creation of nature for future preservation. (Environmentally friendly).
3. Can provide various services such as delivery, marketing and security.
4. The main material for our biodegradable foam from natural rubber and eggshell residue is 100% natural and makes it easy to decompose by simply placing it in the landfill for at least 1-3 years or under natural weather to be completely disposed of.

INNOVATION DEVELOPMENT

To prove the biodegradability of our product, we put up 2 tests which are the soil planting test and the natural weathering test. Biodegradation occurs with an enzymatic action and involves living organisms. Molecular degradation is allowed by enzymes and can occur in aerobic and anaerobic conditions, leading to complete or partial removal from the environment.

In the soil planting test, we want to know whether the organisms in the soil react with our products or not. Therefore, we conducted experiments to find out the results. First of all, we cut a rectangular shaped piece of our foam product and a piece of the same size from the standard foam as shown in Figure 2. Then, we dug 2 holes about 2 feet deep and put each foam into each hole. Finally, we plant foam and leave for 6 months to let the organism react completely as shown in Figure 3.

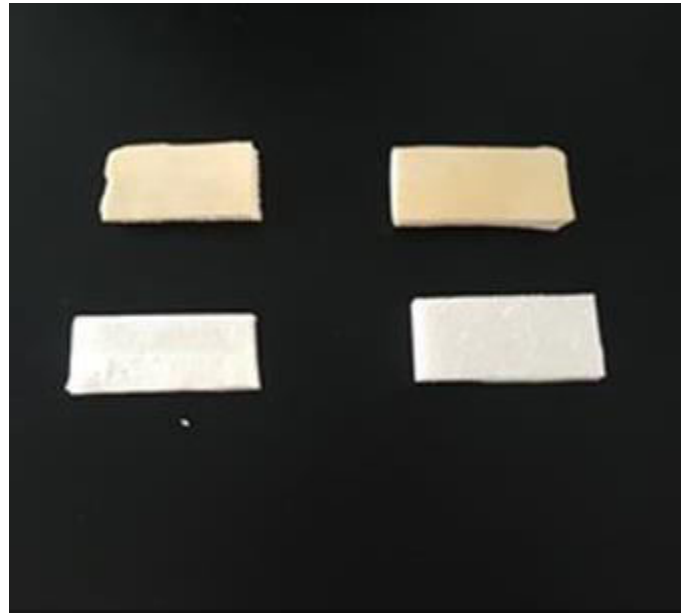


Figure 2. Foam



Figure 3. Foam Planting Test

Besides that, we also do natural weathering tests to see how the natural atmosphere of our earth affects our products. Natural Weathering is the fragmentation of rocks, soil and minerals as well as wood and artificial materials through contact with the Earth's atmosphere.

For this test, we did the same thing as the soil planting test where we cut a rectangular-shaped piece of foam from each type of foam. Then, we find a suitable place where they are exposed to all kinds of weather. Then, we stick it using masking tape to keep it local as shown in Figure 4. Finally, we left it for six months for the full process.



Figure 4. Natural Weathering Test

RESULTS

i. Crack Formation

After 6 months full of process, we discover some formation of cracks and propagation on the surface of our foam product and on the other hand, there is no formation on standard foam as shown in figure 5.

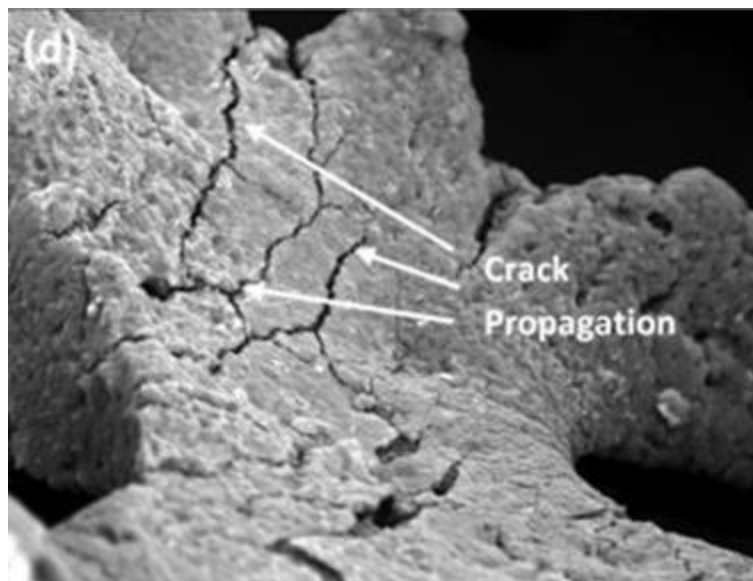


Figure 5. Formation of cracks

ii. Growth of Fungus in Foam

As for the soil planting test, we can see that there are signs of fungal growth on the surface of our foam products. There are several types of microbes that have grown well on the surface of biodegradable foam as shown in Figure 6. However, there are no immediate signs of the existence of microbes on standard foam



Figure 6. Microbial growth

Therefore, from these tests, we can infer that our biodegradable foam surely will degrade after a while rather than the synthetic ones.

COMMERCIAL POTENTIAL

For a successful marketing process, it is significant to assess a product's market potential. Therefore, we'll be highlighting three market potential.

i. **RECENT CLIMATE.**

We believe that our product which is biodegradable foam can overcome the problem of disposing of various synthetic packaging.

ii. **COST**

Our biodegradable foam surely costs cheaper and affordable compared to the synthetic one

iii. **RIVALRY**

We assume that our biodegradable foam can compete with other biodegradable foam or the synthetic one that has been on the market.

FIGURES



Figure 1: Biodegradable foam

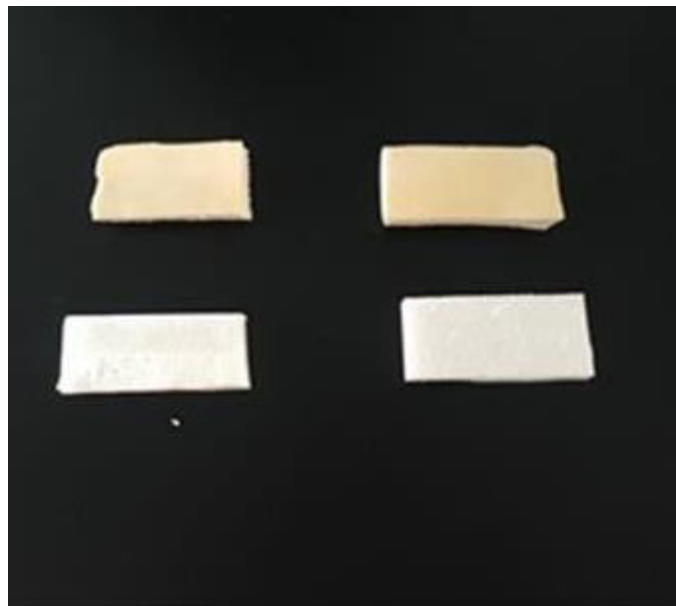


Figure 2: Foam



Figure 3: Foam Planting Test



Figure 4: Natural Weathering Test

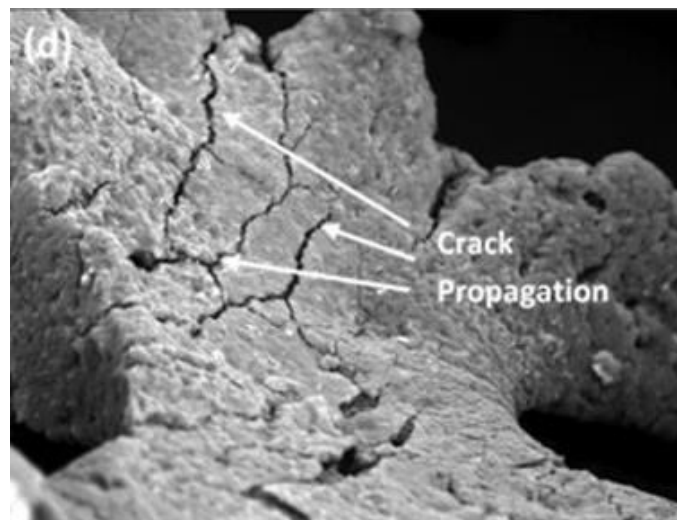


Figure 5: Formation of cracks



Figure 6: Microbial growth

TABLES

Cost Analysis

1x1m sheet of our biodegradable foam: RM6.00

Table 1: Cost Analysis

Materials	Cost for 1m x 1m sheet (MYR)
Biodegradable foam	RM6.00
Synthetic Packaging Foam, LDPE Foam	RM11.00

CONCLUSION

Natural rubber and eggshells have been proven to have the ability to produce our biodegradable foam. Instead of the foam and "eco-polybag" we have created, factories and others like farmers can finally use our biodegradable foam as one of their daily products in terms of packaging to ensure a greener and cleaner world in the future. Our two main ingredients, namely eggshells and natural latex, can also be used in the future in producing other useful products rather than being the main wastes in our world.

In the future, we hope that our products will motivate entrepreneurs around the world to produce products that can guarantee a greener earth. The idea of using waste as one of the materials in producing a valuable product should not be forgotten and is seen as a minor issue as such an idea can reduce wastage that also benefits human life. Hence, it can maintain the sustainability of humans and the environment.

ACKNOWLEDGEMENT

The accomplishment and outcome of this project required a lot of guidance and assistance from many people and we are extremely privileged to have got this all along with the completion of our project. All that we have done is only due to such supervision and assistance and we would not forget to thank them.

We respect and thank the professors of Malaysia's Science University (USM), for helping us succeed in our project, especially in the production of our biodegradable foam. We are grateful that they are willing to help us who are under constraints due to certain factors such as lack of materials, as well as safety aspects. We are extremely thankful to them for providing such nice support and advice as well, although they had a busy schedule managing the corporate affairs.

We owe our deep gratitude to our project guide Sir Syawal, for his patience, insightful comments, valuable information, practical advice, and unceasing ideas that have helped us tremendously at all times in our research and writing throughout this time completion of our project work.

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InnoVent

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ABSTRACT

InnoVent is an innovation that exists in the form of an application. InnoVent can also be described as a social media platform but instead, it is focusing on innovation and invention as the main focus of the application. The purpose of the creation of this application is to create a platform where innovation can deliver its function to the community and be able to contribute towards a better future. In addition, giving a chance for the innovation to gain publicity and be upgraded before the innovation can begin to be presented in either competitions or conferences. Thus, being able to fight the problems where the innovation or idea evanesced after some competitions. Hence, making InnoVent, a great solution to fight these problems. Also, InnoVent will serve as a platform where it is connecting innovators and entrepreneurs to create new innovation and also creating networks among them. In the meantime, InnoVent can also act as a platform to spread awareness and ideas about innovation and invention among the community. Hence, encouraging more students, innovators and community to make new innovation and inventions. In conclusion, InnoVent is an innovation that is created to tackle these upcoming problems related to innovation and invention while giving the opportunity it deserved.

