CREATIONS de UiTM

INTERNATIONAL MEGA INNOVATION CARNIVAL 2024

Navigating Innovation and Seizing Global Fortune

CHANGE THE WORLD THROUGH INNOVATION

e-PROCEEDING

27th APRIL 2024

UNIVERSITI TEKNOLOGI MARA
CAWANGAN SELANGOR, KAMPUS DENGKIL
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CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2024

ePROCEEDING BOOK

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Ts. Dr Nor Aziyatul Izni Mohd Rosli
Fatimah Azzahra Md Raus
Nor Faridah Hanim Mat Junit
Nur Haryati Mohammad Raduan
Nurul Hannan Mahmud
Sakinatul Ain Jelani
Dr. Tengku Norbaya Tengku Azhar

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FOREWORD

Assalammualaikum wbt and good day.

Alhamdulillah, all praises are to Allah, the merciful, and Beneficent by whose Grace and blessings, we have gathered here today.

It is my great pleasure to welcome you to Creations de UiTM: International Mega Innovation Carnival 2024 with the theme "***NAVIGATING INNOVATION AND NURTURING GLOBAL FORTUNE***". I am very proud to announce that UiTM Centre of Foundation Studies is organising its 4th 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 Creations de UiTM 2024 is opening its doors to participants from around the world and there's an increased number of participations from last year with the involvement from various organisations, agencies, universities and countries. Our Mega Innovation Carnival this year was also supported by our industry collaborators who have involved in showcasing their Innovation and knowledge during the Carnival's exhibition.

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

Thank you and congratulations to the Organizing Committee of Creations de UiTM 2024 for working tirelessly to organize this event. Their tremendous support, cooperation, and hard work have enabled us to successfully organize this event, and we are grateful for that.

Professor Ir. Dr. Ahmad Farid Abidin @ Bharun
Director
Centre of Foundation Studies
University Teknologi MARA (UiTM)
Cawangan Selangor, Kampus Dengkil

PROGRAM OVERVIEW

CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2024 (CDU2024) is inspired by UiTM2025 Strategic Plan, which outlines the university's transformation to become a leading global university of science, technology, humanities, and entrepreneurship by 2025. Innovation development is crucial to acquiring knowledge, information, know-how, and technology, for providing opportunities for both the institution and the country to achieve national development agenda. The implementation and diffusion of new ideas and talents, as well as their continuous evolution, are critical in making innovation a major catalyst that can propel Malaysia five years ahead towards the status of a developed and high-income country.

This year, the Centre of Foundation Studies at UiTM Selangor Kampus Dengkil is once again hosting an international innovation initiative themed "*NAVIGATING INNOVATION AND SEIZING GLOBAL FORTUNE*" through the CREATIONS de UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2024 (CDU2024). Aligned with the current theme, the CDU2024 program, conducted in a hybrid format, seeks to unveil how technology and its applications are integrated into our lives. The CDU2024 program, is designed to highlight creative talents and innovative mindset across different segments of society throughout the country. It welcomes participation from university students and innovators, both nationally and internationally, allowing them to showcase their experiences and exposure in different fields while creating innovative products that are not only appealing but also beneficial to the community. It keeps countries and innovators relevant, competitive, and adaptive, which also strengthens the culture of innovation among innovators, as well-nurtured and optimized culture of innovation plays a pivotal role in successful innovation.

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CATEGORY A
(Professional)

Efficient Visible-Light-Active of Ag_2CO_3/Nb_2O_5 photocatalyst for EDCs removal in wastewater

Nur Ramadhan Mohamad Azaludin[1], Zul Adlan Mohd Hir[1], Zuraida Khusaimi[2], Nurul Infaza Talalah Ramli[1] and Hartini Ahmad Rafaie*[3]

[1]Faculty of Applied Sciences, Universiti Teknologi MARA Pahang, 26400 Bandar Tun Abdul Razak Jengka, Pahang, Malaysia

[2]Centre for Functional Materials and Nanotechnology, Institute of Science, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

[3]Centre of Foundation Studies, Universiti Teknologi MARA, Selangor Branch, Dengkil Campus, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: hartinirafaie@uitm.edu.my

ABSTRACT

Photocatalysis has become more attractive and important since it has a great potential in solving environmental problems. One of the most important aspects of environmental photocatalysis is the selection of photo-active materials. Ag-based semiconductor materials are currently catching the interest and research efforts of numerous material researchers due to their wide range of applications especially photocatalyst for wastewater treatment. Silver carbonates (Ag_2CO_3) is a common p-type semiconductor with a moderate band gap of 2.30 eV has also caught interest for its high-performance photocatalytic performance and anti-bacterial properties. To further improve the separation of photo-induced charge carriers, Ag_2CO_3 was employed to couple with niobium pentoxide (Nb_2O_5) can greatly accelerate the charge separation. In this work, hybrid Ag_2CO_3/Nb_2O_5 composite as a photo-active material was successfully prepared by a facile chemical precipitation method. The photocatalytic activities of the hybrid samples were evaluated by monitoring the photodegradation of bisphenol A (BPA) under visible light irradiation. The hybrid Ag_2CO_3/Nb_2O_5 composite sample exhibited promising results in the photocatalysis process with BPA removal of 79.09 % and showed good stability and reusability that can be used up to 4th cycle. The enhanced performance of hybrid Ag_2CO_3/Nb_2O_5 photocatalyst shows that it has potential for designing the dye waste-water treatment.

Keywords: Ag_2CO_3; Nb_2O_5; photocatalysis; visible; wastewater.

1. INTRODUCTION

A lot of emerging pollutants such as endocrine disrupting compounds (EDCs) are discharged into the aquatic system and posing a serious threat. One of the commonly known EDCs is Bisphenol A, an extremely harmful substance substantially produced in various plastic products (Godiya & Park, 2022). Hence, eliminating such hazardous pollutants from the environment or converting it into harmless compounds is crucial. Photocatalysis has been popular for degrading these pollutants into organic compounds (Zamri et al., 2021). Ag_2CO_3 has been identified as an excellent photosensitizer and a highly active visible light-driven photocatalyst due to its small

band gap (~2.17 eV), which is beneficial for sunlight absorption (Rafaie et al., 2023). However, this photocatalyst displays photocorrosion behaviour that had hindered its functionality. Thus, many efforts were taken to improve such drawback. As previously reported, heterojunctions formation between Ag-based photocatalyst and Nb_2O_5, had shown promising properties, like enhanced separation of charge carriers (Osman et al., 2021). Thus, in this work we report the facile preparation of hybrid Ag_2CO_3/Nb_2O_5 composite with different weight ratios using facile chemical precipitation method, as well as its significant photodegradation performance on BPA.

2. METHODOLOGY

2.1. Synthesis of Ag_2CO_3/Nb_2O_5 composite

All chemicals and reagents were used as received and no purification step was done. The facile chemical precipitation method was employed to prepare the hybrid Ag_2CO_3/Nb_2O_5 composite photocatalyst at different molar ratios. Nb_2O_5 (0.01 mol) was added into $AgNO_3$ (0.02 mol) solution prior to sonication for 30 minutes. Na_2CO_3 (0.01 mol) was added into the solution with constant stirring for 1 hour at room temperature. Subsequently, the precipitates of Ag_2CO_3/Nb_2O_5 composite were collected, washed several times with deionized water and dried at 60°C for 24 hours, yielding a pale-yellow powder named as Ag:Nb 1:1. The other molar ratios of Ag_2CO_3 to Nb_2O_5 (1:3,1:5, 3: 1 and 5:1) were synthesised likewise, meanwhile pure Ag_2CO_3 were also be synthesized similarly but without Nb_2O_5.

2.2. Photocatalytic performance

The photocatalytic performance of Ag_2CO_3/Nb_2O_5 composite was evaluated by measuring the degradation of BPA. In all measurements, 0.1 g of photocatalyst were dispersed into BPA solution (200 mL, 10 mg/L) and magnetically stirred for 30 minutes in the dark to achieve the adsorption-desorption equilibrium prior to visible light irradiation for 150 minutes. At each time intervals, 5 mL of sample were extracted out and the change of concentration of BPA was monitored and analysed through UV-vis spectrophotometer at λ_{max} = 276 nm.

3. RESULTS AND DISCUSSION

The photocatalytic activity of Ag_2CO_3/Nb_2O_5 composite photocatalyst was investigated through the photodegradation of BPA and the findings are as depicted in Figure 1 (a). It was found that within 150 minutes, Ag_2CO_3/Nb_2O_5 composite photocatalyst was degraded up to 79.09%. The stability and reusability of Ag_2CO_3/Nb_2O_5 composite photocatalyst was ascertained by the repetitive use of the photocatalyst under the same experimental conditions. After each cycle, the photocatalyst was recovered. Fresh BPA solution was used for each cycle without treating the photocatalyst to any kind of chemical or physical pretreatment before each cycle. As depicted in Figure 1 (b), Ag_2CO_3/Nb_2O_5 composite photocatalyst showed good stability trend even after four cycles. This result suggested that the Ag_2CO_3/Nb_2O_5 composite photocatalyst remained significantly photoactive with good stability towards visible light irradiation. The reduction in percentage degradation might be due to the photocorrosion of the photocatalyst as well as weight loss during the filtration process.

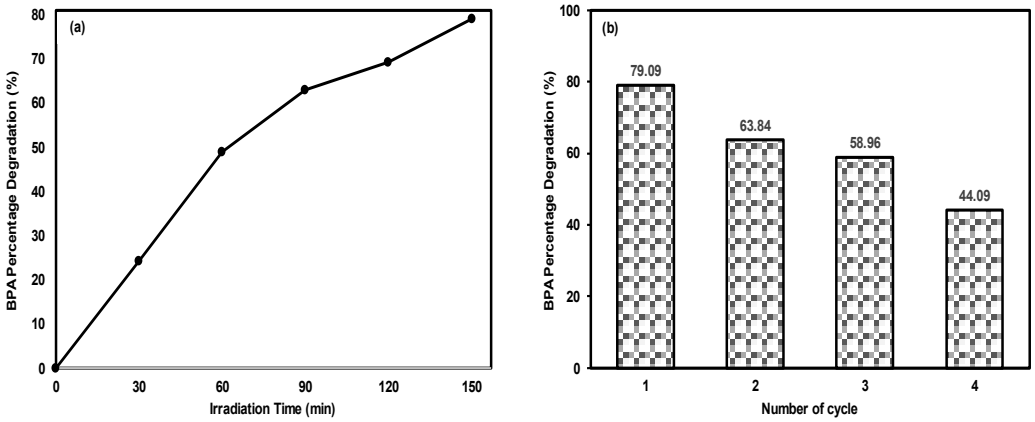

Figure 1. (a) The percentage degradation and (b) The reusability of Ag_2CO_3/Nb_2O_5 composite photocatalyst in degradation of BPA solution. Conditions: [BPA] = 10 mg/L; pH = 6.1; 150 minutes irradiation time.

4. CONCLUSION

In conclusion, it was revealed that Ag_2CO_3/Nb_2O_5 composite photocatalyst exhibit a significant performance of BPA degradation under visible light irradiation in 150 minutes and can be used up to 4th cycle, where the reduction in photocatalytic performance was observed from 79.09% to 44.09%. To improve the photocatalytic performance of Ag_2CO_3 based photocatalysts, another alternative such as adding transition metals e.g., Fe, Co, Ni and decorating the composite with noble metal nanoparticles e.g., Au, Ag also can enhance light absorption through surface plasmon resonance (SPR) effects. This study is hugely beneficial for its potential application in industrial wastewater treatment, especially towards the removal of EDCs, as well as dyes. Furthermore, this research is also a significant strategy for finding semiconductor photocatalyst that is useful towards cost-efficient wastewater treatment process due to the utilization of more affordable visible light irradiation compared to UV light irradiation that is costly.

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The authors gratefully acknowledge the financial support provided by the Ministry of Higher Education (MOHE) and Universiti Teknologi MARA (UiTM) for the YTR grant (600-RMC/YTR/5/3 (005/2020)), including the services and facilities provided to carry out the laboratory work in UiTM Pahang Branch, Jengka Campus and Centre for Functional Materials and Nanotechnology, Institute of Science, UiTM Shah Alam, Selangor.

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Bike – Hoe

Najibah Ab Latif, Mohamad Ameerul Aieman bin Nazri and *Ainaa Maya Munira Ismail

College of Engineering, Mechanical Engineering, Universiti Teknologi MARA, Cawangan Johor, Kampus Pasir Gudang, Jalan Purnama, Bandar Seri Alam, 81750 Masai, Johor, Malaysia

*Corresponding author: ainaa7609@uitm.edu.my

ABSTRACT

Agriculture tools are devices which useful in farm practices to assist farmers in various tasks related to cultivation, planting, harvesting and other agricultural activities. This Bike-Hoe main function is to lose the soil for gardening and watering the plant. It was fabricated with some improvements from the existing equipment in term of function. This innovation consists of a bicycle frame with a wheel and a blade or tines attached to the frame. The previous version of Wheel Hoe is required large physical effort to push and manoeuvre. The farmer must bend over from the waist to reach the ground. The objective of this project is to design and fabricate loosen soil equipment with additional function which less effort needed during the loosen soil process for gardening using waste materials. Some fabrication process has been made like designing, measuring, cutting, welding, joining, and installing process. This Bike – Hoe successfully fabricated and function well. Therefore, it can help gardeners and farmers to work more efficiently and effectively in their fields, resulting in healthier crops and greater yields as well as has commercial potential for future.

Keywords: bike; hoe; loosen; soil; agricultural.

1. INTRODUCTION

Previously, soil was loose for gardening by using a hoe manually. Therefore, how to make it easier and at the same time enjoying during gardening? Bike-Hoe is a gardening tool which is used to cultivate soil and weed gardens. It was developed to make gardening and farming tasks easier and more efficient (Kumar et al., 2014). It consists of a bicycle frame with two wheels and a blade or tines attached to the frame. The wheels make it easy manoeuvrability and control, while the blade or tines are used to break up soil, remove weeds and create furrows for planting. The previous version of Wheel Hoe is required large physical effort to push and manoeuvre. The farmer must bend over from the waist to reach the ground. The objective is to make it easier for gardeners to plant seeds or transplant seedlings. This versatile tool is a great alternative than traditional garden hoe, and it is helpful for gardeners with larger plots of land (Chethan, Chender and Kumar, 2018).

Some fabrication process has been made like designing, measuring, cutting, welding, joining, and installing process. The idea behind the Bike-Hoe is to provide an efficient tool that can be easily cycled through the soil, allowing the gardener to cultivate the soil around their plants without damaging the plants themselves (Chethan and Krishnan, 2017). The type of soil that is targeted for this product is peat soil. Overall, this Bike-Hoe was making more efficient, and

sustainable tool for farmers and gardeners, making it a significant innovation in the field of agriculture.

2. METHODOLOGY

Several fabrication processes were used to fabricate the product included designing, cutting, welding, grinding and assembling all the parts. Figure 1 show the flow diagram of the fabrication process. Some of the part of the Bike-Hoe should be made through these processes and the best practice for this product design. Main frame of body through welding method with the base of the water tank backward of the Bike-Hoe. Then the water tank was assemble using bolt and nut.

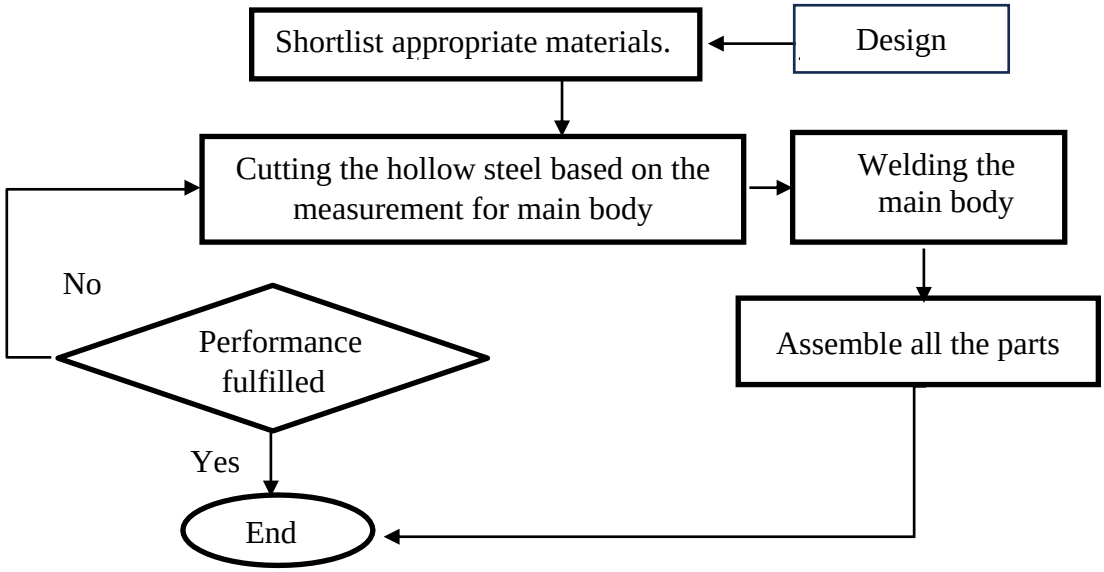

Figure 1. Flowchart of the fabrication process

3. RESULTS AND DISCUSSION

The main function of the prototype is to loosen the soil at small farms such as vegetable farms. Even though the prototype is eligible to be used in small farms, the target market has been reduced to a smaller scale to ensure that the prototype will provide the best outcome to the user while loosening the soil. The farmer usually uses the wheel hoe which they must walk while using it but with this product they can reduce the time at the farm because they just cycle the bicycle, and the cultivator can reach more than the wheel hoe. The time expected for the product to complete the farm chores is between 1 hours for 2 km straight line, at a constant speed 10km/h. A water container is attached to the bicycle to water the soil if the soil is too hard. Figure 2 (a) shows the final prototype of the Bike-Hoe, Figure 2 (b) shows an isometric view of the Bike-Hoe and Figure 2 (c) shows bill of materials. There are some advantages that have been discovered of this product included easy to handle, low maintenance and user friendly.