Keywords: InnoVent; application; innovation and invention; platform

INTRODUCTION

Innovation and invention have taken centre position in our community since the start of time [4]. The definition of innovation itself is the creation of a new product, system or even process, in order to enhance the system that existed before. Innovation and invention can also be seen as a solution towards the uprising problems or issues [1]. In this time, innovation can be seen as having an explosive spur in order to fight and contain the ongoing pandemic, Covid-19 [8]. Thus, proving how important innovation and invention is in our society. In addition, Sustainable Development Goals (SDG) has also contributed tremendously towards the explosive spur of innovation in the current time. Innovation has been proven to promote economic development and the prosperity of territories and nations, which in turn leads to an improvement in the SDGs [6].

As result of the spur of innovation and invention, there has been a lot of competition and conferences that is being held with theme of sustainability, Covid-19 and other long list of uprising issues in the 21st century. These competitions not only include undergraduate and postgraduate but also now, included students in both high school and primary school. By including students in this kind of competition, creativity can be encouraged among them [5]. As we know, there would be more innovation being created as the result of increasing amount of competition being held across the globe. This is due to the fact that competition is the basis of encouragement for innovation to be created by the community [7]. Even so, there are only small percentages of innovation that get the chance to deliver its function to the community

while the others evanescenced after the competition and does not get to contribute to the society. Furthermore, a survey has proven that there is only a little more than half innovation project that can be called completely or at least partially successful [2].

Thus, InnoVent application will be introduced to fight the problem where most of the innovation evanescenced after a few competitions without being able to be continued. InnoVent can also be said as a social media platform but instead, its main focus is innovation and invention. InnoVent would be used by the users of InnoVent via having them uploading their innovation and invention to the application while connecting with other innovators and entrepreneurs. InnoVent objectives that need to be fulfilled are 1) to create a global platform where innovation being spread and gains publicity, 2) to give an equal chance for all innovation to contribute towards a better future. Hence, becoming an effort to appreciate the most important shaping force in the history of mankind which is innovation [3]. InnoVent is also being created in hope to spread awareness about innovation and invention among the community especially among the students and adolescents, who will be the leaders of the future while encouraging them to make new innovation in the near future.

INNOVATION DEVELOPMENT

InnoVent application would be built to meet all the criteria that it is designed for. Also, InnoVent would be available to be downloaded by using their smartphone's respective application store. InnoVent would also consist of 5 main pages while being grouped into 2 sections which are the user's section as shown in Figure 1. Meanwhile, the second section would be the innovation section which is shown in Figure 2. Also, functions of every page would be described in Table 1. InnoVent would be different from any other social media application as it is focusing on innovation and invention.



Figure 1 Design of users' section

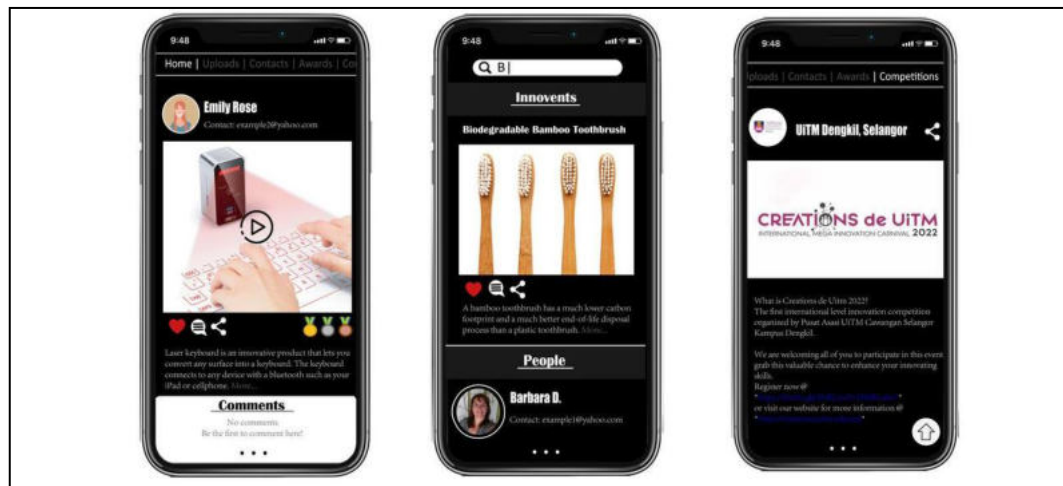


Figure 2: Design of Innovation Section

Table 1: Description of InnoVent application

Pages	Features	Description
Users Section		
Upload Page	Users` Profile / Upload Innovation	This page would be the place where users can see their innovation and upload other innovations that they have created
Contact Page	Contact and Message	Users would be able to contact and message other users using this page
Innovation Section		
Home Page	Displaying Other Innovations	This page will show a gallery of innovations and their description. Thus, enabling users to watch other innovations
Search Page	Search for Innovation	This page would allow the users to search innovation that fit the description that they are interested in
Competition Page	List of Competition	List of ongoing competitions can be shared in this page for the users to participate

COMMERCIAL POTENTIAL

InnoVent would be a great solution in addressing the problem where innovation evanesced after a few competitions. This is supported by how InnoVent works where InnoVent would enable the users to upload their innovation to the application. Thus, saving the innovation for the future while making it known to the public and gaining the public`s recognition.

InnoVent would also be the place where entrepreneurs and innovators can connect and message each other to create a better innovation for the better future. Not just that, InnoVent would also contribute to the society by spreading awareness about innovation to the whole global society as the targeted group for this innovation is society as a whole, ranging from the adolescents to the senior citizens group. While spreading awareness, InnoVent would also encourage the society and the community to create new innovations and inventions. Hence, giving every person and innovation a chance to contribute towards the brighter tomorrow.

CONCLUSION

InnoVent is an application that emphasizes on revitalizing and upgrading innovation or invention before or after a competition. Thus, giving every innovation an equal chance to contribute towards the community while gaining publicity to market the innovation. Also, bringing users' innovation to the global level and attracting global level innovators to InnoVent application. The authors are also planning on making this app more accessible to the public by creating a website for InnoVent. Not just that, the authors are looking forward to incorporate 3D features to the application. Hence, making the application more interactive to attract more people within the society to use InnoVent.

ACKNOWLEDGEMENT

The authors would like to express their utmost gratitude and appreciation towards Miss Syamilah for her guidance and supervision throughout the project duration. Also, the authors would like to express their gratefulness towards Pusat GENIUS@Pintar Negara on their sponsorship for this project. [Project ID: D005]

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Seedling Cultivation System (SCS)

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ABSTRACT

Excessive and disproportionate use of chemical fertilizers and inconsistent watering of plants had been a common complication in agricultural cultivation. Chemical fertilisers tend to harden the soil and reduce fertility, whereas over-watering or under-watering the plants may eventually kill the plants. Therefore, this paper aims to introduce the Seedling Cultivation System (SCS) as an alternative in overcoming this issue. SCS is an all-in-one innovation of an auto-watering system infused with a cultivating base which consists of organic fertilized soil. The soil is organically fertilized with the composition of effective microbes, dried leaves, and earthworms with the use of vermicomposting methods. The fertilized soil is fully natural and has a high saturation of nutrients that benefit early stages of seedling growth. For the cultivating base, it consists of a 4x3 planter, water tank, rechargeable battery, and piping system which will all be programmed for timing-based execution. With the help of our innovation, both veteran gardeners and beginners alike will be at ease in the early steps of seedling cultivation knowing that the plants will grow well with sufficient water and nutrients.

Keywords: Seedling Cultivating System; auto-watering; organic fertilizer; battery powered

INTRODUCTION

Agriculture is an important sector in Malaysia that has been constantly developing throughout the years. However, there are still some critical issues that are yet to be improved. As the sector has developed, the aging agriculture community in Malaysia has raised concerns among the related parties. Such issues have driven this paper to its main objective which is to explore the inclination of the younger generation, particularly the youth, towards their involvement in agriculture [3].

Fertilization is a crucial step that provides plants with nutrients for optimum growth. Over-fertilized and under-fertilized seedlings along with inconsistent watering are among the complications faced by both beginner and veteran gardeners during cultivation. This leads to the production of low-quality products that will not satisfy consumers' and market's demand.

Recently, excessive use of fertilizer throughout the world has caused major environmental problems. This is due to the usage of chemical fertilizers that contain heavy metals. When these chemical fertilizers enter the food chain, it will eventually lead to water, soil and air pollution, including the emission of greenhouse gases [6]. While chemical fertilizers are an unconvincing choice for cultivating seedlings in the long run, the amount of water used to water the seedlings must also be taken into account. Overwatering can result in succulent plant tissue that may lead to disease. Underwatering plants can stress a plant, leading to death

or stunted growth.[8] It can be a challenge to keep track of the volume and time to water the seeds which leads to the error of inconsistent watering and may eventually kill the seedling.

The Seedling Cultivation System is a tool invented to fix these problems. Different from other auto-watering systems such as aquaponic systems. Aquaponics is an eco-friendly system for food production utilizing aquaculture and hydroponics to cultivate fish and crops without soil [7] while SCS uses organic fertilizers and is equipped with an automatic watering system that can be set by the owner. This innovation helps to eliminate the negative impacts of chemical fertilizers in addition to the common errors of over and under watering seedlings. Moreover, organic fertilizers retain a blanket like cover on the soil thus enabling it to recapture the moisture level and not let it out. Thus, it also helps to recover the stress levels of the soil by maintaining its moisture content. The organic fertilizers help to sophisticate the soil structure by nourishing it, enhancing its productivity and at the same time protecting it from being eroded away. Artificial and inorganic fertilizers have certain disadvantages as they have to be applied again and again.[5] Therefore, the objective of SCS is to reduce the greenhouse gases emitted due to the overuse of fertilizers as well as to encourage new gardeners while giving ease to the veterans in agriculture.

INNOVATION DEVELOPMENT

SCS is divided into two main components which are the organic fertilizer and the automatic watering system. The organic fertilizer is made by vermicomposting, which is the process using organic waste that is broken down through the synergistic actions of earthworms and microbial communities [2]. The organic fertilizer is composed of soil, effective microbes, dried leaves, goat manure and earthworms. The fertilizer is prepared by mulching the layers of soil, dried leaves, EM, goat manure, and earthworms together in a container. Next, close the container and leave it in a moist and dark place, then wait for 2 weeks for the earthworms to excrete the feces. Lastly, filter out the earthworms and use the remaining product as an organic fertilizer.

For the cultivating base, it consists of a 4x3 planter, water tank, rechargeable battery, and piping system which will all be programmed for timing-based execution. The planter base is made from recycled plastic, water tank from terracotta, lithium ion-based battery, while the piping system is made from PVC tubing. Holes are drilled to the piping system and wrapped with gauze fabric to prevent the soil from entering the tubing. Capillary mats are laid inside each planter for equal water dispersion. For the automatic watering mechanism, an Arduino circuit board is connected to a rotating motor. The motor will turn and allow water to flow for a few seconds at intervals of once every 24 hours. The power will come from a rechargeable 9V battery that will last a whole 3-week cycle with no problems to enable consistent watering which is crucial for the development of the seedlings.

COMMERCIAL POTENTIAL

A significant source of greenhouse gas (GHG) emissions comes from the manufacture of synthetic nitrogen, N fertilizers consumed in crop production processes. The application of synthetic nitrogen fertilizers is recognized as the most important factor contributing to direct N₂O emissions from agricultural soils [1]. The problems that we are trying to solve are pollution caused by the usage of chemical fertilizer and the inconsistent watering of the seedlings. The seedlings need to have enough nutrients and water because it is an important step in cultivation. Without proper care of the seedling, it will produce low-quality crops. Thus, SCS provides convenience to beginners by ensuring the seedling gets enough nutrients and water using its

organic fertilizer and automatic time-based watering system. With the novelty of being a multipurpose innovation, where a non-chemical fertilizer and automatic watering system as an alternative to watering by hand in the cultivation process.

We are planning to sell SCS for the price of RM 300 which is RM33 more than the production cost. In this way, target demographics such as housewives, retired folks, and both young and old population that are interested in agriculture can afford SCS. It also strikes a good compromise between profit margins and affordability for the majority of people. In the future, we hope to reduce the production cost by sourcing from locals and manufacturing certain components in-house. In the future, we hope to bring SCS to more consumers by incorporating a high-brightness LED into a version of the system. This will create the ability to meet the needs of seedling cultivation in harsh conditions such as extreme cold and indoors [4].

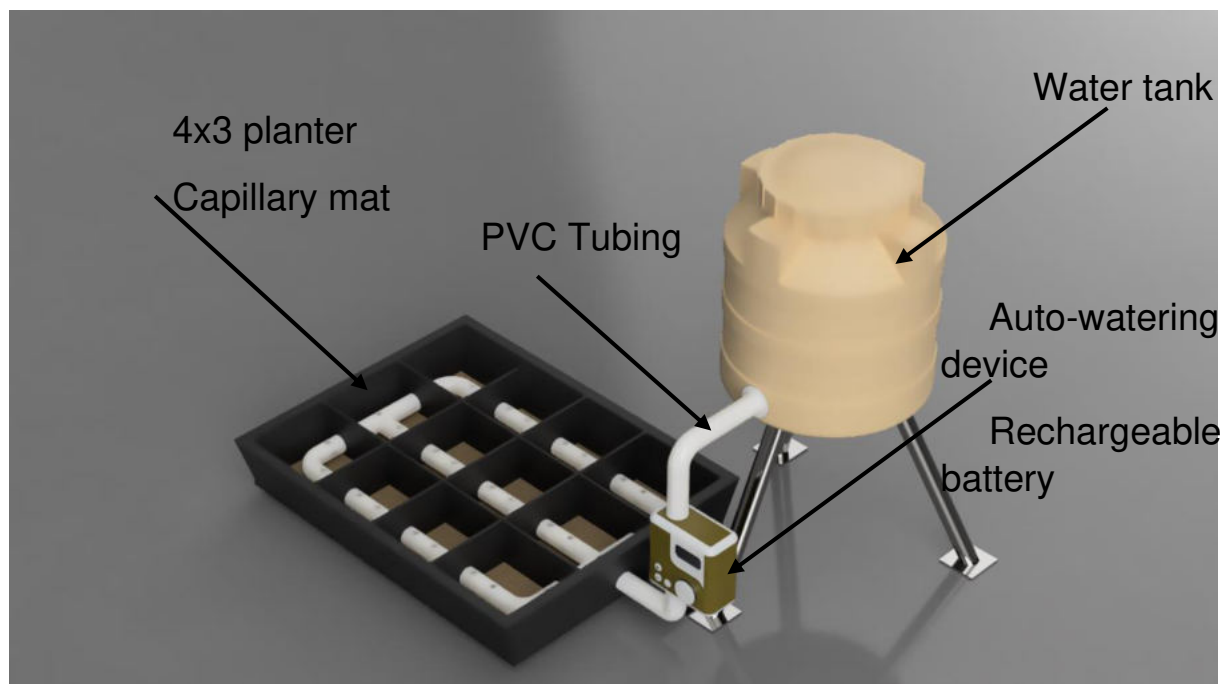


Figure 1: Model of SCS (Seedling Cultivating System)

Table 1: Auto-Watering System Media Components

Items	Function
4x3 planter	Planting medium specifically for the system with an overall dimension of 45cm x 20cm x 7cm = 6300cm ³ . The planter consists of 12 slots with a dimension of (45/4)cm x (20/3)cm x 7cm = 525.2 cm ³ .
Water tank	The 2.5 litres volume water tank will be filled up every 3 days to provide enough water for the soil.
PVC tubing	Tubing which connects the water tank to the planter and channels water to moisten the soil.
Auto-watering mechanism	This device will control the flow of water from the tank according to program and settings.
Rechargeable battery	Power source that makes sure the system can be used for a long period of time as long as the battery is charged when it is drained.

Table 2: Organic Fertilized Soil Composition

Material	Function
Soil	Serves as bedding and a natural medium
Goat feces	Earthworms will feed off the goat feces and excrete vermicast
Dried leaves	Consumed by earthworms to be excreted later on as vermicast
Earthworms	Convert the goat feces and dried leave into worm manure (vermicast) to fertilize the soil
Effective microbes	Provides more nutrients for the earthworms and speeds up the process of vermicomposting

Table 3: Cost of Prototype

Components	Price
Soil (2kg)	RM12
Goat feces (300g)	RM17
Dried leaves	-
Earthworms	RM35
Effective microbes (100ml)	RM15
Planter base (recycled plastic)	RM10
PVC tubing	RM3
Capillary mat	RM25
Terracotta water tank	RM65
Steel tubes (water tank feet)	RM3
Arduino kit	RM60
Rotating Motor	RM1.50
Mechanism Housing	RM3
Battery holder	RM1.50
9v rechargeable battery	RM16
Total	RM267

CONCLUSION

The rise in the interest and involvement of youth in agriculture can be ensured by the introduction of this Seedling Cultivating System prototype. In this system, conveniences for the seedling to grow are provided without worries for the plant to be in an unfertile condition. It is hoped that this innovation will continue to develop on a much bigger scale. The organic fertilizer will be thoroughly researched to achieve a more complex organic composition, making it better, while the auto-watering prototype will be increased in size and features. Currently, the design requires the user to refill the water tank every 3 days due to its lower volume than the planter. Larger volume of water tank than the planter along with the elevation to be a larger scale was planned as a further improvisation allowing the user to refill the tank every week. Subsequently, we hope to bring SCS to more consumers by incorporating a high-brightness LED into a version of the system. This will create the ability to meet the needs of seedling cultivation in harsh conditions such as extreme cold and indoors.

ACKNOWLEDGEMENT

Authors would like to express our appreciation to Mdm. Mahirah Taib for the support of being our supervisor throughout the project. The authors also want to thank Kolej GENIUS@Pintar Negara, UKM for the sponsorship and assistance given for the project. [Project No: D007]

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DBOX 2022

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ABSTRACT

D-Box helps individuals who work far from their homes to receive their goods safely. Recently, people are facing an issue where their parcel is missing because there is no one at the delivery address to pick up the parcel as it is not secured. Consumer goods delivery found that it was difficult for them to be at the delivery address itself due to a variety of factors. So, by using this product, users can unlock and lock the door of D-Box and check whether their item has been successfully placed into D-Box or not just at their fingertips. All these operations are controlled by Blynk, an IoT app that has a user-friendly interface. So, this app can be used by anyone regardless of age. D-Box is super affordable, and it gives a huge impact to the user. By using D-Box, users can focus on what they are doing and should not worry about their parcel anymore. Three out of the nine pillars of the Industrial Revolution 4.0 pillars are implemented in D-Box.

Keywords: Delivery Box; safety; consumer

INTRODUCTION

Scope and Objective

Industrial Revolution 4.0 (I.R 4.0) is expected to change how we live, work, and communicate it is also likely to change the things we value and the way we value them in the future. I.R 4.0 focuses heavily on interconnectivity, automation, machine learning, and real-time data (Li et al., 2017). D-Box applies high-tech security control system in line with the Industrial Revolution 4.0 (IR 4.0). D Box is a user-friendly safety box that can be placed in every home. Usage of Arduino WeMos as the main micro controllers and the usage of solenoids as the door locking system. The usage of IoT is also applied in this D-Box. Three out of nine pillars of I.R 4.0 elements has been used in the project. D Box solve the problem of items delivery when the recipient is absent. Consumer goods delivery found that it was difficult for them to be at the delivery address itself due to a variety of factors. People are facing an issue where their parcel is missing because there is no one at the delivery address to pick up the parcel as it is not secured.

Problems Statement

In the past decades, online shopping has gone from being non-existent to becoming a common practice among millions of people around the world. However, the absence of parcel recipients at the delivery address during the delivery process can cause many difficulties. Moreover, due to current global pandemic, people are advised to practice social distancing and avoid human contact. This situation will bring some trouble in delivery process. To overcome these problems, we had come out with an idea of enabling a smart, safe, and secured delivery process.

Literature Review

Risk describes whose responsibility it is to look after the goods. The risk in the goods transfers means that the receiver will face anything that happens to the goods (Kusrini et al., 2020), including damage to the goods and storage and transport of the goods. According to the lodhouse survey approximately 5% of online deliveries fail on the first delivery attempt. Moreover, in urban areas 15% of all types of deliveries fail to reach the customer on the first attempt including theft and delivery to the wrong location. The impact of Covid-19 delivery operations, increase the rise of contactless delivery when not effectively managed does nothing to improve the situation, as packages are left on front porches unattended to prevent physical contact between delivery providers and customers.

Risk for the customer involved a decision making which provides a means of handling the uncertainty involved in any decision-making process (Alexander, 2019). To avoid the problems, customer needs a secure environment to make sure that the parcels will deliver to them safely.

Methods

D-Box or Delivery Box is an innovation in security and safety that applies IoT technology. IoT or Internet of Things is a system of interrelated computing devices, mechanical and digital machines, objects, animal, and people that provided with unique identifiers and, also the ability to transfer a data over a network without requiring human-to-human or human-to-computer interaction. All the electrical components such as a solenoid, photoelectric sensor and servo motor is connected to the WeMos D1 Wi-Fi UNO ESP8266 development board. Then we connect WeMos D1 Wi-Fi UNO ESP8266 to an IoT application, Blynk to make it usable to control the operation of D-Box just at our fingertips.

INNOVATION DEVELOPMENT

The purpose of this research project is to discover answers to questions through the application of D-Box tools. The main aim of research is to find out the truth, which is hidden, and which has not been discovered as yet. Though each research study has its own specific purpose, some general questions of research below:

- i) What is the solution for security problems of delivery items.
- ii) What is the solution for the problem of item receipt time.

The study is divided into two phases and each phase's output is an input to the next phase. Phase-1 (first phase) we do the literature review and continue with the survey in which the survey is implemented by using a questionnaire. The purpose of this survey is to get some information whether respondent having a trouble in receiving delivery packages and the risk.

Second Phase (Phase-2) involve an evaluation on the solution suggest by respondent. This phase also aimed to evaluate and find the possible solution suggest by respondents and develop the prototype of D-Box as a possible solution for the problem.