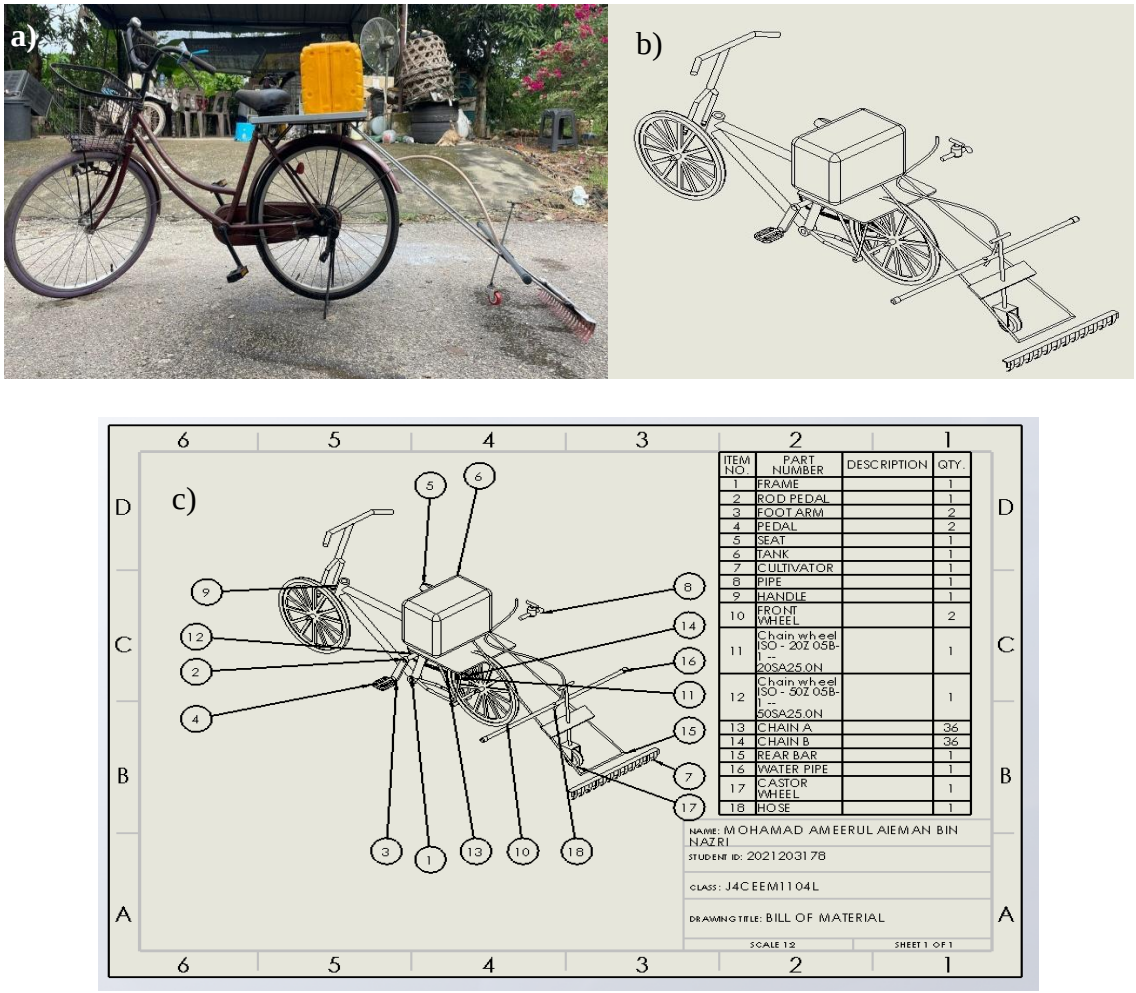

Figure 2. a) Prototype of the Bike-Hoe, b) isometric view of the Bike-Hoe and c) bill of materials of the Bike-Hoe

4. CONCLUSION

The loosen soil bicycle can helps to overcome the problem which is ease the burden to loosen hard soil by watering it through the water pipe. They can easily reduce the time taken to complete the farm chores as well as the energy usage also being decreased. Furthermore, this project also benefits the farmer by loosening the soil more quickly and efficiently. It has a potential for commercialize as low-cost product.

ACKNOWLEDGEMENT

Grateful thanks to the Universiti Teknologi MARA.

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Effects of Bu_3MeNTf_2N Ionic Liquid Addition on Conductivity of PVC- NH_4Tf Polymer Electrolytes

*Siti Khatijah Deraman, Hussein Hanibah, Nor Zakiah Nor Hashim, Nik Norziehana Che Isa and Tengku Maaidah Tengku A.Razak

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: drsitikhatijah@uitm.edu.my

ABSTRACT

Solid polymer electrolytes (SPEs) with poly (vinyl) chloride (PVC) doped with a fixed amount of ammonium trifluoro methane sulfonate (NH_4Tf) and with varying concentrations of ionic liquid butyltrimethyl ammonium bis (trifluoromethyl sulfonyl) imide (Bu_3MeNTf_2N) were synthesised via solution cast technique. PVC-NH_4Tf- Bu_3MeNTf_2N-based SPEs with 15 wt % Bu_3MeNTf_2N exhibit conductivity of 1.56×10^{-4} Scm^{-1} at room temperature. The ionic conductivity is attributed to the dissociation of NH_4Tf facilitated by Bu_3MeNTf_2N. Results of XRD indicate that the most amorphous film has the highest conductivity and this is corroborated by the results of DSC. FTIR spectra revealed that Bu_3MeNTf_2N has weak interaction suggesting that it acts mainly as a lubricant to facilitate polymer segmental motion.

Keywords: polymer electrolytes; ionic liquid; ionic conductivity; XRD; infra-red spectroscopy.

1. INTRODUCTION

Plasticisation (Hadi et al., 2020) has been one of the methods adopted by researchers to increase the conductivity of polymer electrolytes apart from formation of composite polymer electrolytes (Pradhan et al., 2011). Plasticising solvents such as EC (Wang et al., 1996), PC (Starkey et al., 1997), DMF (Subban et al., 2004), PEG (Srivastava et al., 2000) and other low molecular weight aprotic solvent with high dielectric constant and low viscocity has often been used to achieve plasticising effects in polymer electrolytes. Of late, ionic liquid (IL) which consists of an organic and bulky cation with inorganic anion have been used as a plasticising agent (Cheng et al., 2007, Mohammad et al., 2013, Anuar et al., 2012, Missan et al., 2010). Rather, the ions in IL exists in alternating layers of cation and anions extending several ion layers (Missan et al., 2010). Thus, IL on its own cannot be used as electrolytes in batteries which involve migration of specific target ions. On the other hand, IL can be used as electrolytes in capacitors and actuators which does not involve migration of specific target ions. Hence many different forms of IL incorporated polymer electrolyte have been reported. In most reports, the polymer electrolyte is composed of a polymer doped with inorganic salt and IL or IL doped with inorganic salt and polymer (Cheng et al., 2007, Mohammad et al., 2013, Anuar et al., 2012) while in the work reported by Missan et. al. (Missan et al., 2010), the polymer electrolyte is composed of a polymer with IL and filler. From the mass of work reported for IL incorporated polymer electrolytes, although interactions are observed between IL and the other components of the polymer electrolyte (Mohammad et al., 2013, Anuar et al., 2012), the role

played by IL is still unclear. In this work, ionic liquid Bu3MeNTf2N is used as a plasticiser to enhance the conductivity of PVC-NH4Tf based polymer electrolytes. The ionic conductivity, some structural and thermal properties are presented in this paper. This type of polymer electrolyte enhances the development of a new generation of devices which improves the stability and performance of the devices due to the solid nature of the electrolyte which is PVC as polymer host of proton conducting polymer electrolyte and Bu3MeNTf2N ionic liquid as a plasticizer are a novelty in this research.

2. METHODOLOGY

PVC and NH4Tf were mixed with Bu3MeNTf2N in various wt.% ratio with ratio of PVC-NH4Tf fixed at 70:30 wt. %. Solution cast films were obtained by pouring the solution into glass petri dishes, which were dried at room temperature. The films formed were further dried in a vacuum oven at 313 K for 24 hours. Impedance was measured using HIOKI 3532-50 LCR Hi-Tester for frequency ranging from 100 Hz to 1 MHz. DSC was measured at heating rate of 20°Cmin-1 in nitrogen atmosphere using Perkin-Elmer Q100/200 DSC. FTIR measurements were carried out using Perkin-Elmer FTIR Spectrometer with resolution of 4 cm-1 while XRD were recorded using X'pert Pro Analytical Diffractometer for 2θ varying from 5° to 90°.

3. RESULTS AND DISCUSSION

To investigate the effects of ionic liquid addition on the nature of PVC-NH4Tf complex, XRD studies were carried out. Figure 1 shows the XRD patterns of pure PVC film, PVC-NH4Tf complex at 70:30 wt. % ratio and PVC-NH4Tf-Bu3MeNTf2N complex with different amounts of Bu3MeNTf2N. The XRD pattern of pure PVC shows its predominant characteristic broad peak from 2θ = 13 to 30° with centre at 25° indicative of the low crystalline nature of PVC. On addition of NH4Tf in PVC a broad hump appeared with two peaks at 2θ = 14 and 24°. The intensity of the broad hump is observed to increase substantially with increasing concentration of Bu3MeNTf2N (Figure 1 c-e) which shows a decrease in degree of crystallinity of the polymer electrolyte.

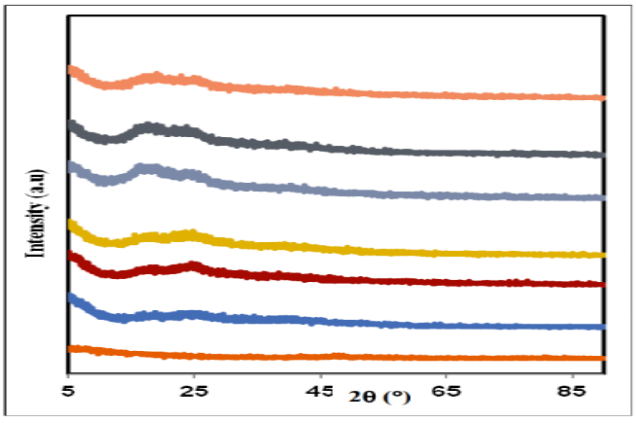

Figure 1. XRD spectra of a) PVC b) PVC-NH4Tf complex with 70:30 wt. % ratio and PVC-NH4Tf- Bu3MeNTf2N complex with c) 95: 5 (d) 90:10 (e) 85:15 (f) 80:20 (g) 75:25 wt. % ratio.

Interaction between components of the polymer electrolyte is investigated by FTIR whose spectra are displayed in Figure 2 for the samples studied in this work. The IR peak

corresponding to C-Cl stretching at 634 cm^{-1} (Figure 3) of PVC shifted to higher wavenumber at 639 cm^{-1} in all the PVC-NH4Tf-Bu3MeNTf2N complexes enunciating the interaction between C-Cl and NH4+ /H+. CF3 symmetric deformation of NH4Tf (spectrum not shown) at 764 cm^{-1} remains unshifted at 765 cm^{-1} in PVC-NH4Tf and 766 cm^{-1} in PVC-NH4Tf-Bu3MeNTf2N complexes with not much change in intensity and shape upon increase in IL concentration indicating that the IL interacts weakly with the polymer and salt suggesting its lubricating action. The band at 764-766 cm^{-1} implies the presence of a highly associated triflate ion Li2Tf+ (Starkey et al., 1997) indicating presence of ′free′ ions in the sample which contributes to its conductivity. The shift of SO3 symmetric stretching of NH4Tf at 1032 cm-1 to lower wavenumber at 1027 cm-1 in PVC-NH4Tf-IL complexes indicate presence of free ions (Mohammad et al., 2013) which also contributes to the conductivity of the system. Complexation of the IL (IR spectrum not shown) results in changes in the frequencies of bands associated with it: combination of C-S and S-N stretching, S-N-S asymmetric stretching and C-SO2- N bonding at 791, 1054 and 1342 cm-1 respectively. This is shown in Fig. 2, where it is seen that the combined C-S and S-N stretching at 791 cm-1 shifted to 798 cm-1 disclosing that there is interaction between the IL and components of the polymer electrolyte. The intensity of this band however did not change much with increased IL concentration indicating a weak interaction thereby suggesting that it acts more like a lubricant.

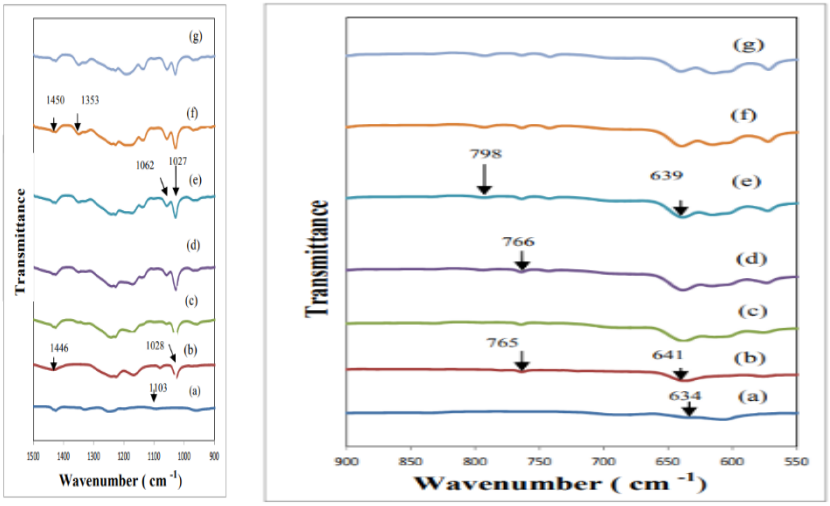

Figure 2. FTIR spectra of a) PVC b) PVC-NH4Tf complex with 70:30 wt. % ratio and PVC - NH4Tf- Bu3MeNTf2N complex with c) 95: 5 (d) 90:10 (e) 85:15 (f) 80:20 (g) 75:25 wt. % ratio with different wavenumber (cm^{-1})

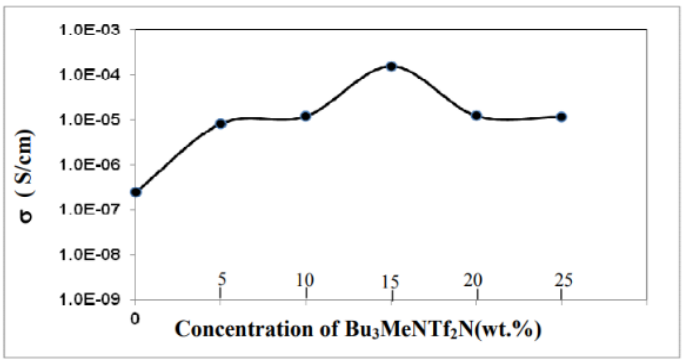

Figure 3. Ionic conductivity dependence on concentration of Bu3MeNTf2N in wt. %.

The variation of room-temperature ionic conductivity of PVC-NH4Tf with respect to Bu3MeNTf2N content is presented in Figure 3. A sudden initial increase of almost one order of conductivity is observed when 5 wt. % of ionic liquid is added to the PVC complex. Thereafter a gradual increase in the conductivity is observed on further addition of IL up to a maximum of 1.56 x 10^{-4} Scm^{-1} for 15 wt.%. Beyond this composition, the ionic conductivity decreased. Presence of Bu3MeNTf2N increased the conductivity up to three times when compared to the IL free sample. The initial increase in conductivity is attributed to the enhancement of ionic mobility due to plasticisation of the PVC complex. The amorphous phase of the PVC complex increases with increasing Bu3MeNTf2N content up to 15 wt. % resulting in the increase in conductivity. This is corroborated by XRD results which showed that the complex with 15 wt.% IL is the most amorphous. Addition of IL has shown presence of free ions due to dissociation of salt leading to an increase in the number of charge carriers. The incorporation of Bu3MeNTf2N into this polymer-salt system has produced more mobile ions and has also lowered the viscosity that led to increase in ionic mobility which consequently led to increase in conductivity (Missan et al., 2010).

4. CONCLUSION

PVC- NH4Tf- Bu3MeNTf2N proton conducting polymer electrolytes have been prepared by solution cast technique. Highest ionic conductivity was obtained for the electrolyte PVC-NH4Tf: Bu3MeNTf2N with weight ratio of 85:15 with a value of 1.56 x 10^{-4} Scm^{-1}. XRD and DSC results showed that the Bu3MeNTf2N containing polymer electrolyte films were more amorphous and flexible with improved thermal stability. FTIR showed that Bu3MeNTf2N acts as a plasticizer with weak interaction in the polymer system.

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iTrackah - An Innovative Solution for Accurate Tracking of Raka'ah During Muslim Prayers

Sharifah Norasikin Syed Hod, *Mea Haslina Mohd Haris, Saufianim Jana Aksah, Noraini Ahmad and Nur Syazana Rosly

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: mealina@uitm.edu.my

ABSTRACT

In Islamic tradition, the accurate performance of prayer rituals, particularly the tracking of raka'ah, holds immense significance. Yet, practitioners often encounter challenges in maintaining focus during prayer, resulting in errors in counting raka'ah. Existing manual counting methods or reliance on memory are prone to error and may detract from the spiritual experience. Thus, there is a pressing need for technology-driven solutions to offer accurate and accessible means of tracing raka'ah. A preliminary survey conducted for iTrackah, a novel device designed to address this need, revealed a significant demand and acceptance for such a product. Initial feedback indicates that iTrackah holds promising potential to alleviate the common challenge faced by Muslims worldwide. iTrackah is a device that leverages sensor technology to accurately monitor prostrations and translate them into the corresponding number of raka'ah completed. The device is designed to cater to the diverse needs of the Muslim community, including those with disabilities or those granted rukhsah. For users eligible for rukhsah, iTrackah intelligently recognizes the subtleties of prayer gestures to accurately determine the number of raka'ah performed. Moreover, iTrackah offers features to assist users in case of forgetting the number of raka'ah during prayers, ensuring a seamless and uninterrupted prayer experience. With its user-friendly interfaces and optional reminders, iTrackah emerges as an innovative solution poised to transform the way Muslims engage in prayer, guaranteeing precision, inclusivity, and peace of mind in worship.

Keywords: iTrackah; raka'ah tracking; Muslim prayers; movement sensors; solat assistance.

1. INTRODUCTION

In Islam, there are five pillars that every Muslim has to oblige. The second pillar is performing solat which is a form of Muslim prayer. Solat means prayer and is defined as a ritual consisting of specific words and actions that commences with takbiratul ihram (raising hand with specific recitation) and ends with salam (turning face to the right shoulder) with certain conditions (Nik Yusri Musa, 2018). Muslims must perform five daily prayers with specific raka'ah: Fajr (2), Zuhr (4), Asr (4), Maghrib (3), and Isya' (4). Despite the need for full concentration, people sometimes forget their raka'ah count due to mind wandering or forgetfulness, affecting the quality of their solat. According to Blondé et al. (2022), mind wandering is probably one of the most common inner mental activities that we engage in daily. It is an attentional disengagement from the environment which is not a phenomenon without consequences (Girardeau, 2022). Forgetfulness about the number of raka'ah in solat affects both young and old alike.

Having some kind of reminder of the number of raka'ah while praying may become an ideal remedy to this problem. A simple display of the raka'ah will help to reduce the problem without distracting the attention when praying. Saujana et al. (2022) developed a device that counts the number of raka'ah based on head detection by the sensor when a person prostrates. This device also comes together with a real-time clock that buzzes when it is time to pray. Products regarding raka'ah count which utilize praying mats were innovated by Kasman & Moshnyaga (2017) and Sudin et al. (2023) where the sensors were placed at certain parts under the mat such as knee, feet, or forehead. Different from the previous devices mentioned, another product that tracks the number of raka'ah was formulated using an image processing technique. A camera was used to monitor five movements in solat and acted as a prayer movement monitoring system (Alfarizal et al., 2023). The paper is organized as follows: Section 2 covers the methodology, including the model framework. Section 3 discusses the results and the market survey of the product. Section 4 concludes the overall findings.

2. METHODOLOGY

With the same intention of avoiding any doubt about the number of raka'ah while praying, a device called iTrackah is being developed. The name is derived from the words Innovative Tracking Raka'ah. This device is suitable for every Muslim including the disabled person or person who has the excuse to not perform the prostration with the forehead on the praying mat (person who qualified for rukhsah). For the person who is granted rukhsah, the number of raka'ah detected is based on the action of bowing lower than ruku' which symbolizes the prostration. The model framework of iTrackah is illustrated in Figure 1, where the number of raka'ah is calculated based on (1).

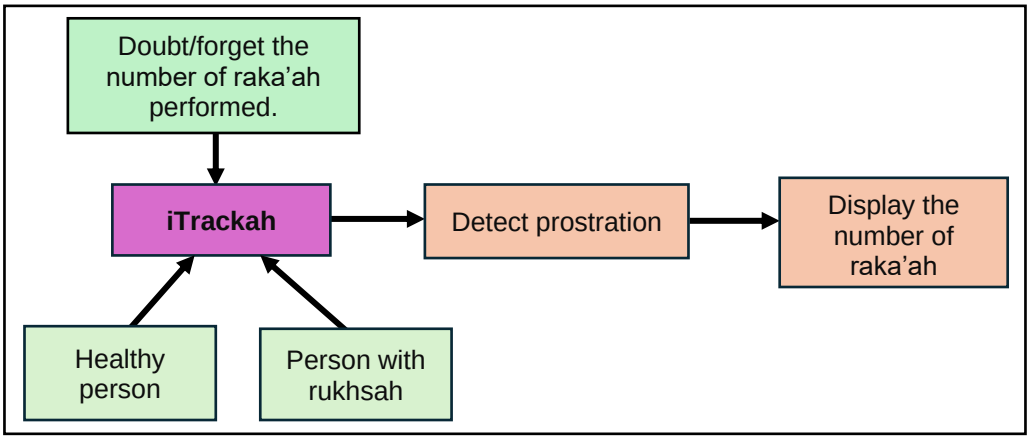

Figure 1. Model Framework

$$number\ of\ raka'ah = \frac{number\ of\ prostration}{2} \quad (1)$$

The prostration detector, iTrackah, uses an infrared sensor to detect each instance of sujud by recognizing specific motions and positions. The embedded system processes this data to confirm complete prostration cycles and calculates the raka'ah count, incrementing it with each validated cycle. The device features advanced technology and a comfortable design, including embedded sensors to track sujud positions and a compact, lightweight form for portability.
To use iTrackah effectively, the user places it on the praying mat near the prostration area. After turning it on, the device initializes and calibrates its sensors. During prayer, it detects each

prostration, and for users with rukhsah, it detects lower bowing motions. The processing unit updates the raka'ah count in real-time, which is displayed on the device. Post-prayer, users can review the total raka'ah count.

The device's efficiency is tested in various locations like mosques, homes, and workplaces, and with different user groups, including those eligible for rukhsah. This ensures its functionality, accuracy, and adaptability across different environments and prayer practices.

3. RESULTS AND DISCUSSION

A short survey has been done to 28 respondents to observe the needs and acceptance of iTrackah and the results are shown in the figure below.

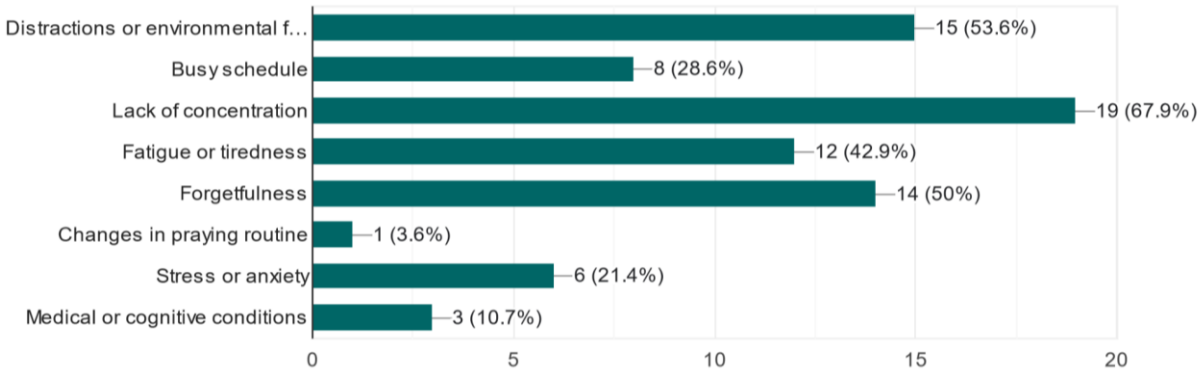

Figure 2. Survey on Reasons for Forgetting the Number of Raka'ah During Prayers

Figure 2 shows that respondents identified several factors making it difficult to track raka'ah during prayer, with lack of concentration being the most common reason.

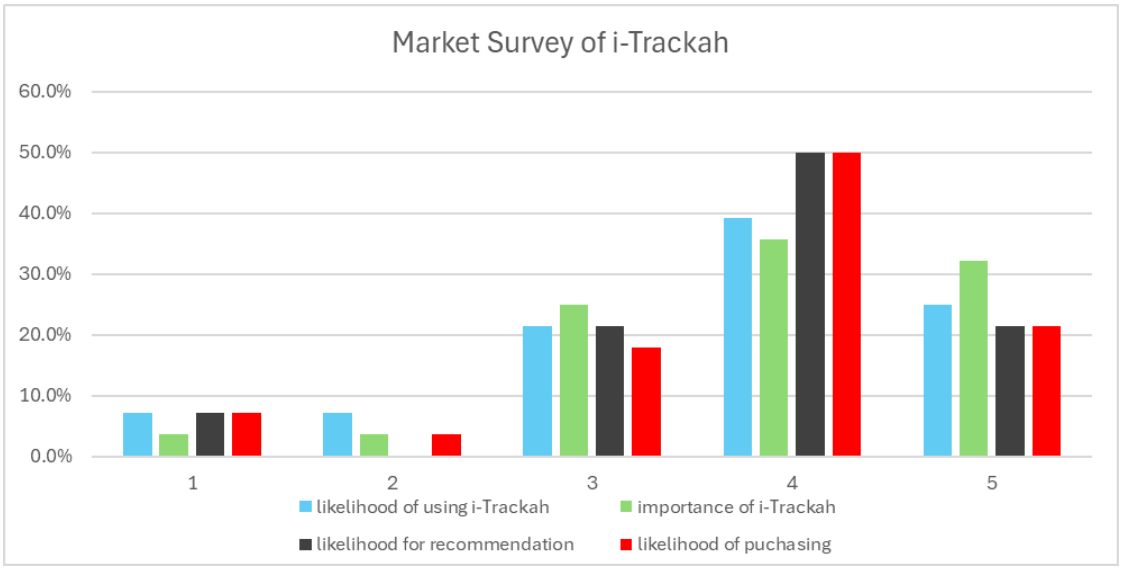

Figure 3. Result of Market Survey of i-Trackah

In Figure 3, the market survey outcomes on the usage likelihood, importance, recommendation, and purchase of iTrackah is presented. Respondents rated their preferences on a scale of 1 (Very Unlikely) to 5 (Very Likely). The results showed that 64.3% prefer using iTrackah for tracking

raka'ah, 67.8% believe it's crucial to have such a device, and 71.4% would consider purchasing and recommending it. These findings indicate strong interest and confidence in iTrackah's potential to enhance prayer quality.

4. CONCLUSION

In conclusion, the short survey aimed to understand the product's customer preferences and purchasing behavior. Key findings revealed a solid demand for a user-friendly device and a preference to have a device that may improve the quality of solat. These insights suggest the opportunity to develop a sustainable product. However, it is still significant to note the limitations of the survey methodology, such as sample size constraints and potential response biases. Moving forward, future research could explore the influence of social media influencers on consumer decision-making in the industry. Overall, the survey findings provide valuable insights for businesses seeking to adapt to changing market dynamics and meet evolving consumer needs.

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FOOTBALL TRAINING MODULE UNDER-19: A MODULE TO IMPROVE COMPETITIVE FOOTBALL MATCH ON ASASI FOOTBALL TEAM

*Mohd Helmy Yusof, Muhammad Taufiq Rosdan, Muhammad Ali Firdaus Mohd Nazri, Muhammad Amar Faridulafraz and Ahmad Hafiz Naufal Rosdan

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: mohdhelmy_87@uitm.edu.my

ABSTRACT

Football is one of the most popular team sports in the world that involve kicking a ball to score a goal by eleven player per team. University student (collage) is one of the footballer age levels, but the main problem is they are facing with busy schedule, specifically to manage their academy and football playing time. Addressing the challenge of pack and tight schedules for university students involving in football requires a flexible and efficient training approach. Therefore, this football training module is designed based on S.E.T. strategy that aims to provide a holistic approach to develop young university footballers without neglecting their academic work. This module consists of systematics schedule training activities focusing not only on technical and tactical aspects but also on physical fitness, mental resilience, and teamwork. In addition, small-sided games, and game-based scenarios (game simulation), enable Under 19 (U19) get the opportunities to develop every aspect of football game play. By utilizing this football training module in their drill, out of seven participations on competitive match and friendly, 5 won (71.4% winning percentage) and 2 drew (28.6%) is achieved. Ultimately, by following this structured module, university students under U19 players can enhance their skills and knowledge of the football game, preparing them for success both on and off the field without neglecting their academy achievements.

Keywords: Football; University U19; Pack and Tight Schedule; Training Module; S.E.T.

1. INTRODUCTION

Becoming a good footballer requires dedication, practice, and a strong understanding of the game. Players must consistently train to improve their individual technical skills. They should also work on their physical strength, speed, and agility through regular fitness training and conditioning.

Creating a balanced training schedule is crucial for university students under the age of 19 who are busy with their academic studies. Most of the student in Centre of Foundation Studies, Universiti Teknologi MARA is facing the tight and pack academy schedule form 8.00am to 5.00pm (may extend to 6.00pm). Not only facing with their tight academy schedule, but they are also busy with a lot of assignments and others university activities. Previous study shown, effective football training required an average 4 hours per day and 3 days/week for professional football player (Morgans et al., 2014). Developing an effective training program for U19 players involves a flexible and comprehensive approach that addresses technical, tactical,

physical, and psychological aspects of the game. In addition to technical and physical training, psychological aspects and time of training should also be considered when designing training modules for U19 football players.

Therefore, the training module for football U19 is introduced by applying the S.E.T. (Simple, Efficient, Tip-top) strategy, consist of well-planned football training activities that can incorporate systematic time management and flexible training schedules. Ultimately, a well-rounded training module for U19 football players should encompass technical, physical, tactical, and psychological elements to prepare them for the demands of the game at a higher level without neglecting their academy responsibilities.

2. METHODOLOGY

2.1. Idea and concept.

Applying S.E.T. strategy and system. SET is abbreviation for Simple, Efficient and Tip-top. "S - Simple, easy to understand, and flexible to practice", "E – efficient and implementable at their age/level" and lasty "T - top tip by getting the good results.

2.2. Components arrangement.

By developing SET strategy system, three major components on football training are included in this training module which are Technical, Tactical and Game simulations.

2.3. Content Editing

This football training module is in eBook format. All the editing process including picture, figure and picture with instruction are edited by using Canva and Soccer coaching-board Software.

2.4. Training schedule

Three days of training session is scheduled per week. The schedule for training session is made for each evening session, specifically on Wednesday, Thursday, and Friday, 5.30pm to 7.15pm. Meanwhile, Saturday is selected focusing on friendly and competitive match.

3. RESULTS AND DISCUSSION

Figure 1. Training Module Frontpage

Figure 2. Example of various training activities with simple picture and clear instructions.

NO 4: TRAINING ACTIVITIES

SCHEDULE

EXERCISE/TRAINING ACTIVITY	SETS/REPS	REST
EXERCISE A		
1. Warm-up	10 minutes	3 -5 minutes for each activity
2. Passing (short)	25 minutes	
3. Scan & Awareness	20 minutes	
4. Small Game (7 vs 7)	20 minutes	
EXERCISE B		
1. Warm-up	10 minutes	3 -5 minutes for each activity
2. Passing (long)	20 minutes	
3. Rondo	20 minutes	
4. Small Game (7 vs 7)	25 minutes	
EXERCISE C		
1. Warm-up	10 minutes	3 -5 minutes for each activity
2. Passing (short & long)	20 minutes	
3. Tactical Formation	20 minutes	
4. Simulation Game (11 vs 11)	30 minutes	
Every Saturday, MATCH DAY/FRIENDLY/COMPETITIVE MATCH		

Figure 3. Example of TRAINIG SCHEDULE, with specific exercise, sets and rest intervals. All the activities will be applied during training sessions.

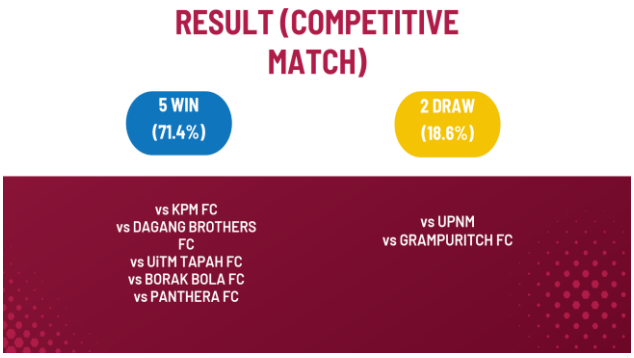

Figure 4. Result on their competitive match against the opponent of the same age group.

In this training module, with a visually appealing front page (Figure 1) this training module presents a detailed breakdown of various aspects crucial for football development tailored for university student involve in football. In the technical section (Figure 2) they will learn about fundamental skills such as dribbling, passing, agility and strength exercises, ensuring they are always at the top of the game. By applying the concept of TABATA (high-intensity interval training method), can increase player's overall stamina, explosiveness, and recovery time (Hill-Haas et al., 2012). Furthermore, the specific training schedule (Figure 3) offers a well-structured plan to optimize the period of training sessions, balancing skill development and rest time to maximize the performance on competitive and match days.

With the good training and guidance by the coach provided in this training module, the team (ASID FC, UiTM Dengkil) achieved an outstanding 71.4%-win rate, and a 18.6% draw rate with zero percentage loss. The competitive match result shown (Figure 4) was not just a lofty goal, but an achievable reality.

4. CONCLUSION

This football training module invented by following SET strategy successfully prepared and enhance the performance of the students of Asid Football Club, UITM Dengkil and it effectively equipped students with the necessary technical and tactical skills to enhance both individual and team performance in soccer, without neglecting their study time. Ultimately, this module ensures that they achieve excellent results in any competitive matches football games they participate in.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude in the achievement of developing the FOOTBALL TRAINING MODULE FOR UNIVERSITY STUDENT UNDER-19; the group members of the project Mohd Helmy Yusof (Leader), and all the team members, and most importantly University of Technology MARA(UiTM), Dengkil Campus provided us with the opportunity to complete this project. We are grateful for the support and guidance we received from the university. Our group members worked hard and dedicatedly to complete this project. We hope this module will make a good impact to the UiTM Dengkil Football club (ASID FC).

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Trigo-Tricks (TT): Enhancing Mathematics Learning Via Online Games

*Balqis Hisham, Suraya Hassan, Norlaili Md Saad, Juhaidah Hairom and Nurfatihah Mohamad Hanafi

Department of Mathematics, Centre for Foundation Studies, International Islamic University of Malaysia, Gambang Campus, 26300 Gambang, Pahang, Malaysia

*Corresponding author: balqish@iium.edu.my

ABSTRACT

Gamification in mathematics is an interactive pedagogy that can be used to increase students' interests. In learning mathematical concepts like trigonometric topics, more interactive activities and engagement platforms are proposed to help the students' understanding. An online game called Trigo-Tricks (TT) was created so that students could play it and concurrently work through the games' questions. The aim of this study is to examine the students' interest in learning trigonometric topics which are found to be difficult for them to understand using Trigo-Tricks (TT). This Trigo-Tricks (TT) is designed using the Buildbox platform and it is integrated with trigonometric concepts. A sample of 45 sciences students in the Centre for Foundation Studies, International Islamic University Malaysia (CFS IIUM) will be selected for this study using purposive sampling technique. Overall, the findings support that gamification in mathematics gives a better learning environment and is suitable to be used as educational tools. Students are more likely to explore new learning methods for understanding subject matter compared to traditional methods. For commercialization, this game can be introduced and utilized by all institutions that offer pre-university programme. The game is practical, and it is easy to be accessed by students. As a conclusion, Trigo-Tricks (TT) provides an advantage for students such as increasing the students' interest and understanding in learning Mathematics.

Keywords: Gamification in mathematics; Students' interest; Pre-University programme; Interactive learning.

1. INTRODUCTION

The most popular method of teaching nowadays is game-based learning activities. Based on Trybus (2015), game-based learning is the process of incorporating specific game concepts into real-world situations. It's considered as one of the interactive methods that can enhance creativity in learning (M. Khatibi, 2021 & M. Kalinauskas, 2014). Besides, it is an instructional strategy that allows teachers to draw students' attention to various game elements so they can learn and apply particular abilities in real-world contexts (Fu et al., 2006; 2009). Why game-based learning? Because, based on Willis (1996), games will introduce the player to four main criteria during playing that are language used, motivation, exposure and teaching. It is not easy to design interesting game-based learning which suits the learning objectives. It was designed as such to make sure that through learning and playing, students can have a deeper understanding about the topic (Kirstavridou et al., 2020). Gamification is one of the game-based learning and it is a trend nowadays. It was accessible through smartphones, tablets, computers, laptops, televisions and others at anytime and anywhere. Numerous studies have been done to test the

effectiveness of gamification in education. Based on Buckley & Doyle (2014), it gives positive influence and motivation on student achievement. Moreover, Xu & Hamari (2022) proved that gamification can increase someone's creativity. Referring to Kuo-Wei, L. (2023), their study of the implementation of gamification using six teaching methods shows that it enhanced students' creativity, communication skills and collaboration. It also stimulates their motivation, attitudes and learning interests. Thus, Trigo-Tricks (TT) was created so that students could play it and concurrently work through the games' questions. The main objective of this study is to determine the students' interest in learning Trigonometric topics using Trigo-Tricks (TT).

2. METHODOLOGY

Trigo-Tricks game was developed using Buildbox software. Ideation was the first step in designing and developing the game. It involved the idea of how to ask the question while students are playing the game and integrating the gamification concept with learning the subject matter.

Figure 1. Trigo-Tricks Game illustration.

Based on Figure 1, the main character (Ninja Girl) will start to run and jump to collect the rewards in terms of coins and diamonds. The main character needs to face challenges such as enemies (dragon with fire and monster) and different geographical landmarks such as elevated blocks, rivers, holes, boxes, high cliffs and the most important landmark is the keys. Once the main character gets the key, the question will appear, and the players (students) will answer the pop-up question. If the player answers correctly, the player will resume playing the game or else, the game is over.

The next step was called plan engagement. The developers will choose where to find the characters, objects, enemies, challenges, rewards and sound effects. Platform chosen to design the game is Buildbox software. There is no prior coding or design skill required to design a game using Buildbox software. It uses only drag and drop creations or objects into the game world. The mid-map will link all of the actions that must appear in the game.

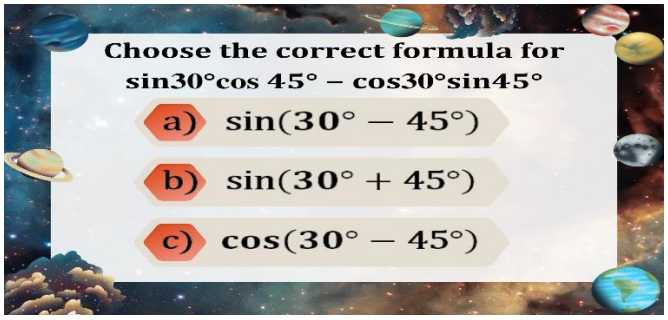

Figure 2. Trigonometric questions in the Trigo-Tricks game.

Figure 2 shows a question from the topic Analytic Trigonometric was included in the game for students to answer while playing the game.