For the purposes of this research, the writer has decided to use a sciences research tools questionnaires and interviews (Sarantakos, 2013). The questionnaires will be distributed among

people from district in Kota Setar which most of them are working. There are 108 of respondent were selected for this survey.

RESULTS

Jantina
108 responses

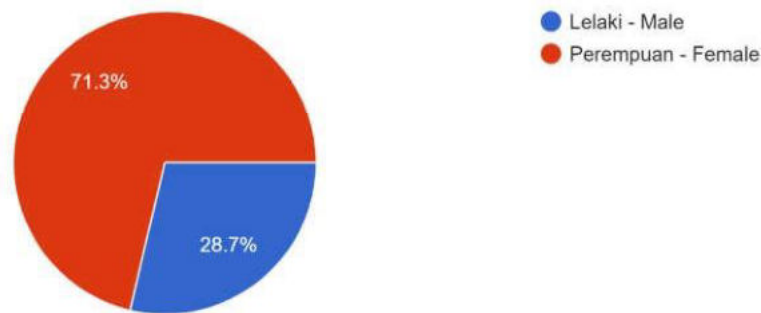


Figure 2. Respondent gender

Based on our analysis from 108 respondents, 77 of them were female, and 31 were male.

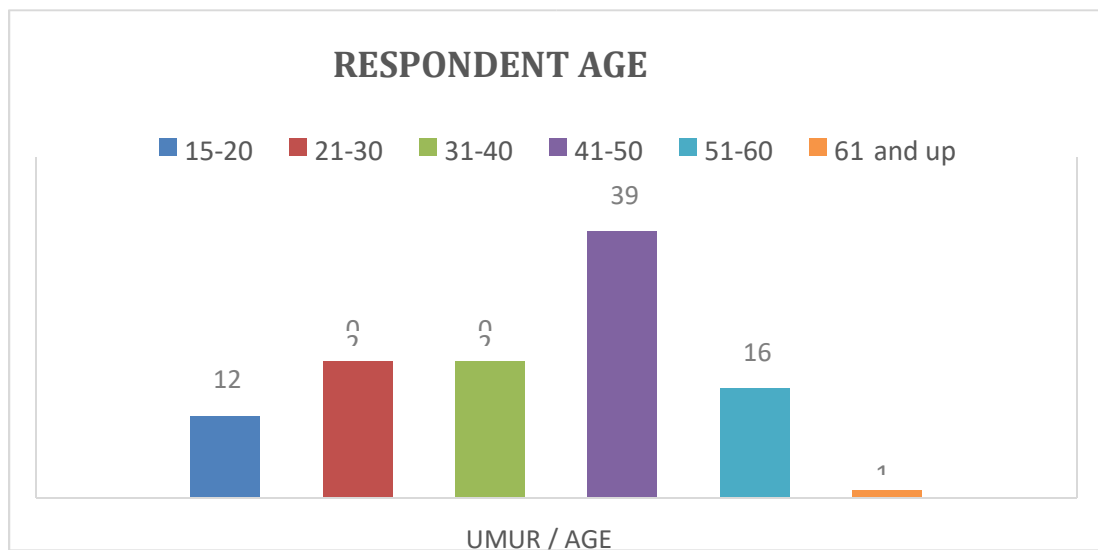


Figure 3. Respondent Age

The highest age range is 41-50, with a total of 39 respondents who participate in our questionnaire, then followed by the age range of 31-40 and 21-30 with the total respondents of 20. followed by that, the age range of 51-60 with the total of the respondent is 16 and the total of 12 respondent at the age of 15-20. The lowest total respondents are from the age of 61 and above.

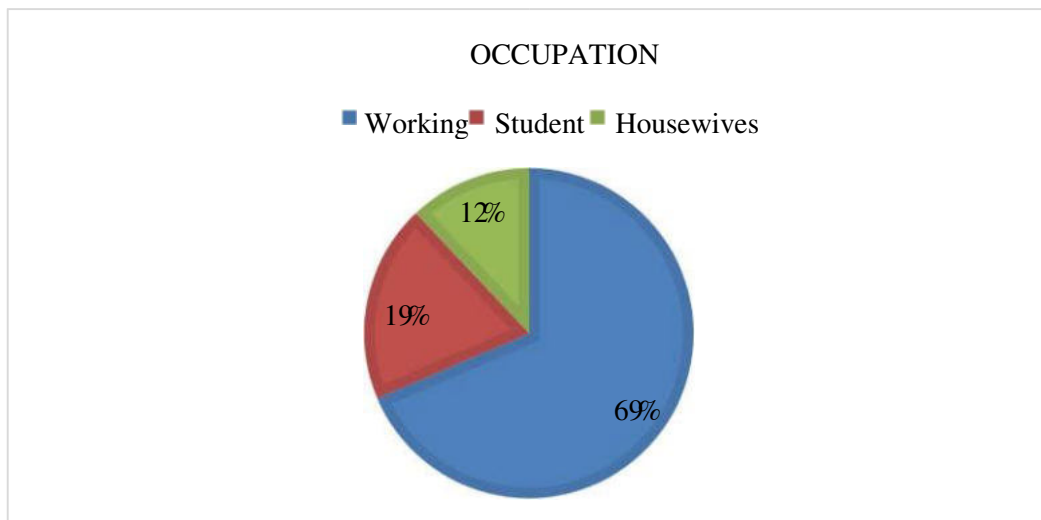


Figure 4. Occupation

The study found that 68.5 percent of respondents work while 19.4 percent of respondents are students, and only 12 percent of respondents are housewives.

Question 1: Are you working or study far from your home?

Question 2: Are you having a trouble in receiving delivery packages?

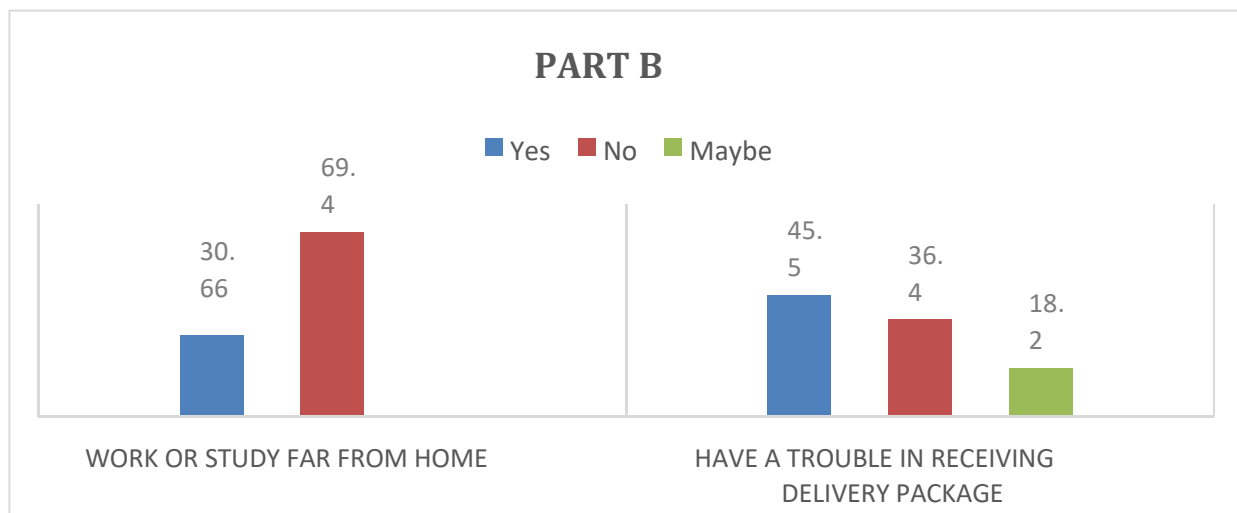


Figure 5. Occupation

Based on the questionnaire we did, 30.66 percent of respondent who works or learns far from their home has trouble in receiving delivery packages.

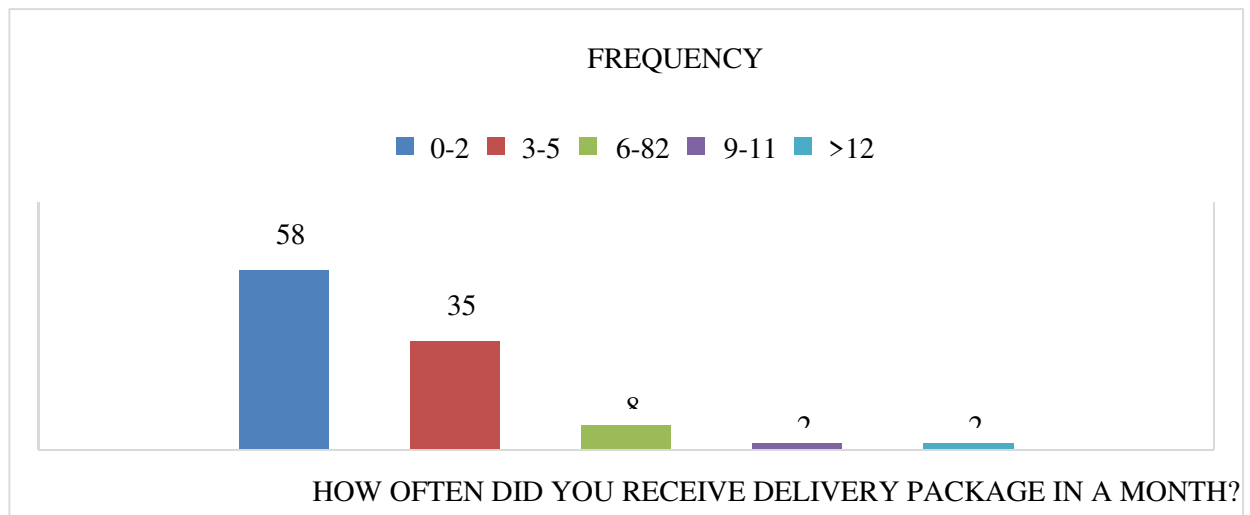


Figure 6. Frequency Receive Delivery

Based on the questionnaire, most of our respondents received delivery packages within the range of 0-2 by 55.2% followed by a 3-5 range of 33.3%. Meanwhile, 7.6% of the respondents received delivery packages within the range of 6-8. Ranges 9-11 and >12 have the same number of respondents as 1.9%