3. RESULTS AND DISCUSSION

3.1 Descriptive Analysis

By using 17 items in the adapted survey form, descriptive analysis was done using SPSS to measure the mean score of the Motivation for Learning and Effectiveness constructs.

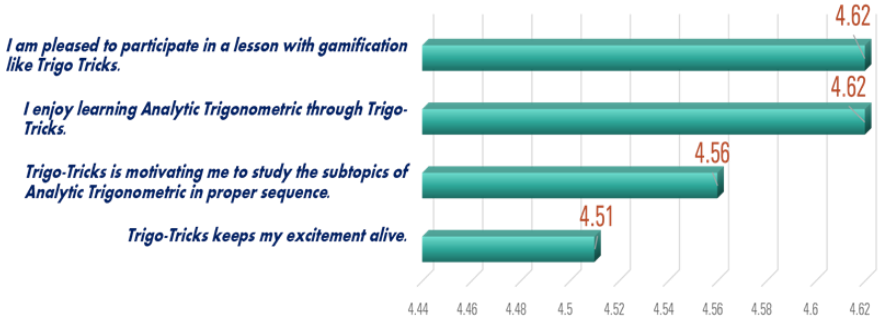

Figure 3. Mean Scores for Motivation for Learning.

Based on Figure 3, the item “I am pleased to participate in a lesson with gamification like Trigo-Tricks" has a mean score of 4.62 while the item “Trigo-Tricks keep my excitement alive” has a mean score of 4.51. In addition, the other mean scores for Motivation items were nearly 5 scores which indicates the students agreed with the Trigo-Tricks gamification may help to motivate themselves to learn trigonometric topics.

3.2 Inferential Analysis

The Mann-Whitney U Test was used to compare the distribution of the Motivation and Effectiveness construct between the gender.

Table 1. Mann-Whitney U Test results.

Constructs	N		Mean Rank		p-value
	Male	Female	Male	Female	
Motivation	26	19	19.38	27.95	0.030*
Effectiveness			18.90	28.61	0.013*

*Significant at 0.050 level.

Based on Table 1, it showed that at the 5% significance level, there is a significant difference between the distribution of construct Motivation between male and female. Similarly, under construct Effectiveness, the difference is significant between both genders. Hence, this gamification gave students' perceptions and experiences of differences between both genders.

4. CONCLUSION

As a conclusion, Trigo-Trick game offers a huge milestone in interactive and engaging learning experiences. This innovative platform incorporates technology to make trigonometry more accessible and additionally impacts the way students perceive and approach mathematical topics. The adaptability and user-friendly interface of Trigo-Tricks cater to diverse learning styles, ensuring that students of various abilities can benefit from this online game. Overall, the findings support the idea that gamification in mathematics will lead to a better learning environment and are suitable to be used as educational tools. Students are more likely to explore new learning methods for understanding subject matter compared to traditional methods. For commercialization, this game can be introduced and utilized by all lecturers from other institutions.

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Islamic Adab Courseware for Year Two Students Based On UDL Principles

[1]Nur Afiqah Rosli, *[2]Zazaleena Zakariah, [1]Norulhidayah Isa,
[2]Nazatul Azleen Zainal Abidin and [2]Nawal Abdul Razak

[1]Kolej Pengajian Pengkomputeran, Informatik & Matematik,
Universiti Teknologi MARA, Kampus Kuala Terengganu, 21080 Kuala Terengganu,
Terengganu, Malaysia

[2]Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor,
Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: zazaleena@uitm.edu.my

ABSTRACT

KAFA Class is an abbreviation of Fardhu Ain Religious Class for primary students in a few states in Malaysia. For KAFA Classes, there are eight to nine subjects taught in class for year 1 to year 6 students. Since its presence, all subjects have been taught using traditional methods (in class through a face-to-face method by using textbooks and activity books). During the pandemic of Covid-19, teachers are facing difficulties in teaching online as there are very minimal sources of teaching materials. Hence, this study is conducted in response to the issue. For this study, the focus has been set for year 2 students that taking Islamic Adab subjects in Sekolah Kebangsaan Tembak, Kedah. The main aim of this study is to develop a standalone courseware for Islamic Adab for year 2 students. To achieve the main aim, three objectives have been set. The process starts with preliminary studies to gather information on courseware requirements. The preliminary findings have been mapped to Universal Design Learning (UDL) which focuses on three main theory components which are (i)engagement, (ii)representation, and (iii)action and expressions. The findings are then used in the development phase which involves analysis, design, development, implementation, and evaluation. To complete the testing phase, the courseware then undergoes functionality and usability testing. Findings from the testing results indicate that the courseware developed meets all requirements set at the preliminary stage and is suitable to be used in teaching Islamic Adab for year 2 students.

Keywords: KAFA; Islamic Adab; Islamic Class; Islamic Courseware; Multimedia Courseware.

1. INTRODUCTION

In certain Malaysian states, the term KAFA Classes refers to the Fardhu Ain Religious Class for elementary school pupils. For pupils in years 1 through 6, eight to nine subjects are covered in class in KAFA classes. Since its introduction, the conventional approach has been used to teach every subject. The main objective of this study is to design and develop standalone courseware for Islamic Adab for year 2 students. The design process starts with preliminary studies to gather information on courseware requirements from selected respondents (teachers and students) from Sekolah Kebangsaan Tembak, Kedah. The preliminary findings have been mapped to Universal Design Learning (UDL) which focuses on three main theory components

which are (i)engagement, (ii)representation, and (iii)action and expressions. The findings are then used in the development phase which involves analysis, design, development, implementation, and evaluation. These development phases will ensure that the development is systematically planned and executed (Widyastuti & Susiana, 2019; Ratnaditya et al, 2022). To complete the testing phase, the courseware then undergoes functionality and usability testing with the chosen respondents. Findings from the testing results indicate that the courseware developed to meet all requirements set at the early planning stage and is suitable to be used in teaching Islamic Adab for year 2 students.

2. METHODOLOGY

For this study, three main objectives have been set up. All three objectives have their approach and method to ensure each objective is accomplished. The methodology adopted in this study is illustrated schematically in Table 1.

Table 1. A schematic overview of the methodology adopted in this study

RESEARCH OBJECTIVE	**To identify components for courseware of Islamic Adab for Year Two students**	**To develop courseware of Islamic Adab for Year Two students**	**To evaluate the functionality of courseware of Islamic Adab for Year Two students**
RESEARCH APPROACH	• Empirical Study • Theoretical Study	• Project development	• Functionality and usability testing

Empirical and theoretical studies have been conducted in the process of achieving objective one which is to identify components for for courseware of Islamic Adab for Year Two students. In this phase, a preliminary study is also conducted to confirm the components gathered. From the first phase, five components have been identified which are interfaces, functionality, content, user-friendliness, and reliability. These components are then mapped with three main UDL principles due to the possibilities and functionality of UDL in real classrooms and online classrooms (CAST, 2020). The UDL principles are fulfilled through the implementation of the identified factor as discussed in the result and discussion section.

3. RESULTS AND DISCUSSION

First phase of the study objective is to identify components for courseware of Islamic Adab for Year Two students. To achieve this objective, empirical and theoretical studies have been conducted. To ensure that the components gathered are right and meet the needs of the target users, a preliminary study is also conducted to confirm the components gathered. The possibilities and functioning of UDL in both real classrooms and online classrooms lead to the mapping of these components with three primary UDL principles. Table 2 shows how the determined components satisfy the UDL principles resulted from phase one.

Table 2. Mapping of UDL principles with identified components

UDL PRINCIPLES	UDL CRITERIA	COMPONENTS
ENGAGEMENT	1. Make sure that students have the opportunity to engage in the activity. 2. Provide students with the opportunities to do activities	1. Interfaces (offer appropriate use of text, image, color, icon, and button) 2. Functionality (perform its intended function and meet user requirements) 3. Content (provide different types of content) 4. User-friendliness (designed for the user's convenience and ease of interaction) 5. Reliability (perform its function without failure at any specific time)
REPRESENTATION	1. Different types of content, including learning notes, and teaching videos will be offered to accommodate various learners. 2. Offer a wide variety of different activities like quizzes.	
ACTION AND EXPRESSIONS	1. Provide self-assessment exam for students to self-evaluate	

From the components identified, the project development has been conducted. Figure 1, Figure 2 and Figure 3 show the sample interfaces of Courseware for Islamic Adab for year two students.

Figure 1. Main interface of Courseware for Islamic Adab for year two students.

Figure 2. Interface of teaching video

Figure 3. Interface of activities

The courseware was then evaluated through a collaborative effort involving a supervisor (1 person), IT experts (2 persons), and users (teachers and students). The testing is based on the five components that have been identified in phase one and have been applied in the project development. This testing and evaluation phase evaluate the functionality of courseware of Islamic Adab for Year Two students based on the components identified. Table 3 shows summarized results of the testing and evaluation of Courseware for Islamic Adab for year two students that have been conducted.

Table 3. Testing and Evaluation of Courseware for Islamic Adab for Year Two Students

TESTER	COMPONENTS				
	Interfaces	Functionality	Content	User Friendliness	Reliability
SUPERVISOR	80%	80%	80%	80%	75%
IT EXPERTS	80%	75%	80%	75%	80%
USER (TEACHERS)	90%	80%	85%	80%	80%
USER (STUDENTS)	85%	80%	80%	80%	80%

The testing and evaluation results showed that the courseware developed for this study fulfils the functionalities required based on the five components. From the findings, it can be summarized that the courseware provides a positive learning experience for the target users.

4. CONCLUSION

The main aim of this study is to develop a standalone courseware for Islamic Adab for year 2 students. To achieve the main aim, three objectives have been set. In the first phase, five components have been identified which are interfaces, functionality, content, user-friendliness, and reliability. These components are then mapped with three main UDL principles due to the possibilities and functionality of UDL in real classrooms and online classrooms. From the mapping, the courseware has then been developed. The final phase has then been executed to evaluate the courseware functionality and usability. Findings from the testing results indicate that the courseware developed meets all requirements set at the early planning stage and is suitable to be used in teaching Islamic Adab for year 2 students.

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Learning Arabic Through Virtual Classroom (LAVC) For Year Six Students

[1]Muhammad Ajwadi Asnari, *[2]Zazaleena Zakariah, [1]Norulhidayah Isa,
[2] Nazatul Azleen Zainal Abidin and [2] Nawal Abdul Razak

[1] Kolej Pengajian Pengkomputeran, Informatik & Matematik,
Universiti Teknologi MARA, Kampus Kuala Terengganu, 21080 Kuala Terengganu,
Terengganu, Malaysia

[2]Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor,
Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: zazaleena@uitm.edu.my

ABSTRACT

Arabic education in Malaysian schools has taken a systematic turn to keep up with the need to comprehend the fundamental sources of Islam: the Quran, prophetic sayings, and other Islamic Sciences. Today, the Program Jawi, Quran, Arabic, and Fardhu Ain (JQAF) has substantially contributed to Malaysia's consolidation of Arabic education. From being an option, it was later declared mandatory for all Malaysian students in national primary schools and secondary schools. In observation, teaching Arabic language can be challenging as there is a lack of online sources related to Arabic language that is based on syllabus taught in Malaysia schools. Hence, this study is conducted in response to the issue. Through this study, a virtual classroom (LAVC) is proposed aimed at addressing the challenges faced by year 6 students in Sekolah Kebangsaan Dato' Yahya Subban, Perak as the focus group. LAVC is a platform that consists of teaching materials, activities, assessments, and others. LAVC is developed using the Universal Design for Learning (UDL) theory and the Adapted System Development Life Cycle (SDLC) method. UDL has been chosen as it is comprised of three theory components which are (i)engagement, (ii)representation, and (iii)action and expressions. The phases in the adapted SDLC are Planning, Analysis, Design, Development, Implementation, and Report. The virtual classroom was evaluated through a collaborative effort involving a supervisor, IT experts, Arabic specialists, and 30 respondents. The evaluation results showed that the virtual classroom developed meets the requirements and provides a positive learning experience for students.

Keywords: Arabic Language; Courseware; Islamic Class; Islamic Courseware; Multimedia Courseware.

1. INTRODUCTION

Today, the Program Jawi, Quran, Arabic, and Fardhu Ain (JQAF) has substantially contributed to Malaysia's consolidation of Arabic education. From being an option, it was later declared mandatory for all Malaysian students in national primary schools to secondary school. Researches identify several key challenges, such as a lack of motivation, limited exposure to Arabic outside of school, and difficulties with the Arabic script (Al-Azawei et al., 2016; Ibrahim & Rahman, 2018; Al Shlowiy, 2019; Bukhari et al., 2021). Hence, this study is conducted in response to the issue. As a start for this study, the focus has been set on managing Arabic

learning materials that focus on year 6 students. In this study, researchers proposed to develop a virtual classroom that will be an online repository and classroom focused on Arabic language aimed at year 6 students. The study proposes using the Universal Design for Learning (UDL) theory and the Adapted System Development Life Cycle (SDLC) method. UDL has been chosen as it is comprised of three theory components which are (i)engagement, (ii)representation, and (iii)action and expressions (Al-Azawei et al., 2016; CAST, 2020; Lee & Griffin, 2021). The phases in the adapted SDLC are planning, data analysis, designing, product development, implementation, and report writing.

2. METHODOLOGY

For this study, three objectives have been set up. All three objectives have their approach and method to ensure each objective is accomplished. The methodology adopted in this study is illustrated schematically in Table 1.

Table 1. A Schematic Overview of the Methodology Adopted in this study

RESEARCH OBJECTIVE	***To identify the problem in learning the Arabic language for primary school users***	***To design and develop the LAVC for primary school users to perform their knowledge.***	***To evaluate the functionality of the proposed system***
RESEARCH APPROACH	• Empirical Study • Theoretical Study	• Project development	• Functionality and usability testing

Based on the three principles of UDL, eight LAVC criteria have been identified. These three principles will be implemented appropriately in the development process for this study to ensure that the research goals are accomplished. All criteria are believed to be able to improve the proposed virtual classroom in terms of its functionality and usability. **Table 2** shows table the mapping of UDL principles with LAVC criteria.

Table 2. Mapping of UDL Principles with LAVC Criteria

UDL PRINCIPLES	**LAVC CRITERIA**
ENGAGEMENT	1. Make sure that students have the opportunity to engage in the activity. 2. Provide students with opportunities to do activities.
REPRESENTATION	1. Different types of content, including notes, videos, and slides will be offered to accommodate various learners. 2. Offer a wide variety of different activities. 3. Entertaining activities such as quizzes and crossword puzzles.
ACTION AND EXPRESSIONS	1. Provide self-assessment for students to self-evaluate. 2. Make it possible for students to provide feedback on their teachers through an online questionnaire. This would help the teachers improve. 3. Allow students to voice their opinions about the content of the course.

3. DEVELOPMENT AND EVALUATION RESULT OF LAVC

For LAVC, the system's code is being developed in PHP and HTML using VS Code. In addition, the XAMPP Control Panel creates a connection between the system's database and the Google Chrome browser, providing students with easy access to the content. Wordwall is being utilized to construct quizzes and exercises that motivate students to participate in their learning actively. In addition, using quizzes and exercises is believed to be able to help in testing student comprehension and offer performance feedback. Figure 1 and Figure 2 show the sample interfaces of LAVC.

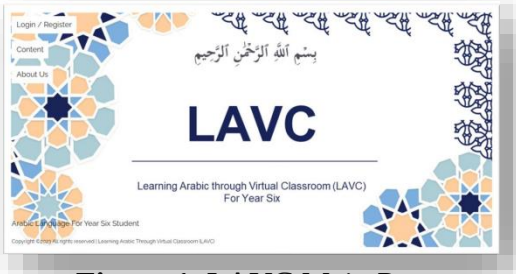

Figure 1. LAVC Main Page

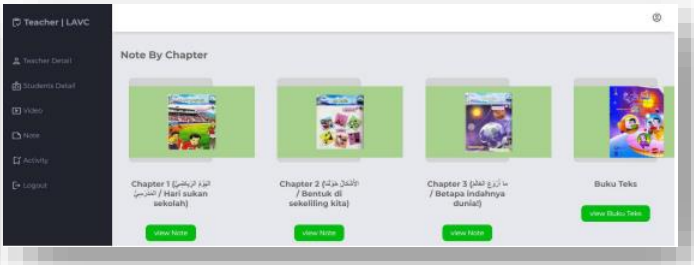

Figure 2. Learning Materials Page

LAVC was evaluated through a collaborative effort involving a supervisor (1 person), IT experts (2 persons), an Arabic specialist (1 person), and users (30 students). Table 3 shows summarized results of the evaluation of LAVC that have been conducted.

Table 3. Evaluation Result of LAVC

TESTER	***FACTOR***				
	User Interfaces	**Functionality**	**Content**	**User Friendliness**	**Reliability**
SUPERVISOR	80%	85%	90%	80%	80%
IT EXPERTS	85%	85%	80%	80%	85%
SPECIALIST	85%	80%	75%	85%	75%
USER	78%	80%	85%	80%	80%

During the evaluation, testers are required to rate the performance of LAVC based on five main factors which are user interfaces, functionality, content, user-friendliness, and reliability. Each factor is assessed to ensure that LAVC meets the user requirements that have been identified in the early stage of project development. The evaluation results showed that the virtual classroom developed for this study meets the requirements and provides a positive learning experience for students.

4. CONCLUSION

The LAVC is a valuable tool for primary school students who are in Year Six and anyone who want to improve their understanding on the Arabic language. In a traditional classroom setting, teachers often cannot provide individual attention to each student, particularly those who may be struggling with the material. The virtual classroom provides an alternative learning environment where students can receive personalized attention and work at their own pace. This study contributes to education in several ways. First it allowed personalized learning experience by providing a customized learning experience for each student, allowing them to focus on

areas in which they need improvement. Second, improved accessibility by providing educational resources for students who may not have access to a traditional classroom setting. This makes education more accessible and inclusive. Lastly, it increased engagement by providing a dynamic and interactive learning environment, making it easier for students to stay engaged and motivated. Overall, the LAVC has the potential to revolutionize the way Arabic is taught to primary school students, providing them with a more effective and engaging learning experience.

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MOREBAC: More-Beautiful-Adds-Confident Cleansing Milk

*Baizura Norida Mohamad Noor, Nur Farhana Mohammed Lazim, Ruzita Jusoh, Sharifah Nurul Aina Syed Alwee and Mohamad Farhan Hilme Sendak Omar

Sekolah Menengah Kebangsaan Banggol, 24000 Kemaman, Terengganu

*Corresponding author: zurida06@gmail.com

ABSTRACT

Today's teenagers and adults are very concerned about facial skin care. Most of them have problems with dry skin and oily skin which can be said to be caused by several factors. Among the factors that affect this problem are weather factors and age factors. This problem can also be linked to the use of facial cleansers that do not suit the skin. Our innovation, "MOREBAC (More – Beautiful – Adds – Confident)" milk cleansing from bottle container to plastic airless vacuum pump. The use of a that container is different from others, can be widely marketed because of the uniqueness of the design. Perfect in a smaller container and easy to carry and not easy to spill. It helps teenagers and adults with skin problems. This product is said to be two in one because it can be used as a cleanser and can be used as a make-up remover. The objective of this innovation is to increase self-confidence, and make the skin look more beautiful and healthier. Moreover, it is able to deal with skin problems and is able to make teenagers and adults self-confident in daily life. MOREBAC products are believed to be made from natural ingredients that have many advantages for treating skin cells. Hope the innovation of MOREBAC can go further and better and provide many benefits, especially for those responsible for skin health.