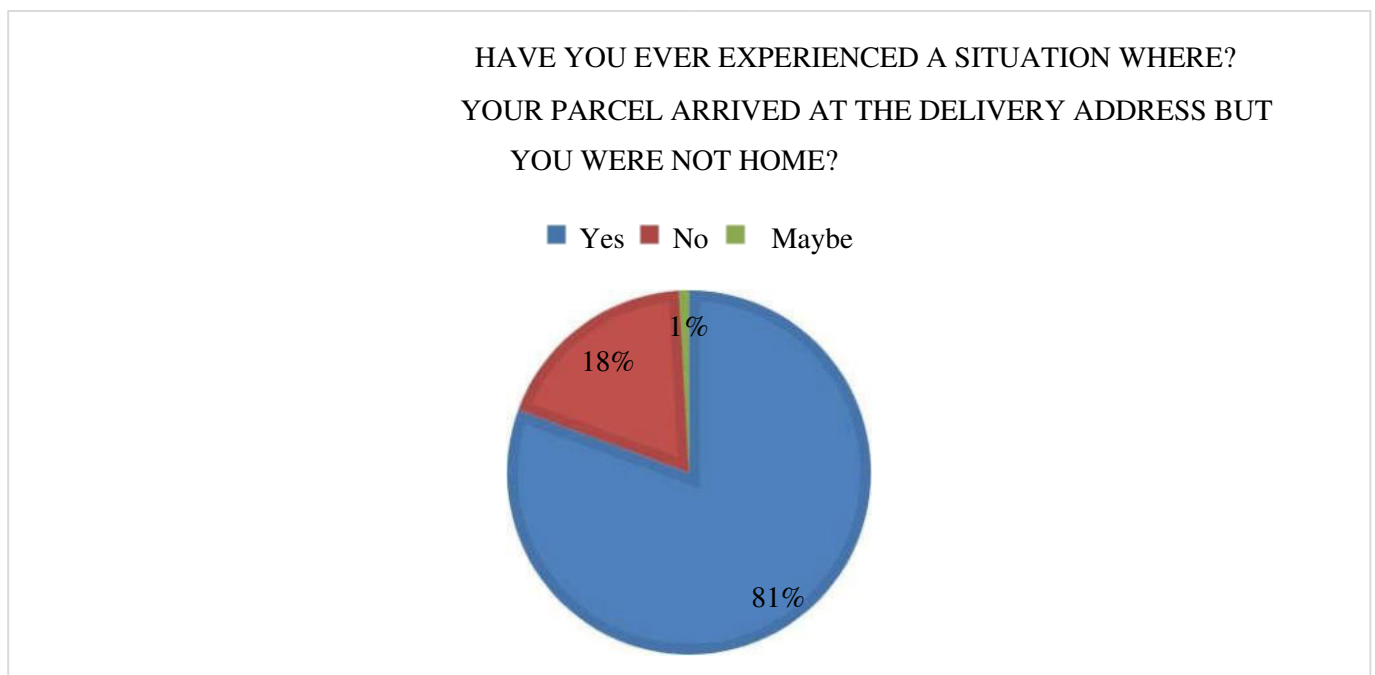


Figure 7. Risk Situation

Most of our respondent says that they have experienced a situation where their parcel has arrived at the delivery address, but they were not home. Only 18% of respondent never encountered that situation before.

ARE YOU COMFORTABLE WITH THE RISK OF RECEIVING THE PACKAGE WITHOUT YOUR PRESENCE AT THE DELIVERY LOCATION?

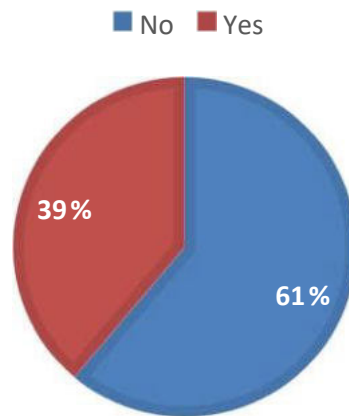


Figure 8. Risk Situation

95% of the respondent says that they are not comfortable with the risk of receiving the package without their presence at the delivery location. So, through all the graph, we can see that D-Box enable a safe delivery process

COMMERCIAL POTENTIAL

Recently, many people are facing an issue where their parcel has lost because there is no one at the delivery address that can pick up the parcel as it is not secured. The case of a parcel lost is increasing each day. By using this product, the user will not worry much about their parcel lost because the user can check their parcel from time to time from the apps itself. Also, we have seen many complaints to the courier services towards the issues that the parcel just left there, and it was raining on that specific day. The items inside have a defect, especially for electronic items. So that is why D-Box invented with a waterproof material.

CONCLUSION

The development of this smart parcel receiver box fulfils all the objectives which are to design a smart parcel receiver box using Internet of Things (IoT) technology. Therefore, all the suggestions and recommendations given by the experts are taken into consideration for the improvement of the product in future research. Overall, this product could help the users receive their parcel by controlling the door of the box during the delivery time. At the same time, the user's parcel safety is more guaranteed with the door locked and SMS notification when the parcel arrives and is received.

ACKNOWLEDGEMENT

I would like to express my deepest appreciation to my committee and principal of SMK Dato' Syed Omar.

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Piezoelectric for Sound Waves as Energy Harvester on Train Railway

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ABSTRACT

Utilising ambient sources of vibration energy has become an emerging trend in the field of power generation with a high potential to be the solution to satisfy the demand for electricity that is increasing and will exceed the domestic supply capabilities within a few years. Our project focuses on using piezoelectric devices to harvest sound waves to produce energy by absorbing noise pollution produced by trains. Trains, a major part of public transport internationally, emit a lot of sound pollution in the form of vibrational energy. Our project focuses on using piezoelectric devices to harvest this vibrational energy or sounds and convert them into electrical energy that can help satisfy the demand for electricity that is increasing and will exceed the domestic supply capabilities within a few years. These piezoelectric devices will be placed under already made train tracks and the wires will also run under those train tracks. To maximise the supply of electrical energy, a voltage multiplier system will be used. To minimise the materials used, all electricity generated from the trains will be directed to one central spot containing said multipliers therefore every single piezoelectric device wouldn't require an individual multiplier. Only after all electrical energy has been processed in the central multiplier spot will it be sent out to be used. There are 3 major operators for rail transport in Malaysia such as Keretapi Tanah Melayu, Rapid Rail and Express Rail Link. Each of these operators has multiple types of trains. And this is just in Malaysia, looking at it from an international standpoint, subways and metro systems are the most common form of public transport in the world. Therefore, this innovation has a large scope in which it can be applied and that is what makes this idea have such a high commercial potential.

Keywords: Energy; piezoelectric; train system; noise pollution

INTRODUCTION

Utilising ambient sources of vibration energy has become an emerging trend in the field of power generation. Vibrational energy has a high potential to be the solution to satisfy the demand for electricity that is increasing and will exceed the domestic supply capabilities within a few years if no new energy source is able to hold the energy demand. Our project focuses on using piezoelectric devices to harvest sound waves to produce energy by absorbing noise pollution produced by trains. Energy harvesting from external mechanical excitation is becoming an area of increased interest and piezoelectric energy-harvesting devices are a good way to apply this. A plot of power density versus output voltage for common forms of regenerative power production is provided in Figure 1 [1]. Piezoelectric devices have power density values comparable to other regenerative energy technologies figure 1. such as lithium-ion batteries and electromagnetic power supplies, but still possess less power density than

advanced solar cells [1]. Because of that, piezoelectricity is not superior to other forms of regenerative energy. Instead, it is just a new efficient form of regenerative energy that also has potential to be applied to a suitable place.

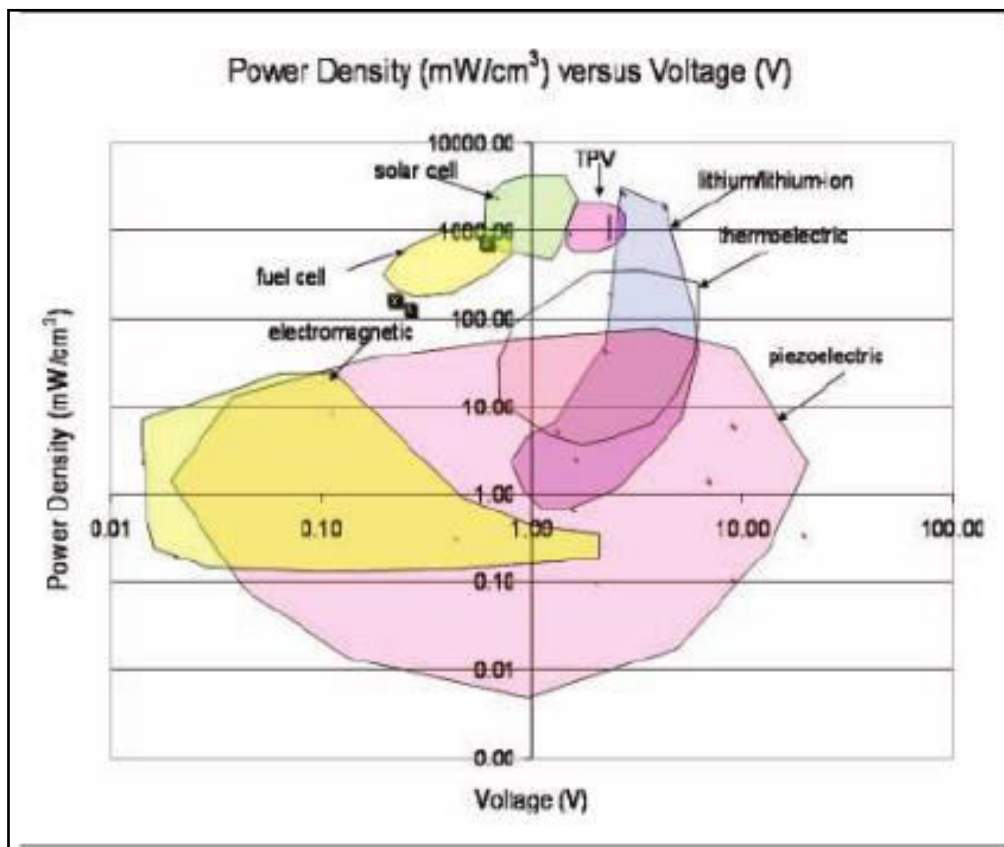


Figure 1: Plot of power density versus output voltage

Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms. 85 decibels are considered the highest safe exposure level up to a maximum of eight hours. The permissible time for safe listening decreases as sound levels increase. For example, sounds as high as 100 dBA, can be safely listened to for only 15 minutes each day [2,3]. Sound of train passing-by could be annoying for the consumers especially for someone who uses rail transport to commute. Trains, a major part of public transport internationally, emit a lot of sound pollution which can reach up to 100dBA to the point where it can even cause health problems and our project wants to harvest all of this vibrational energy. Our project focuses on using piezoelectric devices to harvest this vibrational energy or sounds and convert them into electrical energy that can help satisfy the demand for electricity that is increasing and will exceed the domestic supply capabilities within a few years. These piezoelectric devices will be placed under already made train tracks and the wires will also run under those train tracks. The rail transport system in Malaysia has a distance around 1833km with more than 300 train stations and hundreds of trips available everyday [4,5,6]. This is only in Malaysia. In the whole world, subways and metro systems are the most used and most common form of public transport [7]. This shows that this idea has high potential as it can be applied in so many places to take advantage of the sound pollution caused by the train.

As the sound of a train passing by would not last long because of how fast the train moves, it isn't necessary to modify a train to reduce its noise as the cost would not be worth it considering the impact it will give. Also, it would be hard to reduce the sound that the train produced. It will involve the modification of the train which would be harder to do as it requires engineers to make a new design of a train that doesn't produce noise as loud as a train does currently on average. Instead, we can apply a sound harvesting device which in this idea, a piezoelectric device, to take advantage of the potentially harmful sound produced rather than making it useless and only dangerous.