Keywords: facial skin care; skin problems; cleanser; make-up remover.

1. INTRODUCTION

Teenage facial skin is quite sensitive to the chemicals in facial cleansers that are in the market. Chemicals such as sodium lauryl sulfate (Desiree Stordahl,June 22, 2021) and (Debra Jaliman, MD on February 29, 2024) can cause teenage skin to become dry and irritated, high school students also usually don't bring face wash to school because face wash containers are quite large, spillable and difficult to carry. Therefore MOREBAC (more – beautiful – adds – confident) is an innovative product which is believed to be made from natural ingredients that have many advantages for treating skin cells. This innovative product is said to be two in one because it can be used as a cleanser and can be used as a make-up remover. We produced a product called MOREBAC that helps teenagers and adults have skin problems. Natural ingredients in MOREBAC products are Castor Oil, Sweet Almond Oil, Jojoba Oil, Rosemary Extract, Rose Hip Oil, Sweet Orange Oil, Vitamin E and Emulsifier Oil. Among the benefits of MOREBAC product innovation is that it contains Rosemary Extract that can tighten and refresh skin tissue, deal with skin inflammation and can stimulate blood circulation well. In addition, MOREBAC contains Castor Oil which can slow down the aging process, stimulate collagen production, helps overcome skin hyperpigmentation and makes the skin tighter help you be

more flexible. Next, Sweet Almond Oil can help to balance, heal and nourish the skin. Sweet Almond Oil is also rich with vitamin A and vitamin B, which can help moisturize the skin. In addition, there is also Jojoba Oil and vitamin E that help treat acne, helps brighten the skin, make the skin look radiant and can remove freckles. MOREBAC also contains Sweet Orange Essential Oil which can improve skin complexion and stress reduction. Emulsifier Oil that can control sebum secretion and protect skin cells. This advantage is very helpful for teenagers and adults who strive to maintain the beauty of their skin and increase self-confidence. To overcome the problem of face wash containers that are quite large, easy to spill and difficult to carry, the next innovation is to use airless vacuum pump technology plastic containers. Airless pump technology is a convenient and effective packaging solution that minimizes product waste, improves shelf life, and dispenses an exact amount of product. (Paramount global, Jan 27, 2023)

2. METHODS

2.1 Ingredients For 100 grams of Morebac

1. 10 g Castor Oil
2. 55 g Sweet Almond Oil
3. 27 g Jojoba Oil
4. 0.5 g Rosemary Extract
5. 0.5 g Rose Hip Oil
6. 1 g Sweet Orange Essential Oil
7. 1 g Vitamin E
8. 5 g Emulsifier Oil

2.2 Procedure

1. The prepared equipment rinsed by distilling water and wiped it dried.
2. Hands need to be washed first before starting the mixing of materials.
3. Make sure the place of preparation was cleaned and lined with paper or tissue.
4. Prepared the ingredients that have been measured.
5. Mix Castor Oil, Sweet Almond Oil, Jojoba Oil, Rose Hip Oil, Rosemary Extract into a beaker and stirred with spatula evenly.
6. Emulsifier oil was added and stirred.
7. The Sweet Orange Essential Oil and Vitamin E was added and stirred evenly.
8. The liquid is stored and packaged in a 10 ml volumetric airless vacuum pump technology plastic container.




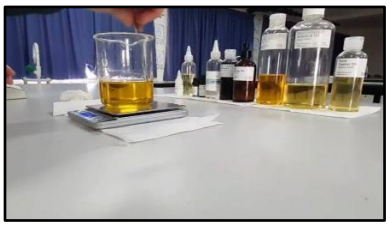

Figure 1. Processing of the MOREBAC

Figure 2. MOREBAC

3. RESULTS AND DISCUSSION

3.1 Novelty

Interestingly, as MOREBAC is made from natural ingredients, it could help those who have skin problems. These ingredients can shrink facial pores, balance facial skin tones, prevent skin aging and help with acne problems. The use of bottle spray for MOREBAC is different from the others. This product can be widely marketed because of the uniqueness of the design. It will make it easier for the user to see the quantity of the product and it can avoid waste. The size of airless vacuum pump technology plastic container.is made for travel-friendly purpose and cost-effective. This packaging is also easy to use and not easy to spill. Ideal for quick recovery of skin vitally in the office, outdoor, home and etc. Thus, simple to use, pocket size. The mini size can put it in handbag, purse, school bag and even pockets and use it anytime and anywhere.

3.2 Users Feedback

As a result of our observations, MOREBAC users are very satisfied with our innovation product. They give positive feedback. Users are also convinced that MOREBAC can make their facial skin healthier, more beautiful and moister. This will increase their self- confidence. Moreover, the product is great, nourishes, radiant and healthy and definitely recommend this product to anyone who suffers from oily skin.

3.3 Table

Table 1. Morebac in 100 percent

Material	%
Castor Oil	10
Sweet Almond Oil	55
Jojoba Oil	27
Rosemary Extract	0.5
Rose Hip Oil	0.5
Sweet Orange Essential Oil	1
Vitamin E	1
Emulsifier Oil	5
Total	100

(Ruxton, C et al., 2016)

.

4. CONCLUSION

The innovation of MOREBAC can go further and better. This is because MOREBAC uses natural ingredients which can help reduce skin problems for those who care about facial skin care with a guarantee. This products innovation can provide many benefits, especially to those responsible for skin health. Among other things, it allows the skin health department to reduce the rate of skin diseases with this skin health is guaranteed.

ACKNOWLEDGEMENT

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Arabic On-The-Go Kit for Beginners

*[1]Adhanawati Abdul Rapa, [2]Nurhanani Abdul Rapa and [1]Ijlal Saja @ Mearaj

[1]Akademi Pengajian Bahasa, Universiti Teknologi MARA, Cawangan Melaka, Kampus Alor Gajah, 78000 Alor Gajah, Melaka, Malaysia

[2]Pusat GENIUS@Pintar Negara, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

*Corresponding author: adhanawati@uitm.edu.my

ABSTRACT

The open and distance learning (ODL) approach is becoming more often, whereby educators have to adapt and change their traditional teaching method that is mainly based on textbook, whiteboard and presentation slides. However, the lack of open educational resources (OER) for Arabic language at tertiary level poses a problem. Therefore, lecturers need to develop an innovative digital teaching and learning aid for Arabic. Hence, this study aims to introduce and identify the effectiveness of Arabic On-The-Go Kit for Beginners with the concept of Watch, Play, Practice! as a digital teaching aid that simulates textbook conversations and promotes game-based learning. It features a YouTube playlist that consists a series of creative videos with links to online games and quizzes. It was distributed to students in Universiti Teknologi MARA (UiTM) and their feedback was collected through a survey. It was found that the kit enhances their engagement and learning experience, and improving their listening and speaking skills. In addition, it has commercial potential as revenue can be earned when the YouTube channel is eligible for monetization. In summary, this creative digital teaching aid is significant in providing educators and learners with an immersive and enjoyable teaching and learning experience that facilitates open and distance learning session.

Keywords: Arabic teaching aid; YouTube video; open and distance learning (ODL); artificial intelligence (AI); game-based learning.

1. INTRODUCTION

Arabic language is one of the courses that is offered as a third language to bachelor's degree students in UiTM. The course structure has three levels, starting with TAC401 (Introductory Arabic Level I) which covers topics such as Arabic greetings and introductions, university life and more. Since open and distance learning (ODL) approach is becoming more often, lecturers have to adapt and change their traditional teaching method that have less impact on students (Ijlal Saja et al., 2021). With the lack of open educational resources (Nurain Farahana Zainal Abidin et al., 2021), an innovative digital teaching aid should be developed for ODL and one of the methods is video-based learning with YouTube and game-based learning (Ijlal Saja et al., 2021). Thus, this study aims to introduce and identify the effectiveness of Arabic On-The-Go Kit for Beginners with the concept of Watch, Play, Practice! as a digital teaching aid that simulates textbook conversations and promotes game-based learning. Hypothesis is, the use of the Arabic On-The-Go Kit for Beginners, which incorporates creative videos, online games, and quizzes, significantly enhances students' motivation, engagement, and improves their

Arabic listening and speaking skills compared to traditional textbook-based learning methods. It features a YouTube playlist that consists a series of creative videos with the concept of story narrative and cartoon art, and links to online games and quizzes. It was distributed to TAC401 students in UiTM Melaka and their feedback was collected through a survey. It was found that the kit enhances their engagement and learning experience, and improves their listening and speaking skills. The integration of digital teaching aids in language learning has been a significant development in educational methodologies, particularly in the context of open and distance learning (ODL). The shift from traditional teaching methods to more interactive and engaging digital tools is supported by various studies and initiatives, highlighting the benefits and challenges associated with this transition.

Open and Distance Learning (ODL) and Digital Teaching Aids

Open and distance learning (ODL) has become increasingly prevalent, requiring educators to adapt and innovate beyond conventional teaching methods. Traditional approaches, such as textbook-based learning and the use of whiteboards, often fail to engage students fully (Ijlal Saja et al., 2021). The lack of open educational resources (OER) for certain languages, including Arabic, further exacerbates this issue (Nurain Farahana Zainal Abidin et al., 2021). As a response, innovative digital teaching aids have been developed to facilitate more effective learning experiences.

The Role of Multimedia in Language Learning

Multimedia resources, such as videos, games, and quizzes, play a crucial role in enhancing student engagement and learning outcomes. Video-based learning, particularly through platforms like YouTube, offers a dynamic way to simulate textbook conversations and promote game-based learning (Ijlal Saja et al., 2021). The Arabic On-The-Go Kit for Beginners is an example of such innovation, utilizing a YouTube playlist with creative videos and interactive online games to improve listening and speaking skills among students.

Effectiveness of Game-Based Learning

Game-based learning has been identified as an effective method to increase student motivation and interest in the subject matter. The combination of creative videos and interactive games has been shown to enhance learning experiences, making them more immersive and enjoyable (Ijlal Saja et al., 2021). The use of AI tools like Midjourney, Dalle-3, ElevenLabs, and others to create engaging content further supports this approach.

2. METHODOLOGY

Arabic On-The-Go Kit for Beginners was developed with Canva and uses generative AI such as Midjourney, Dalle-3, ElevenLabs, Voicemaker, ChatGPT, and Gemini to create images, voice-overs, and provide the Arabic to English translation. The escape room games, story- driven digital card games and quizzes are created on platforms such as Genially, Scratch, Wordwall and Quizizz. The kit was distributed to TAC401 students in UiTM Melaka and quantitative research was conducted by collecting data through Likert Scale questionnaires. The data was analysed with RStudio software by using descriptive statistical analysis.

3. RESULTS AND DISCUSSION

The survey has a total of 68 respondents from Faculty of Accountancy that consists of 52 (76%) female and 16 (24%) male students. The results show that the students are satisfied with Arabic On-The-Go Kit for Beginners with a Likert Scale overall mean of 4.92.

Table 1. The distribution of students' feedback on Arabic On-The-Go Kit for Beginners.

Items	Statements	Likert Scale						
		1	2	3	4	5	Collectively Agree	Mean
1	Creative videos enhance my motivation and interest in learning Arabic.	-	-	-	4 (6%)	64 (94%)	68 (100%)	4.94
2	I prefer to learn Arabic through the combination of creative videos and online exercises.	-	-	-	4 (6%)	64 (94%)	68 (100%)	4.94
3	The Arabic native speaker voice-overs in creative videos are very clear and interesting.	-	-	1 (2%)	5 (7%)	62 (91%)	67 (98%)	4.90
4	The visual elements and graphics used in Arabic creative videos are very interesting and relevant to the learning topics.	-	-	1 (2%)	7 (10%)	60 (88%)	67 (98%)	4.87
5	I can improve my listening skills by watching the Arabic creative videos.	-	-	-	6 (9%)	62 (91%)	68 (100%)	4.91
6	I can learn speaking skills by watching the Arabic creative videos.	-	-	-	5 (7%)	63 (93%)	68 (100%)	4.93
	Overall Mean							**4.92**

1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree

Based on Table 1, the quality and effectiveness of the kit is evaluated by assessing the students' feedback on the aspects of engagement and learning experience, creative videos quality, and skills improvement. The students' engagement and learning experience is measured with item 1 and 2. All of them collectively agree that the kit enhances their motivation and interest in learning Arabic and that they prefer to learn it with the combination of creative videos, online games and quizzes. The quality of creative videos is evaluated with item 3 and 4, in which 98% of the students collectively agree that the Arabic native speaker voice-overs, visuals and graphics used are very clear, interesting and relevant to the learning topics. The students' skills improvement is observed with item 5 and 6 whereby, all the students collectively agree that they can improve their listening and speaking skills by watching the Arabic creative videos. Referring to Figure 1, the data has shown that on average, the students are contented with the quality and effectiveness of the kit with a mean score that exceeds 4, on all items.

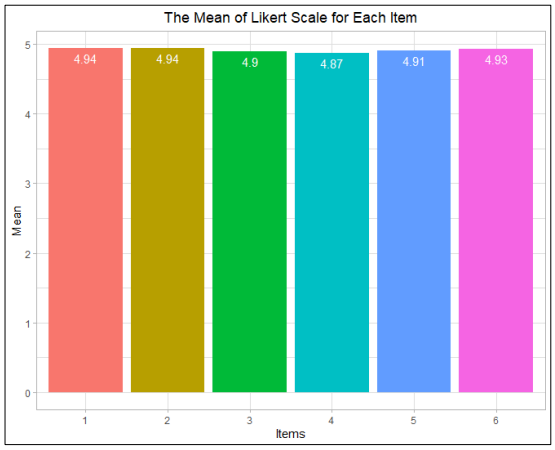

Figure 1. The Mean of Likert Scale for Each Item

4. CONCLUSION

A digital teaching aid with the combination of creative videos, online games and quizzes is an effective way to transform traditional teaching method into a digital approach that aligns with open and distance learning. It promotes self-pace learning which allows students to understand the subject more easily. The immersive and enjoyable learning experience keeps the students engaged and thus, enhances their motivation and interest with the subject.

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Advancing Journalistic Excellence: Elevating News Quality Standards Across Media Platforms for Multimedia Journalists

*Ima Liana Esa, Wan Hartini Wan Zainodin and Massila Hamzah

Media Prima Berhad, Sri Pentas, Persiaran Bandar Utama, 47800 Petaling Jaya, Selangor, Malaysia

Fakulti Komunikasi dan Pengajian Media, Universiti Teknologi MARA, Kampus Shah Alam, 40450 Shah Alam, Selangor, Malaysia

School of Mass Communication, Jln Taylors, 47500 Subang Jaya, Selangor, Malaysia

*Corresponding author: imaliana@tv3.com.my

ABSTRACT

As newsrooms converge and adopt cross-media approaches, maintaining journalistic standards is paramount. Broadcast media organizations must embrace this model to ensure quality news across platforms and enhance journalistic practices among Multimedia Journalists (MJs). Adapting to evolving determinants of news value, including immediacy and multimedia integration, signifies a fundamental shift in news conception, production, and dissemination. Failure to adapt risks losing relevance and audience, thereby diminishing the organization's impact in the public sphere. Five research objectives were pursued: i) Identifying elements crucial for developing news quality standards on cross-media platforms as perceived by MJs ii) Understanding challenges in maintaining news quality on cross-media platforms from the perspective of MJs iii) Investigating transformations in MJs' practices affecting cross-media platforms iv) Exploring collaboration between news management and MJs on cross-media platforms to enhance journalistic practices v) Proposing strategies for newsroom management to overcome obstacles faced by MJs on cross-media platforms in delivering high-quality journalism. Insights from interviews with 30 MJs and news editors highlight the fusion of ethical journalism with engaging digital storytelling. MJs balance speed with rigorous fact-checking, viewing their work as a social responsibility. Emphasized are collaboration, strategic newsroom changes, and supportive HR practices. Media organizations must evolve to stay relevant, while MJs require skills to navigate digital news. This model aims to assist MJs and media organizations in producing high-quality, newsworthy content, potentially integrating into journalism school curricula.

Keywords: multimedia journalist; news quality; cross-media platform; journalistic practices.

1. INTRODUCTION

Crafting high-quality news across cross-media platforms is crucial for fostering informed public discourse and upholding journalistic integrity. The proliferation of news sites, live broadcasts, and social media platforms allows easy access to diverse content, prompting Malaysian mainstream media to adopt cross-media platforms for expanded coverage. This shift, starting around 2010, marked by cross-media convergence, led to the emergence of Multimedia Journalists (MJs) and altered traditional newsroom dynamics (Esa et al., 2022). Standardized

routines guided by media organizations are crucial for navigating future journalism practices (Srisaracam, 2022).

Distinctive features of digital news platforms highlight the evolving nature of news quality standards (Bengtsson & Johansson, 2020). Zelizer (2019) posited that digital journalism integrates technological and business elements with traditional journalistic practices. Mumay's (2019) research emphasised readers' emphasis on both quality and trustworthiness across online and print platforms. To gain insights into establishing standards of news quality on cross-media platforms from media practitioners' perspectives, interviews were conducted with MJs and News Editors from four leading Malaysian broadcast media organizations: Astro Awani, Media Prima Berhad, BernamaTV, and RTM. These outlets were chosen for their representation of mainstream broadcast media in Malaysia, embracing convergence within their operations to adapt to the evolving media landscape. This study aims to elevate news quality standards across media platforms for multimedia journalists, advancing journalistic excellence.

2. METHODOLOGY

This research utilized qualitative in-depth interviews and a phenomenological approach to gather data. Purposive sampling was employed to select 20 Multimedia Journalists (MJs) and 10 News Editors from four prominent Malaysian broadcast media organizations. This sample selection is crucial for exploring cross-media platform adoption within a specific cultural context. Sampling continued until saturation was reached, indicating redundancy or no emergence of new themes. In-depth interviews, as outlined by Creswell and Creswell (2018), involve semi-structured or unstructured questioning, allowing for a comprehensive understanding of complex issues. This approach is widely used in the social sciences and various other disciplines for collecting detailed and nuanced data, as emphasized by Chapman and Brunsma (2021). The interviews were conducted online using Google Meet, and NVivo 12 software was used to analyze the data.

3. RESULTS AND DISCUSSION

This study aims to elevate news quality standards across media platforms for multimedia journalists. In the context of this study, the researcher found that accuracy, objectivity, transparency, timeliness, and engagement are key elements emphasised by informants in developing such standards on cross-media platforms. These elements provide a framework for news organisations to produce high-quality news content that is informative, relevant, and trustworthy.

"I prioritize accuracy, balance, and clarity, setting us apart from citizen journalists. Our credibility stems from reliable sources, distinguishing us significantly." (MJ 1)

Moreover, maintaining the integrity and quality of news reporting across various media platforms presents many challenges for MJs. In the context of this study, several critical concerns were emphasised by the informants, including the burgeoning phenomenon of citizen journalism, which has both democratised and complicated the field. According to Mahamed et al. (2021), while citizen journalism opens up news reporting to a wider array of voices, it often lacks ethical rigor and professional standards traditionally observed by established news outlets.

"My biggest fear is making factual errors in a rush, like once with a Minister, spreading fast on social media. I now triple-check to minimize errors, though distractions can still cause slip-ups." (MJ 2)

Additionally, the transformation of broadcast journalists into MJs represents a profound shift in the dynamics of the journalism profession. As they adapt to their changing roles, these journalists become adept multitaskers, driven by enthusiasm for their work and motivated by a deep-seated discipline. Their evolution has had a ripple effect on cross-media platform work practices, shaping the way news is produced and consumed in the digital age.