Multiple piezoelectric devices will be placed on the train tracks. It will absorb the vibration coming from the sound waves produced by a train passing by. To maximise the supply of electrical energy, a voltage multiplier system will be used as an addition to the piezoelectric sound transducer. To minimise the materials used, all electricity generated from the trains will be directed to one central spot containing said multipliers therefore every single piezoelectric device wouldn't require an individual multiplier. Only after all electrical energy has been processed in the central multiplier spot will it be sent out to be used.

INNOVATION DEVELOPMENT

There are many existing ideas about applying piezoelectric energy-harvesting devices for energy harvesting. Some big ideas including energy harvesting on airport runways using piezoelectric devices [8] is one of our inspirations in creating this innovation. Aeroplanes produce high sound levels which can be exploited to harvest the vibrational energy. We are trying to find in which area can this idea be applied to other than on airport runways and we come up with an idea to apply the piezoelectric energy-harvesting devices for sound waves on train railway track as trains also produce high sound levels which can be exploited for energy harvesting.

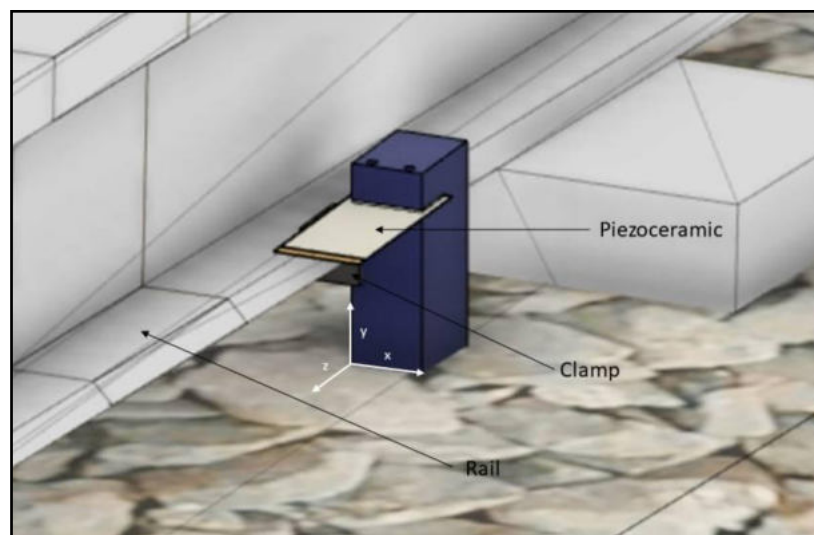


Figure 2: Innovation Prototype

COMMERCIAL POTENTIAL

There are 3 major operators for rail transport in Malaysia such as Keretapi Tanah Melayu, Rapid Rail and Express Rail Link. Each of these operators has multiple types of trains. There are around 14 different rail lines such as Port Klang Komuter, MRT and KLIA Express with

many more still under construction. The rail transport system in Malaysia has a distance around 1833km [4,5,6] excluding the rail lines that are under construction. With more than 300 train stations and hundreds of trips available every day, rail transport is one of the biggest types of public transport in Malaysia and because of that, noise pollution coming from trains is everywhere, this idea can be applied to take advantage of this noise pollution. And this is all just in Malaysia, looking at it from an international standpoint, subways and metro systems are the most used and most common form of public transport in the world. The new generation of high-speed rails allows trains to go even faster than aeroplanes and it is a lot more energy efficient too, potentially making it the future of long-distance travel. Therefore, this innovation has a large scope and secure future in which it can be applied and that is what makes this idea have such a high commercial potential.

CONCLUSION

In conclusion, using piezoelectric devices as energy harvesters on trains is one of many ideas that can help with the ever-increasing demand for electrical energy. This demand for electrical energy that will continue into the foreseeable future will ensure a future for our idea. With better and more efficient train systems that can travel faster than aeroplanes and are getting more and more energy efficient, the foundation of our idea, trains, are also here to stay. In the future we hope to use piezoelectric devices not only on train systems but other areas with high noise pollution and design a device according to the areas need and suitability. We will also keep looking for ways to increase the efficiency of our idea.

ACKNOWLEDGEMENT

We would like to extend our deepest gratitude to Pusat GENIUS@Pintar Negara, UKM for giving us the opportunity and sponsor to participate in this event and research. We are also extremely grateful to the director of Pusat GENIUS@Pintar Negara, Prof. Madya Dr. Rorlinda binti Yusof for allowing Pusat GENIUS@Pintar Negara to sponsor us for this event. I would like to express my deep gratitude to Mr. Muhamad Fikri bin Zaini, our supervisor, for their patient guidance, enthusiastic encouragement and useful critiques of this innovation work. I would also like to thank Mrs Azrina binti Md Azhari, for her advice and assistance in keeping our progress on schedule. Finally, we wish to thank our parents for their support and encouragement throughout this project.

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Water Level & Water Flow Detection System

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ABSTRACT

Flood is a famous natural disaster in Malaysia as it is one of the most frequent natural disasters in this country and has had many adverse effects to the country and even the society. This natural disaster is usually caused by the heavy monsoonal, convectional rainfall, heavy siltation of rivers and human activities that are likely to lead to high flood risk. This research aims to provide an invention that will help to measure the rise of water level and water flow of rivers for the purpose of strengthening any disaster risk management specifically in rural areas. As we know, the major problem in rural areas is usually the lack of knowledge about new technology which makes it harder for the residents to be able to receive any warning about flood or any more dangerous disaster that will come. In order to calculate the water level accurately, a staff gauge combined with a laser range sensor will be used to calculate the height of the butyl tube buoy on the water. Meanwhile for the water flow a propeller inspired by the concept of anemometer will be used as a measuring instrument. The information from the sensor will then be sent to their own respective district offices as a warning sign to the community. As a result of the help from this invention, the information and warnings about any possible sudden rise in water levels can eventually reach the entire community in a place before it endangers the residents.

Keywords: Water level; water flow; sensor; detection system; rural areas

INTRODUCTION

Previous research in Malaysia revealed that floods had been the most common disaster affecting various areas, particularly low-lying areas, since the 1920s [1]. This flood is frequently caused by monsoon changes [2]. The monsoon flood often happens during the second intermonsoon (October) to the early North-East monsoon (November - December), with heavy rains and wind bringing heavy rainfall to Peninsular Malaysia [3]. This situation is undoubtedly concerning to the general public because it has a negative impact on life, property, infrastructure, agriculture, human health, and economic status, all of which influence the community's quality of life [4]. However, despite the fact that various regions in Malaysia are flooded every year, flood handling until now still does not show much progress. The flood disaster is expected to worsen due to increased migration from rural to urban areas, changes in soil structure caused by uncontrolled development, poverty, and other factors that endanger

floodplain areas [5]. This statement can also be evidenced by the questionnaires we have conducted in relation to flood preparedness, please refer to the Figure 1 below:

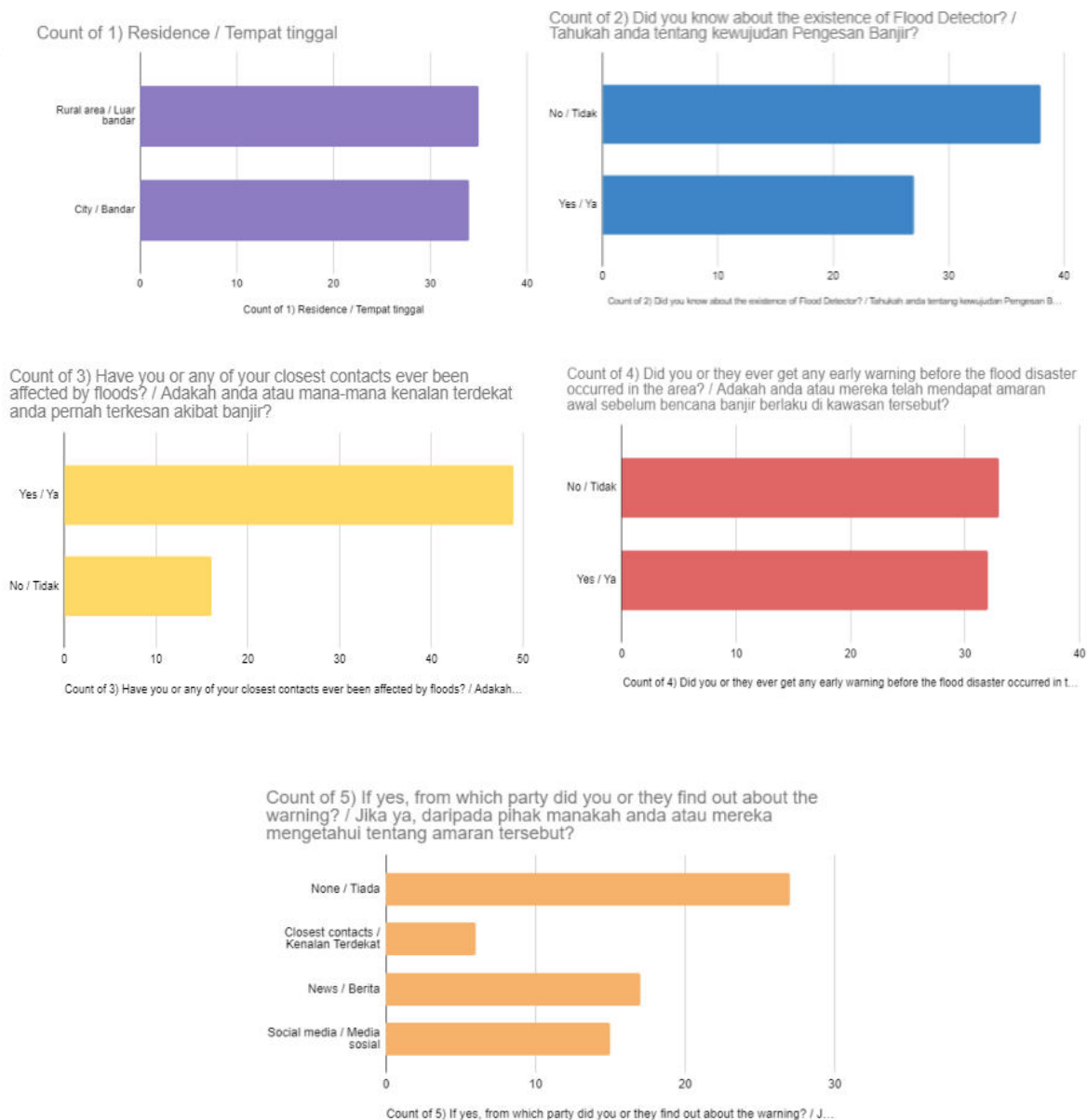


Figure 1: Questionnaire Response from Community

Owing to this situation, the Water Level & Water Flow Detection System has been introduced in this paper. Sg. Tangkak in Kg. Seri Makmur, Tangkak, Johor has been chosen as the location of the establishment of this system. The Water Level & Water Flow Detection System is proposed to provide an innovative and affordable product that can measure the rise of water level and water flow to strengthen any disaster risk management, specifically in rural areas. The problem statement is information of any possible sudden rise of water level and water flow that cannot reach the whole community before it endangers the residents.