"Journalists now face a relentless workload due to the digital age. We handle live Facebook broadcasts, social media updates, photos, and videos on-site. It can be overwhelming, especially for big stories. We feel guilty if we can't assist the office, as it's our duty." (MJ3)

Hence, the importance of collaboration between news management and MJs in contemporary media landscapes is attracting increasing academic attention. Building upon a rich corpus of prior research, including the seminal works of Deuze (2004) and Pavlik (2014), it becomes evident that such collaborative endeavours enrich journalistic practices and contribute to resilience within a complex and rapidly changing media ecosystem. This study explores the intricate collaboration between news management and MJs across four mainstream broadcast media agencies in Malaysia.

"Editors often have various requests, so communication between editors and MJs is crucial. MJs need to explain any obstacles and offer solutions. Without good communication, the newsroom can't function well." (MJ 4)

Lastly, the findings indicated that newsroom culture, characterised by encouragement, a progressive mindset, and individual initiative, is intrinsic in shaping the professional disposition and productivity of MJs. The nurturing and motivational ambiance within the newsroom catalyzes creative ingenuity and innovative pursuits (Hassan & Elmasry, 2019). Moreover, promoting individual initiative engenders a sense of professional accountability, drives MJs to explore innovative narrative avenues, and enhances overall journalistic quality (Srisaracam, 2022).

"...It's important, and the company needs to invest in reporter training. I attended a special investigation course where I learned techniques that enhance skills, foster creativity, and provide new insights." (MJ 5).

4. IMPLICATION OF STUDY

Briefly, in re-examining Galtung and Ruge's in 1965 news value theory, this study integrates contemporary scholarly critiques and insights to recalibrate news values for modern cross-media platforms. Joye et al. (2016) offer a critical retrospective on this model, synthesizing various scholarly critiques and adaptations to address how the digital age influences journalistic methods. This study extends their work by considering the contexts at individual, organizational, and societal levels in understanding representation, identity, production, regulations, and consumption.

4.1. Individual Level: Representation and Identity

At the individual level, attention to representation and identity is crucial. Multimedia Journalists (MJs) acknowledge the need to maintain integrity in news reporting while confronting challenges such as misinformation and the rise of citizen journalism. MJs have transformed into consumer multitaskers in response to contemporary journalism's demands, disseminating news

across traditional broadcast channels and the digital realm. Their primary responsibility lies in ensuring the timely and substantive delivery of news.

4.2. Organizational Level: Production and Regulation

At the organizational level, there is a need for media organizations to support their journalists in becoming multi-skilled and adaptable. Guided by the principles of news value theory, which identify the elements that make a story newsworthy, adaptability is crucial to ensure that news content meets the evolving criteria of significance, relevance, and interest to the audience. Collaboration between news management and MJs is essential in crafting stories that resonate with these news values, with effective communication being a foundational pillar supporting their dynamic relationship.

4.3. Societal Level: Consumption

At the societal level, consumption is pivotal in maintaining news quality on cross-media platforms. Media practitioners must adhere to journalistic principles, meet public demand, utilize multimedia narratives, understand clickbait and keywords, and monitor social media trends. Mainstream journalists must ensure shared news prompts the public to seek accurate information, aligning with news value theory's criteria of impact, relevance, and timeliness. Achieving news quality on cross-media platforms demands understanding at individual, organizational, and societal levels, ensuring alignment with the evolving media landscape's workflow.

5. CONCLUSION

Implementing this standard is crucial for Malaysian journalists to bolster their performance and credibility across various media platforms. Adhering to journalistic principles lays the groundwork for maintaining news quality, while considering the evolving demands of the public is equally vital. Malaysian journalists face multifaceted challenges, from real-time reporting to combating misinformation, emphasizing the need for rigorous verification processes and ethical guidelines. The evolving journalism landscape underscores the importance of continual professional development. Effective newsroom management is pivotal, promoting professional growth, fostering a supportive environment, and investing in technological infrastructure. Integrating such standards upholds news integrity, driving innovation to meet diverse audience expectations. This model aims to assist MJs and media organizations in producing high-quality, newsworthy content, potentially integrating into journalism school curricula. Additionally, exploring audience perceptions of news quality for future study will further provide a holistic view of the model's effectiveness.

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Compact Hydro Vertical axis Blade Turbine

Mohamad Idham Ishak, *Ainaa Maya Munira Ismail and Najibah Ab Latif

Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA
Johor Branch, Pasir Gudang Campus, 81750 Masai,
Bandar Seri Alam, Johor Darul Ta'zim, Malaysia

*Corresponding author: ainaa7609@uitm.edu.my

ABSTRACT

To develop sustainable alternatives to conventional energy production methods, the importance of renewable energy sources is increasing. Hydropower is a renewable energy source that harnesses the kinetic energy of moving water to generate electricity. In many cases, small-scale hydropower facilities are more feasible and cost-effective than large-scale ones. Hydro turbines are not extensively utilized in Malaysia for the generation of power. Therefore, a compact hydro turbine can be used to provide electricity for communication devices or electrical appliances. This study aims to create a compact hydro turbine power generator employing vertical axis turbine blades that may be applied in many locations, including distant regions. This prototype is well developed by efficient utilization of various production processes, such as machining, sheet metal fabrication, joining techniques, and other mechanical method. With a maximum power of 2 kW, the intended result of providing electricity and facilitating the user's daily tasks using renewable energy was achieved.

Keywords: hydropower; compact hydro turbine; vertical axis turbine blade; renewable energy; electricity.

1. INTRODUCTION

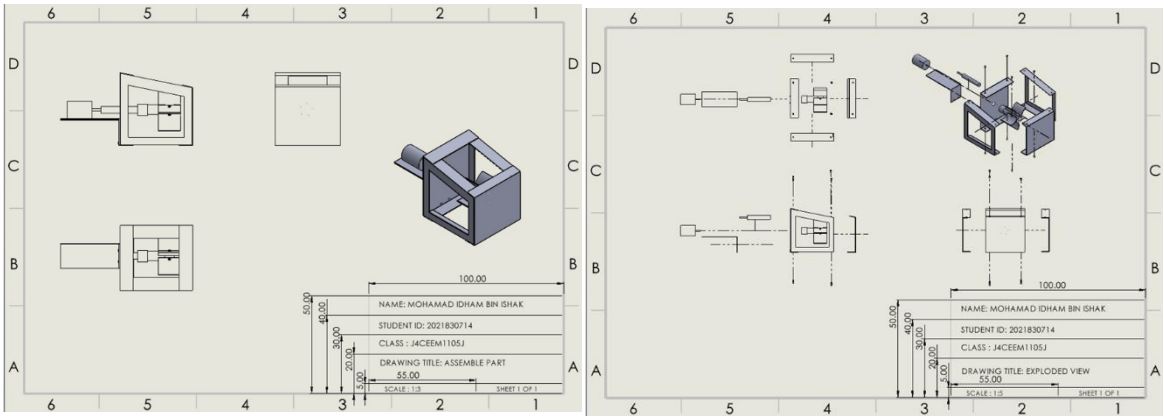
Amidst the global desire for sustainable alternatives to conventional energy production, renewable energy sources are gaining increasing importance. Energy demand in Malaysia is expected to increase. Lifestyle modernization has driven up Malaysia's energy demand by 4.8% over the past decade, and it's expected to exceed 150,000 GVh by 2030 (Hazmin et al., 2024).In the event of a natural disaster causing a disruption in the energy supply, a small-scale or compact hydro turbine can be utilized to provide power for emergency communication devices. This prototype design is highly influenced by the hydrodynamics of the natural water resources, notably rivers. Hence, it is important to understand the river flow dynamics, especially when climate factors like wet and dry seasons greatly affect river hydrodynamics (Gasim et al., 2013). With only a modest amount of electricity required, a small-scale hydro turbine might be a useful tool for producing power (Raman et al., 2009). The utilization of electrical equipment in an area lacking an electrical source is prohibited. For example, when venturing to a remote area, our only power options can be additional batteries or a power bank, which will be insufficient to continue using electronic devices. Moreover, individuals who choose to vacation at a beach or in a mountainous region may encounter difficulties when attempting to recharge their electrical devices(Supardi et al., 2021). The primary objective of this project is to develop a compact hydro turbine power generator that employs vertical wind turbine blades. The purpose is to enhance the efficiency and power output of the system by using sophisticated design and control

approaches. The prototype will be positioned at water sources such as rivers or waterfalls. The water will pass through the blade, and the mechanical energy that propels the generator shaft transforms electrical energy (Rusianto et al., 2023). The torque and nominal speed are the mechanical outputs of the rotor that influence the load and speed of the generator. The product is designed for use in distant and off-grid places. The integration of vertical wind turbine blades with a compact hydro concept can enhance the overall efficiency and power output of the system. Vertical wind turbines are distinguished by their capacity to function in turbulent wind conditions and at lower wind velocities, in contrast to horizontal axis turbines. Vertical wind turbines are affordable, easy to navigate, and can deal with 360° wind(Syahin et al., 2024).The concept involves maximizing space use by integrating a compact hydro turbine with vertical wind turbine blades, making it suitable for installations with restricted space.

2. METHODOLOGY

2.1. Modelling

Modelling was designed by using Solidwork Software and converted into part by part. Then, the part was combined into the design as illustrated in **Figure 1.**



(a) (b)

Figure 1. (a) Assemble part (b) Explode View

The aluminium plate was marked with an appropriate length. After marking, the cutting procedure begins with the aluminium plate and the PVC pipe. The best choice for cutting aluminium is to utilise a sheet metal shear. Next, use a saw to cut the PVC pipe. The next step is grinding. This procedure is used to smooth the sidewalls after cutting. Grinding was also used to remove any excess or undesired steel or PVC from the previously cut plate and PVC pipe. Following that, the drilling process is initiated. This technique is carried out following the cutting process. This technique creates many holes in the case, blade, and blade shaft. The last step is assembly. This technique involves screwing together the blade, casing, and casing shaft. The prototype is built with durability in mind, as is the surface on which the product will be installed. It consists of numerous pieces, including a case, blade, shaft, and holder. The water will flow to the left of the design, causing the blade to rotate. The spinning will generate sufficient power to charge or supply any modest design. The final product as shown in Figure 2.

Figure 2. Side view of Compact Hydro Vertical axis Blade Turbine

2.2. Functionality of Prototype

Designed to offer a convenient way for consumers to charge their electronic gadgets with renewable energy sources, the compact hydro turbine powers generator is a vertical wind turbine blade. The lightweight of the compact hydro turbine enables it to be portable and simple to install in a variety of water sources, including rivers, streams, and waterfall regions. The compact hydro turbine is simple to operate, and it starts to function when submerged in water that has enough flow. The compact turbine is enclosed in a casing for added durability. The casing's ability to contain and safeguard the small turbine supports the compact hydro turbine. The blade, which is the following component, is an essential part of this turbine. The generator produces energy as the water passes through the turbine and rotates the turbine blades.

This prototype is also fabricated with a suitable and modular design for straightforward maintenance. With an emphasis on affordability, sustainability, and user education, this prototype employed a vertical wind turbine blade power generator that aims to empower people to harness clean energy for their charging needs, fostering a greener and more accessible approach to personal device power.

3. RESULTS AND DISCUSSION

Sustainability is the ability to maintain a balance between economic, social, and environmental factors to meet the needs of the present without compromising the ability of future generations to meet their own needs. The sustainability of compact hydro turbines using vertical wind blade design encompasses various environmental, social, and economic considerations throughout their life cycle. The compact hydro turbine using vertical wind blade design harness the power of flowing water to generate electricity, making them a renewable energy source. Unlike fossil fuels, which are finite and contribute to climate change, the energy produced by compact hydro turbines comes from the natural water cycle, ensuring a sustainable and continuous power supply. As presented in **Figure 3**, power increases in direct proportion to velocity.

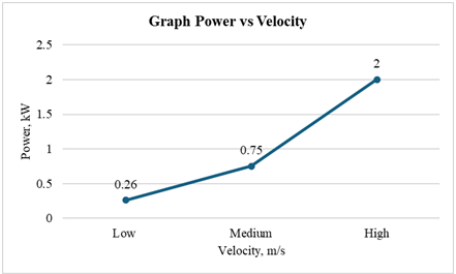


Figure 3. Graph Power (kW) vs Velocity (m/s)

Next, compact hydro turbines using vertical wind blades are generally installed in rivers, streams, or other water sources with a consistent flow. The work by converting the kinetic energy of the moving water into mechanical energy, which is then used to rotate a turbine and generate electricity. Micro hydro turbines are an environmentally friendly and sustainable energy solution, as they do not produce any greenhouse gas emissions and rely on renewable resources. They are particularly suitable for remote areas or off-grid locations where access to electricity is limited.

4. CONCLUSION

In conclusion, the compact hydro turbine using a vertical wind turbine blade power generator stands as a groundbreaking and accessible solution for harnessing renewable energy. With its compact and lightweight design, people can effortlessly bring this compact turbine everywhere, tapping into the power of flowing water to charge any electronic device. This user-friendly feature including its component, blade design, and casing, makes it an ideal companion for outdoor enthusiasts, adventurers, or those residing in off-grid areas. The compact hydro turbine is known as a turbine that generates power from renewable energy. It represents a step toward a future where clean energy is not only accessible but seamlessly integrated into our daily lives, offering a portable and eco-friendly alternative for people everywhere.

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Human Milk's Polyamine: A Potential Advancement as Biomarker

*Nursyuhada Abdul Aziz, Nhawal Aminie Saidon, Tengku Norbaya Tengku Azhar, Siti Noorfahana Mohd Idris and Nur Syakireen Ishak

Faculty of Applied Science, Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor Darul Ehsan, Malaysia

*Corresponding author: 2024986803@student.uitm.edu.my

ABSTRACT

Polyamine composition in human milk comprises putrescine, spermidine, and spermine, each playing distinct roles in infant development and digestive health. Variation in composition occurs across lactation stages and influenced by factors like maternal dietary intake. Imbalanced diets may hinder infant growth, weaken immunity, and heighten infection risks. This cross-sectional observational study analyzed 30 human milk samples from Melaka, Seremban, Selangor, and Kuala Lumpur using High-Performance Liquid Chromatography (HPLC) to quantify polyamine content. Maternal diets were recorded in Nutritionist Pro software, with macronutrient intake calculated automatically. Statistical analysis using Statistical Product and Service Solutions (SPSS) assessed the association between maternal diet and polyamine composition. Carbohydrates were the most consumed macronutrient (59.1%, *M* = 214.42 g), followed by fat (22.8%, *M* = 37.36 g) and protein (18.1%, *M* = 63.40 g). Among polyamines, spermine showed the highest concentration (70.2%, *M* = 5.4 nmol/L, SD = 5.99), followed by putrescine (22.3%, *M* = 1.74 nmol/L, SD = 3.38) and spermidine (7.4%, *M* = 0.58 nmol/L, SD = 0.88). No significant difference was found between maternal dietary intake and polyamine composition. However, a negative correlation existed between polyamine levels and certain macronutrients such as lipids, suggesting involvement in other metabolic processes. This study indicates that while dietary intake may not directly influence polyamine levels in human milk, polyamines may interact with specific nutrients in maternal diets, impacting their metabolism.

Keywords: polyamine; human milk; maternal dietary intake.

1. INTRODUCTION

Human milk is the only source of critical nutrients with a complete nutritional profile for the first few months of a newborn life. Polyamines are naturally occurring bioactive compounds found in various foods, including human milk. These compounds, derived from amino acids, are associated with numerous benefits for infants. Their synthesis within the mammary gland, particularly the primary polyamines putrescine, spermidine, and spermine, is crucial for infant growth and development (Muñoz-Esparza et al., 2021). Each mother has a different level of polyamine in human milk depending on lactation stage and maternal dietary intake by the mothers. Therefore, this study aims to investigate the polyamine composition in human milk using High-Performance Liquid Chromatography (HPLC) and explore the relationship between maternal dietary intake and polyamine levels.

2. METHODOLOGY

The method by Kamaruzzaman et al. (2018) was used in this study aligned to achieve the objective of this study. The primary research question focused on investigating the level of polyamine in human milk and determining whether variations in maternal dietary intake influence the levels of polyamine in human milk. A collection of sample lactating mothers from diverse locations, ensuring representation of different dietary habits and demographic factors. Eligible participants were included healthy mothers who exclusively breastfeed their infants and willing to provide human milk samples.

2.1. Polyamine Quantification by HPLC

Polyamine analyses were conducted using the Agilent 1200 Quaternary DAD High-Performance Liquid Chromatography (HPLC) System, a highly sensitive and accurate analytical technique commonly used for separating, identifying, and quantifying compounds in complex mixtures (Kamaruzaman *et al.*, 2018). Each sample and standard were run twice to identify any potential inconsistencies, and the measurement was consistent, accurate and reliable. The excitation wavelength and emission wavelength are set to 254 nm and 360 nm, respectively. These specific wavelengths were chosen because they corresponded to the optimal excitation and emission wavelengths for detecting polyamines.

2.2. Statistical Analysis

According to Kamaruzaman et al. (2018), the statistical analysis was performed using Statistical Product and Service Solutions (SPSS) statistic 28 version. The data are expressed as numbers and percentages for categorical variables. The total macronutrient intake by each of the mothers was analyzed in the SPSS after analysis in Nutritionist Pro. The correlation between the polyamine composition and macronutrient intake was assessed using Pearson's correlation to determine the strength and significance of the relationship between the variables. A p-value of less than 0.05 was considered significant.

3. RESULTS AND DISCUSSION

3.1. Maternal Diet Composition

The study's results in **Table 1** reveal that lactating mothers in the sample had a macronutrient intake consisting primarily of carbohydrates 59.1% (M = 214.42 g), followed by protein 18.1% (M = 63.40 g) protein and 22.8% (M = 37.36 g) fat, in accordance with Malaysia's Recommended Nutrient Intakes (RNI) guidelines. Research by Mohamed *et al*. (2022) suggests that the Malaysian population should consume a diverse range of foods as per the Malaysia Food Pyramid, yet many rely heavily on rice rather than others, impacting their macronutrient balance. Therefore, rice consumption can impact a person's macronutrient intake balance. Wubetie & Mekonen *et al*. (2023) supported that the nutritional status of lactating mothers is an important public health issue since their nutritional status can affect both the quantity and quality of nutrient concentration in human milk, and maintaining the nutrients in human milk further depletes their body stores. However, high carbohydrate consumption could support milk production and increase the energy required during lactation. Infants ingest carbohydrates in the form of lactose due to the lack of development of the gastrointestinal tract. The production

of glucose from broken-down lactose can be used to synthesize arginine which is one of the precursors of polyamines. Therefore, a high intake of carbohydrates may lead to higher levels of polyamines in the body.

Table 1. Percentage consumes and Descriptive Statistics Macronutrients (g)

Macronutrients	Percentage (%) (n=30)	Mean	Std. Deviation
Protein	18.10	63.40	49.77
Carbohydrate	59.10	214.42	219.63
Fat	22.80	37.36	35.97

3.2. Correlation between Maternal dietary intake with Polyamine Composition

Polyamines were detected in all human milk samples collected from mothers. **Table 2** depicts the percentage and descriptive statistics for polyamines. Spermine had the maximum concentration at 70.2 % (*M* = 5.4 nmol/L, *SD* = 5.99) compared to putrescine at 22.3 % (*M* = 1.74 nmol/L, *SD* = 3.38) and spermidine at 7.4 % (*M* = 0.58 nmol/L, *SD* = 0.88). According to Munoz Esparza *et al*. (2021) found that spermine levels in human milk were significantly higher than in infant formulas owing to the fat content of human milk. A huge metabolic difference could occur since spermine is dependent on other polyamines due to spermine as a protective measure during the perinatal period, while lower putrescine and spermidine in breast milk were influenced by hormonal factors (Ali *et al*., 2013). Previous research discovered that polyamine content in human milk is significantly correlated with maternal diet. However, in this study no correlation was found between macronutrient and polyamine levels in human milk. All results are not significant (*p*-value > 0.05). It shows that polyamine composition was not only associated with the maternal diet but could also be correlated with other anthropometry factors such as BMI, socio-economic, and health issues (Almeida *et al.*, 2021). Even though the association was not statistically significant, **Figure 1** displays a negative correlation between the level of polyamines and lipid content. Sagar *et al.* (2021) postulate that polyamines regulate adipose metabolism. It can aid in fat breakdown and prevent fat storage in the body. Therefore, the finding of a negative correlation between polyamines and fat suggests that the body produces fewer polyamines in response to a high-fat diet.

Table 2. Percentage and Descriptive Statistics for Polyamines

Polyamines	Percentage (%) (n=30)	*M*	*SD*
Putrescine	22.3	1.74	3.38
Spermidine	7.4	0.58	0.88
Spermine	70.2	5.49	5.99

Polyamines	R-value (*p*- value)		
	Protein	Carbohydrate	Fat
Putrescine	-0.054 (0.778)	-0.024 (0.899)	-0.125 (0.509)
Spermidine	0.101 (0.594)	0.122 (0.519)	-0.068 (0.721)
Spermine	-0.215 (0.253)	-0.174 (0.358)	-0.209 (0.269)

Figure 1. Pearson's correlation (R) between macronutrients and polyamines

4. CONCLUSION

This study successfully achieved its objectives by examining the polyamine composition in human milk. Most mothers had a high carbohydrate intake, followed by fat and protein. Using High-Performance Liquid Chromatography (HPLC), we determined the proportion of polyamines in each mother's milk. Spermine emerged as the predominant polyamine, with the highest concentration (70.2%), followed by putrescine (22.3%) and spermidine (7.4%). This finding is marginally significant in comparison to previous research. However, this study found no significance between dietary intake and the levels of polyamines in human milk. As for the recommendation, further research is warranted in Malaysia to understand variations in breast milk composition among different populations, and the sample should be more than 30 to get more accurate data.

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CATEGORY B
(Postgraduate/Undergraduate)

Refluent: Using Cartoons to Innovate Teaching of Sampling Techniques

Siti Munirrah Ahmad Zahran, Hasnatulsyakhira Abdullah Hadi, Nurin Farzana Mohamad Fadzil, Nur Batrisyia Nordin and *Nurul Hidayana Mohd Noor

Faculty of Administrative Science & Policy Studies, Universiti Teknologi MARA (UiTM), Malaysia

*Corresponding author: hidayana@uitm.edu.my

ABSTRACT

The traditional lecture is still one of the most common teaching methods since it has the advantage of being able to reach many students in one time slot. One of the main contributors to student boredom is the use of PowerPoint. The lecturers tend to prepare too many slides, pack them with too much information, and whizz through them in a manner that obliges students to spend most of the session attempting to copy amounts of text from the screen. Interactivity allows students to have an active role in the learning experience. Thus, our approach integrates cartoon-based infographics that simplify complex sampling methods, fostering a more engaging and interactive learning environment. Sampling aims to obtain a sample that reflects the population in terms of variables that are the researcher's focus. Therefore, a good sample selection is a sample that can represent the variable in question from the target population. There are two types of sampling procedures: 1) probability sampling and 2) non-probability sampling. Complex sampling categories make it difficult for students to understand the appropriate sampling method for their study. Most students like to choose a simple random sampling technique without realizing that this technique is not easy, and most students need help explaining the purpose of the technique during the viva presentation or in the thesis report. Refluent is a novel educational tool that uses cartoons to explain complex sampling techniques, enhancing student comprehension and engagement in research methodology courses.

Keywords: cartoons; educational innovation; sampling technique; research methodology.

1. INTRODUCTION

The study addresses the challenge of effectively teaching complex sampling techniques using traditional lecture methods, often leading to student disengagement and poor understanding. Infographics have become one of the most effective learning tools for communicating complex and abstract information to students (Sica et al., 2022). There are several reasons why infographics are a very effective learning tool. First, humans tend to process visual information more efficiently than text. Students are more likely to understand and remember information visually, such as through graphics, diagrams, or pictures (Ferreira et al., 2020). Second, infographics could simplify complex information (Alhadreti, 2021). Infographics allow students to dig up critical information without reading long texts. They can see the general picture and important details quickly. In addition, infographics allow students to compare information easily. A good infographic can display comparisons through graphs or tables. This helps students to understand the relationship between various elements or concepts. Cartoons are also the primary form of infographic communication, as an interpretation image that uses symbols to convey a message. Cartoons are a universal form of drawing that depicts everyday events and presents them funnily and humorously (Martzoukou, 2020). Cartoons have a unique

appeal and can influence the reader's attitude and behavior. Nowadays, the use of cartoons as entertainment and humor materials has proliferated through print or electronic media. Newspapers and magazines now provide cartoon sections alongside other articles to attract readers' interest and as an interlude to relieve tension. The research question for the study is "How do cartoon-based infographics impact student understanding and retention of sampling techniques compared to traditional lecture methods?" and the hypothesis is "Cartoon-based infographics will significantly improve student engagement and comprehension of sampling techniques over traditional lecture methods." The study contributes new insights into the use of visual aids in complex subjects since there is a lack of studies examining the usage of cartoon illustrations in the classroom. Although no empirical study proves the cause of the achievement of results for this subject, it is believed to be primarily driven by student interest. The results of this study can help various parties deal with the problems and issues of students' low motivation in the classroom. At that time, it can help educators realize appropriate teaching techniques to improve their teaching performance. Quality teaching and learning in higher education is fundamental to ensure that learning outcomes are achieved at the end of each program.

2. METHODOLOGY

This research instrument used is a survey approach. The population in this study is undergraduate students in the Faculty of Administrative Science and Policy Studies, Universiti Teknologi MARA (UiTM), who undertook research methodology subjects (ADS511, ADS651, and ADS555). The determination of the sample size was made based on the table made by Krejcie and Morgan (1970) . At a population size (N) of 500, the sample size (n) is 217. The study employed a systematic sampling technique and data were analysed using descriptive statistics.

3. RESULTS AND DISCUSSION

Based on the survey results of 200 respondents, the results have revealed that the main problems faced by the students in learning research subjects, especially sampling techniques, are a lack of learning sources, interactive learning materials, boring teaching techniques, and lack of motivation (see Figure 1). The students also believed the teaching content needed to be interactive and exciting.

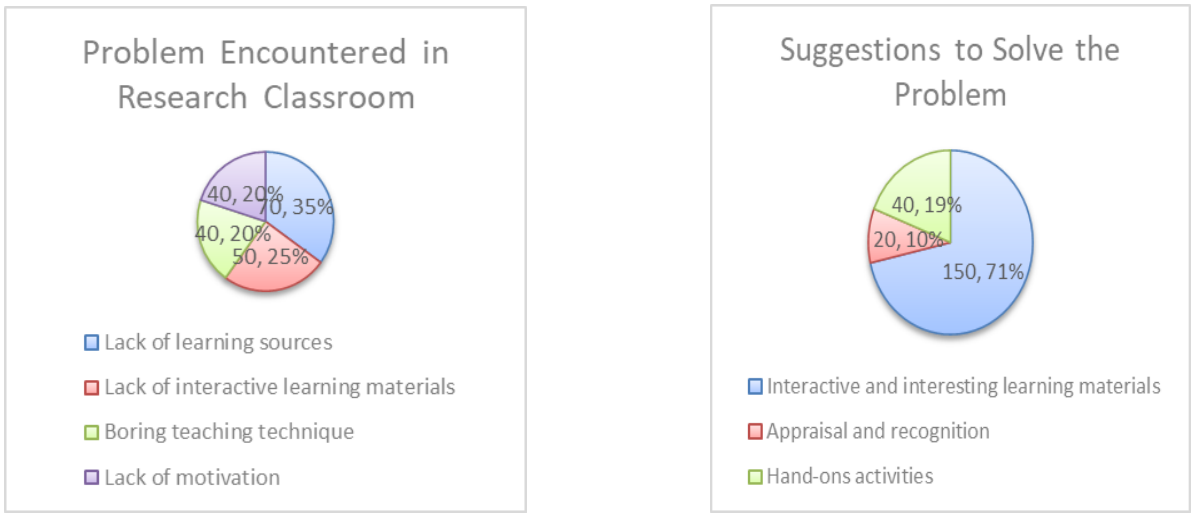

Figure 1. Pie Carts on Problem Identified and Suggestions

Thus, our group has created an innovative note that embedded cartoon illustrations to assist lecturers and students in understanding the sampling technique in research. Complex sampling categories make it difficult for students to understand the appropriate sampling method for their study. Most students like to choose a simple random sampling technique without realizing that this technique is not easy, and most students need help explaining the purpose of the technique during the viva presentation or in the thesis report. Therefore, this creative note is expected to help students and lecturers facilitate teaching and learning about sampling techniques. Figure 2 summarises the sample of the Refluent. Refluent is the first research teaching note-related cartoon, and most research methodology notes are textbooks and slides. The topics covered in the note are simple random sampling, systematic sampling, stratified sampling, cluster sampling, convenience sampling, purposive sampling, snowball sampling, and quota sampling. Many students think the subject of research methodology is challenging to master. If we look at any course offered at the university level, the research subject is a mandatory code taken by students either for undergraduate or postgraduate level. Refluent is expected to deliver new experiences in learning research subjects. Refluent can be commercialized and sold to educators and research practitioners at higher learning institutions.

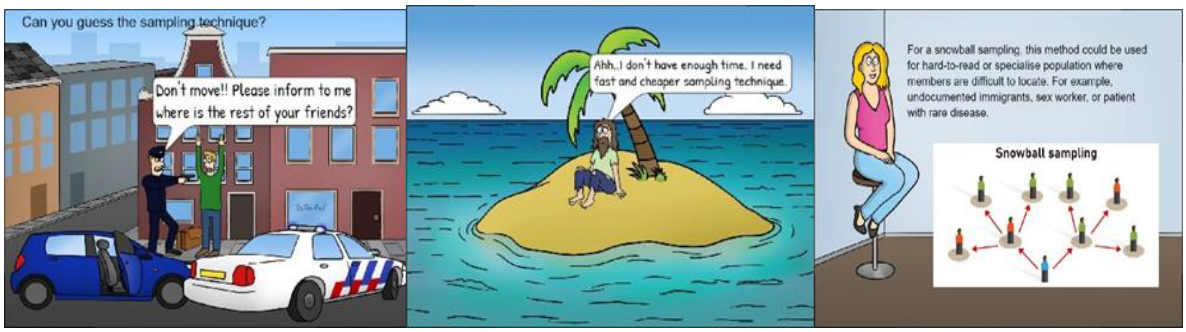

Figure 2. Refluent (Source: Authors' work)

4. CONCLUSION

The study's findings have revealed that most students need more learning sources, interactive learning materials, boring teaching tech techniques lack of motivation. The students also alleged that the teaching contents must be interactive and exciting. Despite extensive research on infographics, researchers need to pay more attention to the potential use of cartoon illustrations as an information dissemination tool by educators in universities, particularly in Malaysia. More research on this topic is thus needed to determine how and why these means are used. The results indicate that simple cartoon infographics can help educators understand the research topics better. Using cartoons helps encourage and motivate the students to continue participating and interacting while having fun (Alhadreti, 2021). Thus, educators need to be creative and innovative in their teaching to ensure learning effectiveness.

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Innovative Pyramidal Microwave Absorber: Eco-friendly Utilization of Biomass and Silicon Carbide for Enhanced EMI Reduction

*Nur Shafikah Rosli, Hasnain Abdullah, Mohd Nasir Taib, Samihah Abdullah and Linda Mohd Kasim

Centre of Electrical Engineering Studies, Universiti Teknologi MARA, Cawangan Pulau Pinang, Pulau Pinang, Malaysia

Malaysia Institute of Transport (MITRANS), Universiti Teknologi MARA Shah Alam, Selangor, Malaysia

*Corresponding author: shafikahrosli99@gmail.com

ABSTRACT

This study presents an innovative approach to developing pyramidal microwave absorbers, addressing environmental concerns associated with conventional polymer materials. The research focuses on integrating silicon carbide, a ceramic material, into the absorber's composition to enhance performance and align with sustainable practices. The absorber is constructed using a blend of cement, water, carbon, aluminum powder, and silicon carbide, showcasing attributes such as heightened fire resistance, super-thermal properties, workability, and environmental friendliness. A comprehensive analysis of the absorber's reflectivity performance is conducted through the NRL free space method. The empirical data culminates in a graph illustrating reflectivity versus frequency, revealing a significant enhancement in absorber performance with the incorporation of 10% silicon carbide, compared to the absence of this compound especially at C-band and X-band. The study also advocates for eco-conscious practices, emphasizing the use of locally sourced biomass materials, particularly in Malaysia's biomass sector. In conclusion, the carbon-ceramic pyramidal microwave absorber emerges as a promising solution for commercial applications, offering efficiency, sustainability, and environmental compatibility in communication technology and electromagnetic interference reduction in anechoic chambers.

Keywords: microwave; absorber; anechoic chamber; biomass; ceramic.

1. INTRODUCTION

An anechoic chamber is a structure that has been covered with an electromagnetic wave-absorbing substance known as an absorber on the surface of a wall, ceiling, or floor so that reflected waves do not interfere with the operation of measuring instruments or devices (Rabelsa et al., 2019). Absorbers are employed in a variety of applications to get rid of unwanted or stray radiation that might impede the functioning of a system (Xie et al., 2020). Due to the widespread and active development of wireless telecommunications technology, which has improved modern lifestyles and made it the most efficient communication platform in terms of data transmission and reception, microwave absorber popularity has rapidly increased in the field of electric communication (Elmahaishi et al., 2022). Commercial pyramidal absorbers are typically made out of polymer materials such as polyurethane, polypropylene, polyethylene, polystyrene, and other polymer materials that are not

environmentally friendly and are difficult to dispose of (Basyigit et al., 2023). Due to benefits like cost effectiveness and customizability, as well as the environmental consequences of chemical compounds employed in the manufacturing of these material, the use of various natural materials such as agricultural products and waste has grown significantly (Basyigit et al., 2023). With the growth of the communications industry, the initiative to create better application for microwave absorbers in anechoic chamber needs to be highlighted. Malaysia's biomass sector has achieved notable strides towards a positive carbon balance relative to fossil fuels, as well as towards sustainability and economic growth as a result of the use of locally renewable materials (Osman et al., 2014). Thus, it is suggested to use biomass material as an absorbing material in this study as an effective way to employ waste material.

Table 1. Previous Studies of Microwave Absorbers using Biomass Material

Material	Frequency (GHz)	Shape	Reflectivity (dB)		Ref
			Min	*Max*	
Banana leaves and resin	6-8.5	Pyramidal	-33.9	-43.1	(Mezan et al., 2014)
Carbon saw dusk & cement	1-12	Flat (brick)	-	-29.5	(Narudin et al., 2023)

From Table 1, the reflectivity performance of the pyramidal microwave absorber made of banana leaves and resin was found to be better than the flat microwave absorber made of sawdust and cement. However, microwave absorbers using biomass materials and resin undergo degradation, while cement-based absorbers provide better durability. The use of silicon carbide, a ceramic material, will be the subject of novel studies in this project. Ceramics have excellent mechanical properties, including high hardness, low density, high strength, and excellent wear resistance—even at extremely high temperatures (Bouanga et al., 2011). By modifying the shape from flat to pyramid and adding SiC as RAM, the creation of a carbon-ceramic pyramid microwave absorber has the potential to provide better reflectivity performance.

2. METHODOLOGY

The initial part of this project involved researching microwave absorbers and gathering information on the structure and composition of pyramidal microwave absorbers. This work uses the NRL (Naval Research Laboratory) arch free-space approach to determine the pyramidal microwave absorber's reflectivity performance.

2.1. Development of Pyramidal Microwave Absorber

In this project, the development process shown in Figure 2 is divided into 4 phases; 1) material preparation and proportioning, 2) mixing, 3) molding, 4) drying and curing. Preparing the raw materials was the initial step in the procedure. In this study, cement, carbon, ceramic, water, and aluminium powder are utilised to construct the pyramidal microwave absorber. All of the material will be weighted and proportioned according to the chosen ratio throughout this phase.

Next would be the material mixing procedure with a concrete mixer. To ensure complete blending, the proportional material will be stirred for 5-8 minutes. Subsequently, the mixture will be placed straight into the mould to begin the moulding process. The pyramidal microwave absorber will then be covered with plastic for a minimum of seven days throughout the drying and curing process.

2.2 Measurements

The reflectivity measurements were performed to analyse the characteristics of pyramidal microwave absorbers, using the NRL free space method. The NRL arch is the mainstream technology for testing material reflectivity (Hofmann et al., 2019). The NRL free space method consists of two horn antennas, one acting as a transmitter and the other as a receiver. These two antennas are directed towards the metal plate at an appropriate 0° angle (Kharber et al., 2017). It employs an intuitive methodology in which the reflection of a metal plate with and without absorbers is compared (Hofmann et al., 2019). The comparison of both data provides the absorbers' reflectivity (Kharber et al., 2017).

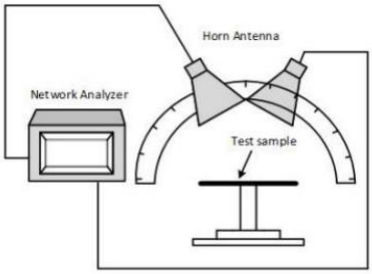

Figure 1. NRL arch free space method (Kharber et al., 2017)

3. RESULTS AND DISCUSSION

Figure 2 displayed reflectivity versus frequency graph of a pyramidal microwave absorber with 0% SiC and 10% SiC. The minimum and maximum data obtained by four different bands are tabulated in Table 2. The maximum value of the absorber indicates its highest level of reflectivity, while the minimum value indicates its lowest level. If the minimum and maximum reflectivity value of a pyramidal microwave absorber is higher, the performance of the pyramidal microwave absorber is better.