INNOVATION DEVELOPMENT

Our innovation is designed to measure the water level and the water flow of rivers. These parameters are chosen because with water level measurement, we can prepare for dangerous water levels and start to evacuate the residents from their home. For water flow, we can predict how long it will take for the water to reach dangerous water levels. Based on these statements, we have innovated a water level and water flow sensor. To calculate the water level, we will be using a staff gauge combined with a laser range sensor which will be used to calculate the height of the butyl tube buoy on the water. The design of the staff gauge is inspired by the shape of the fish tail and the hull design of a boat. To reduce the water resistance, the staff gauge will be shaped like the image on the Figure 2 below:



Figure 2: Innovation prototype equipment (water level sensor)

The height of the poles is specially created according to the level of each river.

Table 1: Water Level Data [6]

Location	Current Water Level (m)	Normal Water Level (m)	Alert Water Level (m)	Warning Water Level (m)	Danger Water Level (m)	Pole Height (m)
Sg. Tangkak in Kg. Seri Makmur, Tangkak, Johor	4.08	2.70	4.00	5.00	5.50	8.50

The only reason we are adding 3 meters more than the warning level is as a precaution since some rivers in Malaysia have ever reached a water level above the danger level as shown in table 2;

Table 2: Danger & Highest Water Level Data [6]

Location	Danger Water Level (m)	Highest Water Level (m)
Sungai Serting in Jam Padang Gudang, Bera, Pahang. (2021)	30.5	30.94
Sungai Kechau in Kampung Dusun, Lipis, Pahang. (2021)	82.5	82.62
Sungai Muar in Kampung Awat, Segamat, Johor. (2021)	19.95	20.2
Sungai Kelantan in Kuala Krai, Kelantan. (2021)	25	25.21
Sungai Melaka in Batu Hampar, Melaka Tengah, Melaka. (2021)	2	2.58

To calculate the water flow, we will be using the concept of an anemometer. A propeller anemometer will be located underwater to calculate the water flow. The propeller blade rotations will be displayed at the the control center as well as the water speed like the image below:

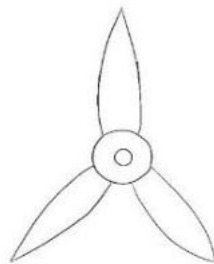


Figure 3: Innovation prototype equipment (water flow sensor)

Here, is the full visual explanation of our innovation prototype that combines sensors for both water level and water flow;

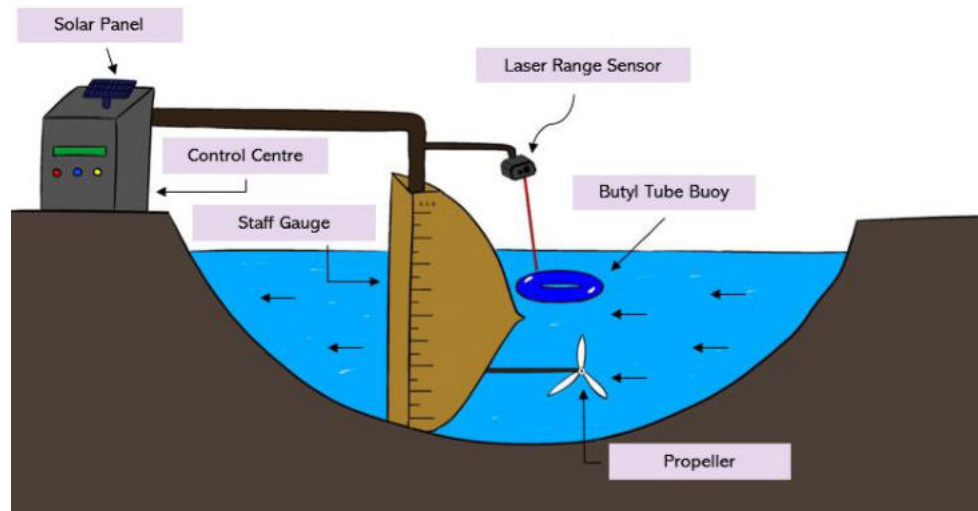


Figure 4: Complete innovation prototype

COMMERCIALISATION POTENTIAL

Due to the flood warnings that are not being widely exposed, it can lead to a bad impact on the environment and society [7]. This causes the residents to not be able to make early preparations at the right time, which results in some being stranded in the floods, losing property and can even claim lives. With the help of current technology, this innovation might be an alternative way to solve these issues.

ADVERTISEMENT

The Water Level & Water Flow Detection System will be sold widely through websites all over Malaysia. The buyer needs to place an order stating which river they want to place this product. So that we can provide a suitable product such as the height of the poles, materials that will be used according to the water level and the conditions of the river. Direct marketing methods such as direct mail, email marketing and social media marketing can help the product get straight to the customers in our target market [8]. We'll also develop a public relations and news media strategy by launching a print and online news media campaign.

USEFULLNESS

This innovative product can measure water level with a combination of laser range sensor and butyl tube buoy. This product is also able to measure water flow using the concept of anemometer. An anemometer propeller will be located underwater to calculate the water flow. The propeller blade rotations will be displayed at the control center as well as the water speed.

IMPACT

With this innovation, many residents who are living in areas that are prone to flood disasters can be rescued, especially in rural areas. They can be able to make early preparations for floods such as moving valuables to a safer place, bringing vehicles to areas that will not be affected and evacuating houses before floods occur. This product can also avoid large losses to the population as a result of the preparations done are quite complete.

CONSTANTLY INNOVATE

The first version of our product might've been revolutionary for the industry or market. After launching the original version of our product, we'll immediately switch our focus to improving on it with the help of customer feedback. Figure out how we can make it better and complete it faster, then launch a new version to capture more of our audience.

BUDGET

The following table shows the items and budgeted amounts for each;

Table 3: Project's Budget

No.	Items	Quantity	Cost (RM)		
			1 unit	Total	
1	Galvanized (GI) C Purlin	2	107	214	
2	Butyl Tube Buoy	1	150	150	
3	Laser Range Sensor	1	300	300	
4	Propeller	1	70	70	
5	250W Monocrystalline Solar Panel	1	236	236	
Total				970	

MARKET PRICE AND TARGET

The price that will be offered for this innovative product is RM 1000. The profit taken from the whole is only rm 30 since our target is to provide an innovative and affordable product that can measure the rise of water level and water flow to strengthen any disaster risk management, specifically in rural areas. To prove this invention is affordable and innovative, we have compared several existing flood detectors with our invention as below;

Table 4: Product's price comparison

No.	Product's Name	Price
1.	Water Level & Water Flow Detection System	RM 1000

2.	HCKK Radar Level Transmitter for monitoring the water level of lakes,rivers	RM 4696.16
3.	3/4" Water Heater Leak Detection and Alarm Shutoff System, NPT	RM 1131.56
4.	Magnetic Liquid Level Indicator	RM 1050.27

CONCLUSION

As stated for the objective product, the purpose of this invention and research is to measure the rise of water level and water flow in order to strengthen any disaster risk management specifically in rural areas. To be concluded, the result may eventually achieve the product's objectives and as the beginning of a new product that may be upgraded in the future in order to help any other places that also needs the same assistance as has been introduced at the research location.

ACKNOWLEDGEMENT

The authors would like to express utmost gratitude to Pusat GENIUS@Pintar Negara, UKM for fully sponsoring this project.

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Automatic Aquaponics System

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ABSTRACT

Agricultural and aquaculture activities are some of the productivity sources produced in Malaysia due to the factors of climate suitability and topography. However, some issues arise in this sector from the aspect of time management, systems, and inefficient use of space. The implementation of agricultural and aquaculture activities separately also involves relatively high costs and is difficult to manage systematically. The encouragement of the Malaysian government towards the implementation of 'Smart Farming' has triggered the idea of this innovation called 'Automatic Aquaponics System'. Regarding this, a model prototype has been prepared to demonstrate the idea. This system combines agriculture and aquaculture simultaneously by using automatic devices to ensure the efficient flow of water systems for fish farming as well as controlling soil moisture on crops. The use of space is optimized and saves time and cost. This prototype Automatic Aquaponics System was created as a model that can be implemented on a large scale in the agricultural and aquaculture sectors. The potential for commercialization is estimated to be very large. It is applicable to be implemented in Malaysia by modern farmers to produce higher productivity with more systematic and efficient management.

Keywords: Automatic Aquaponic System; agriculture; aquaculture; smart farming; efficient

INTRODUCTION

Agriculture and aquaculture are the sources of productivity in Malaysia. Good aquaculture management practices and efficient production activities need to take into account socio-economic and environmental factors. These factors are important to achieve sustainable aquaculture development and ensure the continuity of food security [1]. Good aquaculture management practices and efficient production activity that take into account socio-economic and environmental aspects are crucial to achieving sustainable aquaculture development and ensuring the continuation of national food security [2]. Tiraieyari et.al in an article explains there are many challenges towards sustainable agriculture production in Malaysia such as inefficient agriculture practices, shortage of water resources, land scarcity, pollution, uncontrolled pesticide use, and unsystematic land usage. These problems retard farmers to carry out agricultural activities successfully and achieve the standard of good agricultural practices [3].

Society today has realized the importance of food safety and the benefits of organic food. The increasing awareness of food security and environmental issues led to the growth and the practice of organic agriculture and aquaculture in Malaysia. Consumers began to change their

food preferences on healthy food and organic products [4]. Population increase, climate change, soil degradation, water scarcity, and food security are serious problems that have occurred over the past few decades. Goddek et.al in their paper claims Aquaponics can be one of the solutions as a closed-loop system consisting of hydroponics and aquaculture elements, can contribute to addressing this problem. Analysis shows that aquaponics is capable of being an important driver for the development of integrated food production systems. Arid areas experiencing water pressure will benefit primarily from this operated technology commercial environment. [5].

Aquaponics is a system that integrates mutually with aquaculture and plant cultivation using hydroponic methods. Both crops are combined in a recirculation system that uses less water than traditional agriculture. The nutrients contained in fish tanks are recycled into plant biomass in the presence of nitrifying bacteria that convert the excreted ammonia to nitrite and then to nitrate [6]. Aquaponics can be defined as combining agriculture activities and fish farming by using a smart system. The term originates from the two words aquaculture which is growing fish in a closed environment and hydroponics by growing plants in a soil-less environment.

Based on the above discussion, an aquaponics innovation has been created by our team with the topic of “Automatic Aquaponics System”. There are three problem statements found towards the issue that drives the innovation, which is;

1. Lack of efficiency in agricultural water quality care and aquaculture activities.
2. The combination of agricultural and aquaculture activities simultaneously requires a lot of space.
3. Insufficient and Inefficient time management when agricultural and aquaculture activities were carried out separately.

The creation of this innovation "Automatic Aquaponics System" is to achieve the following three objectives;

1. Combining aquaculture and agriculture activities in one water cycle with more efficient methods to maintain the adequacy of water quantity and its quality.
2. More optimal use of space to carry out agricultural and aquaculture activities simultaneously.
3. More efficient and adequate time management by establishing a mutual relationship between aquaculture and agricultural activities through the integration of automated aquaponic systems.



Figure 1: Innovation prototype

INNOVATION DEVELOPMENT

The prototype model operation of "Automatic Aquaponics System" is a brief demonstration of the system that has been created by using the Arduino system. When the switch is turned on, the moisture sensor will detect the moisture inside the hydroponic media. If there is no moisture detected in the pot, the water pump will pump out the water from the fish tank into the rubber tube flows into the plant pot. The water pump will stop running if the moisture sensor detects a certain amount of moisture in the pot. The excess water from the pot will flow back to the fish tank. This cycle repeats when the moisture sensor detects dryness in the pot.

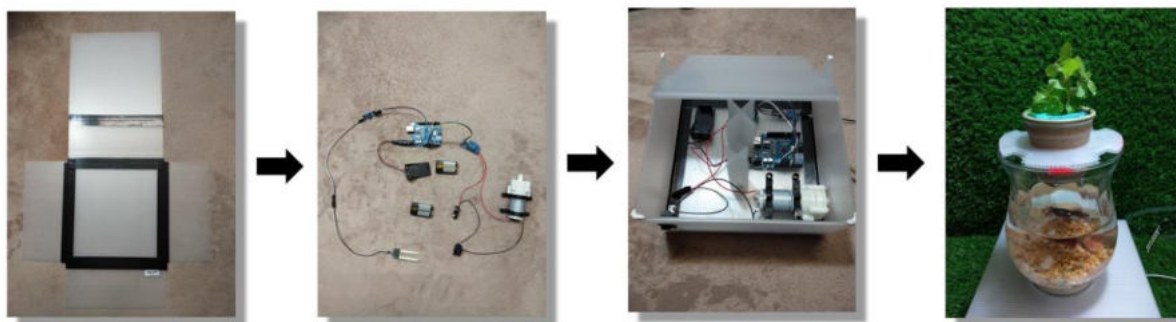


Figure 2: Innovation Development Process

COMMERCIAL POTENTIAL

The role and function of urban agriculture have evolved due to the revolution and community awareness of health and healthy nutrition intake among the communities. Urban agriculture has been used as one of the sources of healthy food in addition to beautifying the house. It is very much in line with the changing needs of today's lifestyle. Factors such as urbanization, urban poverty, and limited agricultural land have been the driving factors for urban agriculture [7].

Recognizing this, aquaponics that combines agricultural and aquaculture activities by using hydroponic methods are expected to be the community's choice to meet the needs with the very limited time and space capacity in an urban area. Innovative improvement that is used

here is automated systems (Automatic Aquaponic System) which facilitate the use of the aquaponic system.

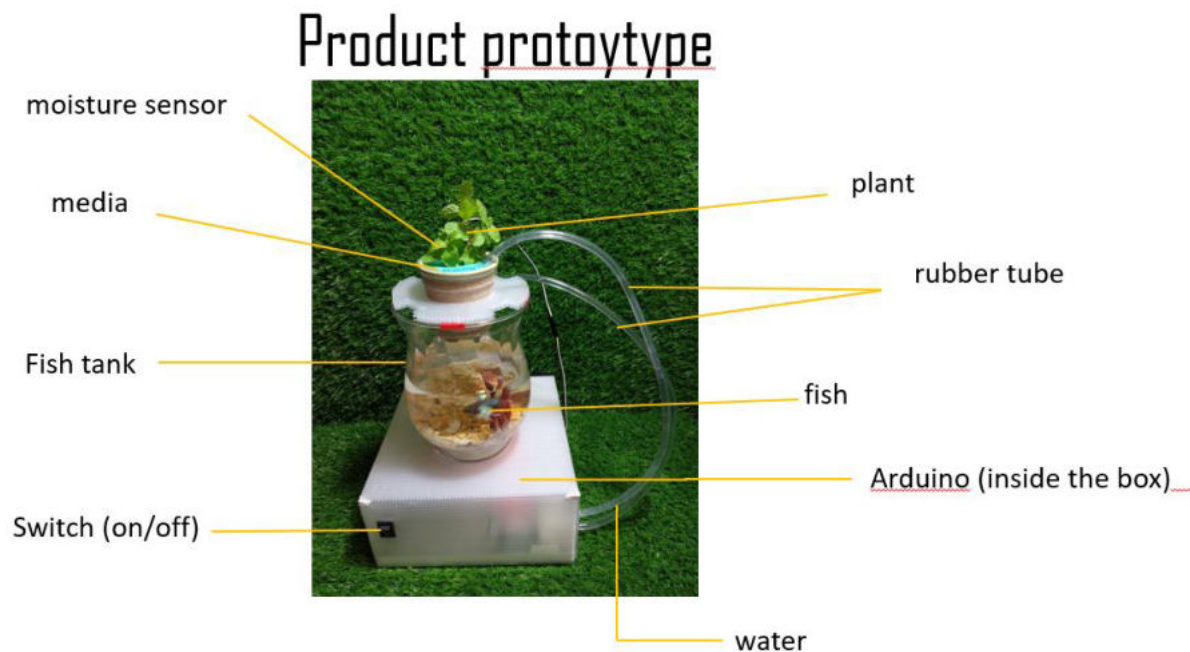


Figure 3: Component of Prototype

Although the aquaponics systems that combine fish farming and crops have existed in the market, some innovations have been made in this innovation, which are;

- a) An automated operating system that uses automated devices (Arduino electronic component and coding). A switch is used to turn on and off the operation.
- b) An electronic device that detects moisture in hydroponic mediums helps farmers to manage agricultural and livestock activities simultaneously. This situation greatly helps farmers to manage better while saving time.
- c) This prototype demonstrates the idea of the Automatic Aquaponics System. The Products can be designed to suit customer requirements.

CONCLUSION

In conclusion, the combination of aquaculture and agricultural activities simultaneously through hydroponic methods or in simple words, aquaponics can address the problem of management inefficiency in agricultural and livestock activities. Water consumption is saved and its quality is maintained.

This method also contributes to more optimal use of space to address the problem of insufficient land space in urban areas. Farmers can manage time more efficiently through the use of automated devices in aquaponics systems.

ACKNOWLEDGEMENT

Our Appreciation to the Ministry of Education, Jabatan Agama Islam Selangor (JAIS), Center of Foundation Universiti Teknologi MARA and our School, Maahad Integrasi Tahfiz Selangor Bagan Lalang. Thank you for this meaningful opportunity to join an International Innovation Competition (Creation de UiTM 2022).

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AnaSer III: A Food Grade Eco-Friendly Innovation in Mosquito Breeding Control Agents

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ABSTRACT

Previously, vector control strategies have focused on killing mosquitos with various chemicals. Chemicals used as synthetic insecticides, have unfavourable effects on health. Because traditional insecticide-based strategies have limitations, especially the development of insecticide resistance, significant efforts have been made to develop alternative eco-friendly methods. As a result, in this study, we develop our own recipe for food grade mosquito breeding control agents using local fruits and herbs. AnaSer III is a brilliant innovation that acts as an environmentally friendly larvicide in the prevention of mosquito larvae. This novel application of this secret fruit-herb formulation, which primarily contains Hibiscus sabdariffa (leaves), Cymbopogon nardus, Ananas comosus, and other ingredients, has never been reported in the study of larvicidal. Our findings suggest that Anaser III's formulation has larvicidal effects by speeding up the killing process, which is consistent with another larvicidal product on the market. Anaser was able to outperform other commercial agents in terms of killing efficiency. This product has the potential to aid in the prevention of mosquito growth and dengue fever outbreaks. The fact that it is food grade and simple to use adds to its value for commercialization and improving societal quality of life.

Keywords: Mosquito breeding; food grade; vector control; fruits; herbs

INTRODUCTION

Currently, research in improving the management of mosquito breeding control using fruit-herb formulation are still inconclusive. Although there are variety of killing formula in the market, the effectiveness of these formula is still in doubt. According to WHO 2009, the maximum usage of Temephos in the water is 1mg/L. It was proven that intake of >1mg/L Temephos can cause inhibition of brain activity and neuropathy, as well as accumulation in adipose tissue [1-2]. According to research, the chemicals used in larvicidal can be harmful to humans. Cancer, poisoning, vomiting, headache, cough, asthma, and other conditions are examples of these [3-8].

Therefore, this innovative product is claimed to be utilize as an effective and safe formulation in controlling immature stage of mosquito. The combination use of fruit-herb formulation from *Ananas comosus* and *Cymbopogon citratus* in combination with selected herbs also have not been reported elsewhere.

INNOVATION DEVELOPMENT

To date, there has been no commercialization of larvicidal products derived from a combination of selected fruits and herbs. The vast majority of items available on the market are synthetic chemical compounds that have the potential to harm people. Furthermore, the formulations we developed have been tested for efficacy against two types of *Aedes* mosquito strains, *Aedes albopictus* and *Aedes aegypti*. Anaser III was found to be 100 percent effective at killing mosquito larvae, similar to synthetic chemical products, according to the results of the experiments. The results of the experiments are shown in Table 1, where a commercially available larvicidal chemical called Abate was used as a standard in the experiments.



Figure 1: The prototype of Anaser

Table 1: Percentage of larvae mortality of *Aedes albopictus* and *Aedes aegypti* after 48 hours of treatment with Anaser III at various concentrations

Strain	Aedes albopictus (Strain 11041601USM)				Aedes aegypti (Strain 11041602USM)			
	25mg	50mg	100mg	Abate	25mg	50mg	100mg	Abate
Treatment (Anaser III)								
Larvae mortality rate (%)	20/20	20/20	20/20	20/20	19/20	19/20	20/20	20/20
	100%	100%	100%	100%	95%	95%	100%	100%

COMMERCIAL POTENTIAL

A unique fruit-herb composition was used to create a chemical-free mosquito breeding control product that was effective against mosquito breeding. A food-grade product, it can assist in avoiding the negative impacts of pesticides and other killing methods that are currently used. As a result of the notion of a chemical-free, simple-to-use, and safe Anaser III, it becomes more valuable and easier to commercialize while incurring the least amount of manufacturing expense. It can be used as a teaching approach in order to avoid dengue epidemics, to raise awareness and to offer alternatives, as well as to improve the overall quality of life in the community.

CONCLUSION

In conclusion, Anaser III outperformed other commercial agents in terms of killing efficiency. As a result, it is suggested that this product may have the potential to aid in the prevention of mosquito growth, larvae development, and dengue fever outbreaks. Aside from that, Anaser III is a food-grade product that is environmentally safe and simple to use, and these characteristics add to its commercialization value by increasing knowledge about dengue control and improving societal quality of life.

ACKNOWLEDGEMENT

The authors would like to express their gratitude to all staff and contributors at Sekolah Kebangsaan Bandar Baru, Kuala Selangor, and the Faculty of Health Sciences, UiTM Selangor, Puncak Alam Campus, for their assistance, insightful suggestions, and unwavering enthusiasm in completing this project.

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