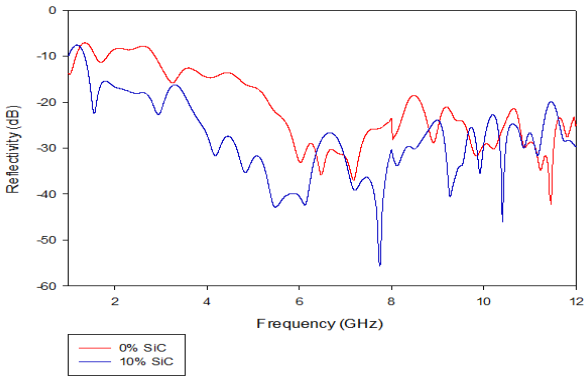

Figure 2. Reflectivity Performance of Pyramidal Microwave Absorber with 0% SiC and 10% SiC

Table 2. Minimum and Maximum Reflectivity Performance

Band	Frequency (GHz)	SiC (%)	Reflectivity (dB)	
			Minimum	Maximum
L-band	1-2	0	-7.1917	-13.9684
		10	-7.5473	-22.4245
S-band	2-4	0	-7.9029	-15.8256
		10	-16.2405	-26.5340
C-band	4-8	0	-13.3559	-37.0251
		10	-26.6215	-55.2752
X-band	8-12	0	-18.4081	-41.9475
		10	-20.2202	-45.8933

From the data shown in Table 2, there is a significant improvement in the performance of the pyramidal microwave absorber with the addition of 10% SiC compared to 0% SiC in all bands. The incorporation of 10% silicon SiC into the microwave absorber significantly enhances reflectivity performance. At L-band and S-band, the minimum reflectivity performance of the pyramidal microwave absorber with 10% SiC could not reach at least -20 dB, and the maximum value could not reach -30 dB, showing unsatisfactory performance. However, the pyramidal microwave absorber with 10% SiC provides good reflectivity performance at the C-band and X-band, where it manages to reach more than -20 dB for minimum reflectance with values of -26.6215 dB and -20.2202 dB, respectively. For the maximum reflectance value, the pyramidal microwave absorber with 10% SiC managed to achieve at least -45 dB at the C-band and X-band, with excellent values of -55.2752 dB and -45.8933 dB. This improvement is attributed to the unique characteristics of silicon carbide, such as heightened fire resistance, super-thermal properties, and overall increased efficiency, making it a valuable addition to the absorber's composition. Overall, it can be concluded that a pyramidal microwave absorber with the addition of 10% SiC performs well at C-band and X-band.

4. CONCLUSION

In conclusion, the developed pyramidal microwave absorbers, leveraging biomass and SiC, showcase enhanced performance in EMI reduction. The addition of SiC proves especially beneficial, leading to superior reflectivity. These absorbers, with commendable fire resistance, thermal properties, and eco-friendliness, hold promise for commercial applications. This study underscores the significance of incorporating sustainable materials in communication technology for advanced electromagnetic compatibility. Further research can explore the broader application of eco-friendly materials in achieving efficient EMI reduction.

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Desainku Application as an Effort to Improve the Quality of Fashion Industry Design in the 5.0 Era

*Sofwannida Yuanita Yusuf, Andre Ferdiawan, Dian Siti Nurhasanah, Moch. Ismail Gading Pambudi and Adelio Shatara Nugraha

Jl. R.Mangun Muka Raya No.11, RT.11/RW.14, Rawamangun, Kec. Pulo Gadung, Kota Jakarta Timur, Daerah Khusus Ibukota Jakarta 13220, Indonesia

*Corresponding author: sofwannida@gmail.com

ABSTRACT

Fashion is becoming a lucrative industry in Indonesia as its growth rate continues to increase. According to Consumer News and Business Channel (CNBC) Indonesia 2019, development of fashion industry can contribute around 18.15%. According to Central Statistics Agency (BPS) Indonesia, in first 3 months of this year, apparel industry's production grew by 29.19%. Fashion entrepreneurs still lack skills in understanding fashion design, but they need a lot of adequate understanding and knowledge, to help high creativity also in creating fashion designs and fashion production. Based on the results of interviews show that fashion entrepreneurs still need to gain skills and understanding in creating the fashion designs they produce. The researchers made the Desainku Application. This research use ADDIE method, which consists of five stages of research, namely Analysis and Design, Development, Implementation. This application also has a business feasibility analysis. As a result, the Desainku application is useful for improving understanding of fashion design industries before they are finally implemented in fashion. Desainku application system uses material from modules adapted to existing learning competencies, design consultation features and instructional videos. Desainku application scored 4.4 in the very good category based on three tests. As a result, it can be concluded that Desainku application is appropriate for use as part of an effort to improve the quality of fashion design industries to realize the 2030 Sustainable Development Goals with 4th point Quality Industrial specifications.

Keywords: applications; sustainable development goals; fashion design.

1. INTRODUCTION

Fashion trends that exist in Indonesia reflect social and economic status that is generally accepted. Fashion is becoming a lucrative industry in Indonesia as its growth rate continues to increase. According to Consumer News and Business Channel (CNBC) Indonesia, in 2019, the development of the fashion industry can contribute around 18.15% or IDR 116 trillion. The Creative Economy Agency (BEKRAF) also continues to work on strengthening the ecosystem and encouraging the development of this sub-sector. With developments in the fashion business world, the apparel industry is a large segment and is currently recording the highest production growth among other sectors throughout the first quarter of 2019 (Kemenperin, 2019). According to the Central Statistics Agency (BPS) Indonesia, in the first 3 months of this year, the apparel industry's production grew by 29.19% on an annual basis. This data shows that the interest of the Indonesian people in the fashion sector is quite high.

There are various fashion design applications circulating in the community including the Fashion design app and T-shirt Design. The system results from the application have the advantage of being able to make fashion designs and sporty clothing designs. However, this application still has drawbacks, including only learning the basics of fashion design, so that the stages of fashion design still need to be completed, and there are design templates that are not suitable for fashion design applications. Successful fashion design requires a combination of adequate skills and knowledge. Someone who wants to become a fashion entrepreneur must understand how to make clothes, which will be a competitive advantage to ensure fashion entrepreneurs focus on improving their skills. (Jack, 2021)

Departing from these problems, the author took the initiative to create functional innovative works in the form of **Desainku Application as an Effort to Improve the Quality of Fashion Industry Design in the 5.0 Era**. This application is expected to improve the quality of design and also the quality of clothing for entrepreneurs in the fashion sector.

2. METHODOLOGY

2.1 Research Method

This research applies the ADDIE method. The ADDIE method in research and development design is a method popularized by Dick and Carey in 1996 which is used in industrial activities. The ADDIE method consists of five stages of research and development, namely: 1) Analysis, 2) Design, 3) Development, 4) Implementation, 5) Evaluation.

2.2. Development Procedure

The design stage of the Desainku application adapts the ADDIE model. As a guideline, the ADDIE method is needed to analyze the usability of the application on the screen display, application performance, and content suitability so that it is relevant to the needs of the community in making designs. The following is the stage of developing the Desainku application by adapting the ADDIE method.

The first activity carried out by a researcher in conducting development research is to conduct a needs analysis, with the aim: 1) As a tool to determine current capabilities and determine current gaps to the desired final condition; 2) Provide direction related to programs, projects, and activities. Researchers must carry out needs analysis to see the condition of the gap from a situation by enforcing directions for the program of the research. Product design is a stage that is carried out after a needs analysis. Researchers will design products according to the needs that exist in the field. At this stage, application development is carried out in collaboration with several experts to develop products. At this stage, media expert validation, material validation, and user testing of Desainku application were carried out with 30 correspondents At this stage, product evaluation is carried out so that the product can develop and be in accordance with current technological advances and benefit the community.

2.3 Research Object

The object of this research is the Desainku Application as an Effort to Improve the Quality of Fashion Design Industrials to Realize the 2030 SDGs.

2.4 Data Collection Techniques

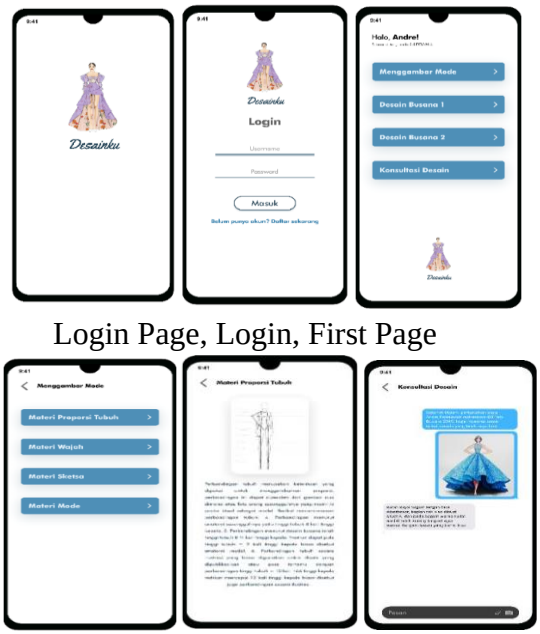
Data collection technique used in this research is by interviewing several sources of fashion industrial who have difficulty in fashion practicum. In addition, it also distributes media evaluation questionnaires to get reviews and input from users in accordance with application development procedures. The purpose of the evaluation questionnaire is to determine the level of feasibility of developing the Desainku application.

2.5 Data Testing Techniques

Technical testing was carried out to determine the level of product feasibility. The author obtained qualitative data after conducting interviews and making questionnaires. Qualitative data were obtained based on opinions and criticisms from material experts, media experts, and application users. Qualitative data was obtained through a validation test questionnaire in the form of category values, namely very good, good, sufficient, less and very poor, then the qualitative data would be converted to quantitative data through a Likert scale as follows.

3. RESULTS AND DISCUSSION

In the design user interface of the Desainku application, you will be presented with an opening page, a login page, a Fashion Drawing material page, a Fashion Design material page 1, a Fashion Design Material page 2, a Design Tutorial Video page, and a Design Consultation Feature.



Login Page, Login, First Page

Figure 1. User Interface

The output product of this research is an Android-based mobile application named Desainku. This application emerged from a complaint regarding the difficulties of industrials comprehending practical fashion design coursework. There are several facilitators with backgrounds in fashion design experts. Desainku is an application that seeks to realize support Indonesia Gold 2045 on the pillars of Human Development and Mastery of Science and

Technology. Desainku offers free design consultations in an effort to improve the design quality of fashion designers. The Desainku Application's free service provides five major features, namely Fashion Drawing Learning, Fashion Design Learning 1, Fashion Design Learning 2, Fashion Design Tutorial Videos, Meet Tutors, and Design Consulting. Users are free to use these features according to their needs.

This application development process uses the ADDIE method. The testing phase is carried out using qualitative and quantitative methods for Media Expert Validation Lecturers, Material Expert Validation Lecturers and User Tests. The results of the Material Expert Validation are 4.5 with a very good predicate, the results of the media expert validation test are 4.0 with a good predicate, and the User Test Result is 4.7 with a very good predicate. From three tests, the results were obtained at 4.4, which can be concluded that the Desainku application is very good and feasible to be used as a learning media.

4. CONCLUSION

The development of information technology must be utilized, one of which is in the world of industry. Improvements in the industrial system must be carried out but with the distance learning system currently being implemented, industrials experience a little difficulty in the learning process, especially in practicum courses. The Fashion Design course is a compulsory subject for Fashion Design industrials.

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Street Art Bukit Bintang by e-Scooter: Application of Fuzzy-AHP & GIS

Muhammad Salahuddin Mohamad Shahrul Annuar and *Nabilah Naharudin

School of Geomatics Science and Natural Resources, College of Built Environment, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

*Corresponding author: nabilahnaharudin1290@uitm.edu.my

ABSTRACT

Cities are grappling with safety concerns surrounding e-scooters, leading to bans in some areas. However, there is a need to understand the best paths for e-scooter users, especially when main roads are unavailable or restricted. Decision-making methods like MCDA and GIS network analysis can help determine the best routes, considering various criteria and outcomes. This study aims to determine the best street art trail for e-scooters through the combined use of Fuzzy-AHP (FAHP) and GIS The objectives include identifying optimal pathway criteria, mapping potential trails using GIS, and assessing differences from other route planner applications. FAHP used to compute the criterion weights and these weights were integrated with GIS to establish a network model and identify the optimal e-scooter pathway using the TSP method. The final output is a map detailing optimal e-scooter route connecting street art in Bukit Bintang, featuring path information, street art locations, nearest train stations, and e-scooter rental stations. Following the derivation of the optimal path, analysis involved comparing it with existing trails from other navigation apps were made.

Keywords: e-scooter; fuzzy-ahp; GIS; network analysis; travelling salesman problem.

1. INTRODUCTION

E-scooters are a convenient and innovative mode of transportation for short trips and last-mile travel, but their rapid growth has raised concerns about functionality, application, riding behaviours, regulations, and security. Some cities have outlawed or suspended e-scooters due to insufficient research (Mat Nayan et al., 2021). Integrating e-scooters into urban infrastructure faces challenges like parking lots, designated lanes, and safety concerns. Understanding user routing preferences is crucial for optimizing infrastructure and services (Zhang et al., 2021). This study identifies criteria for creating optimal pathways using Spatial-Multicriteria Decision Analysis (MCDA), including methods like Fuzzy AHP to resolve imprecise semantics and enhance performance (Kim et al., 2020). A GIS network analysis and the Travelling Salesman Problem (TSP) are used to determine the most economical routes.

This study is significant for several reasons. It integrates MCDA and GIS techniques to identify optimal e-scooter pathways, providing a novel approach to urban transportation solutions which the Fuzzy AHP method enhances decision-making. Urban planners, transportation engineers, policymakers, and e-scooter companies can use these findings to design safer infrastructure, optimize routes, and ensure compliance with regulations. Additionally, optimizing e-scooter pathways promotes efficient urban transportation, improving mobility and social equity by providing a cost-effective mode of travel for underserved communities, thus potentially transforming urban transportation systems, and benefiting society.

2. METHODOLOGY

The research methodology used in the study is shown in Figure 1. The first stage is to determine the criteria that can be used in finding the optimal path for e-scooters accessing street art. The next stage is Data Collection. The data needed in this study are the rating of criteria that was obtained using Fuzzy-AHP technique and spatial data representing the criteria on the ground, road, and location of street arts. The third stage is Data Processing that involved of fuzzy pairwise comparison matrix to derive the weightage of criteria and GIS to create a network model which then were used in finding the e-scooter trail by using TSP. The fourth stage is Analysis site verification was conducted to make comparison of the found trail with the trails that could be found using other navigation or route planner apps. In addition, verification from experts were also conducted to ensure the trail found can be implanted in real-life. The last stage is the creation of a map visualizing optimal path for the e-scooter route connecting the location of street arts in Bukit Bintang. The map also shows location of other point of interests in the study area including rail-transit stations and the location of e-scooter rental stations so that users can plan for their journey when visiting the area.

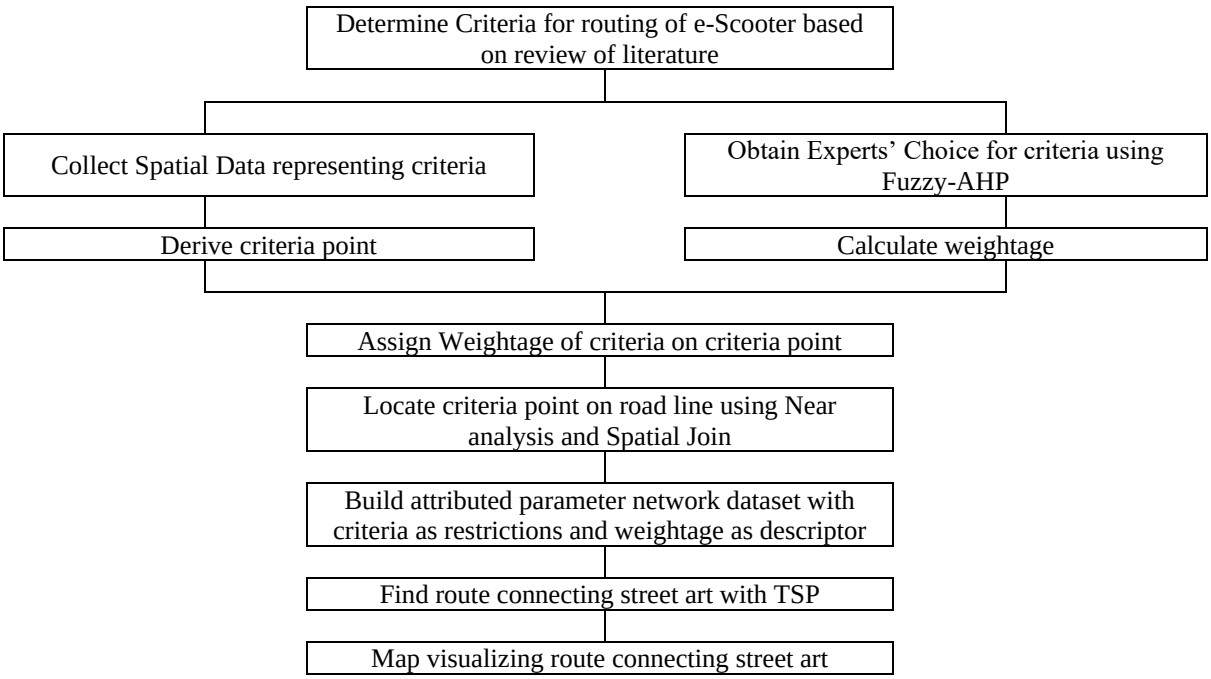

Figure 1. Methodology

3. RESULTS AND DISCUSSION

The map visualizing the optimal path of the e-scooter route connecting street art is shown in Figure 2 which is the product of assigning weightage to the criteria and generated by setting it as the attribute parameter for the network processing. Several elements to ease the map reading are included for better understanding, such as the locations of rail-transit stations, street arts, and attractions. Once the optimal route has been determined using the Travelling Salesman Problem (TSP), it was then analyzed. Based on the differences in distance and time taken in Table 1, it can be seen that the TSP method shows a lower distance and time taken. This difference in the distance and travel time may be affected by the parameters that have been set to provide the most efficient and accurate routes by both methods.

Table 1. Comparison of TSP method and Navigation Application

Comparison	TSP	Google Maps
Total Distance	1700 meters	1810 meters
Travel Time	11 minutes	23 minutes
Parameters	Path facility, Obstruction, Gradient, Traffic Speed	Traffic condition, Average vehicle speed, Travel time

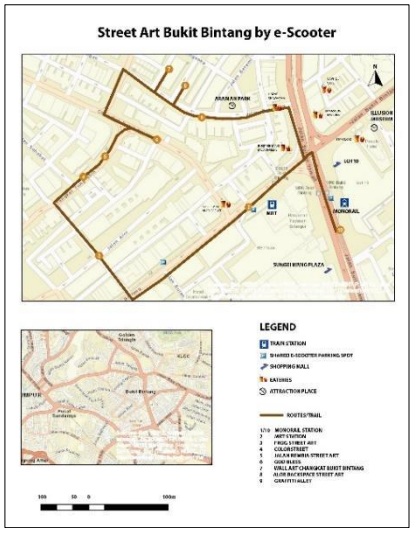

Figure 2. Map of e-Scooter Route connecting Street Arts in Bukit Bintang

4. CONCLUSION

In summary, the study achieved its goals by finding the best criteria for e-scooter paths, using GIS to find routes, and analysing the best paths to street art spots. In the future, we could consider more factors like surface condition and path width to make routes safer and more comfortable. These findings could be used as an aid or guide to improve city travel and enhance tourism experiences, providing a cost-effective mode of travel. Additionally, our research has potential commercial uses in both tourism and transportation industries, emphasizing its practical importance.

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Site Suitability Modeller Tool for Electric Vehicle Charging Stations by using the Integration of Hexagonal Fuzzy-AHP and GIS

Elina Alias and *Nabilah Naharudin

School of Geomatics Science and Natural Resources, College of Built Environment, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

*Corresponding author: nabilahnaharudin1290@uitm.edu.my

ABSTRACT

In this rapidly evolving landscape of urban mobility, a strategic deployment of Electric Vehicle Charging Stations (EVCS) holds key in the creation of sustainable transportation systems especially in the era of escalating demand towards the changes to an environmental sustainability. In fact, the uneven distribution of the existing EVCS causes several challenges such as range anxiety for users. These challenges require a strong approach in identifying suitable site. However, current practice shows limitation such as it may be prone to human errors. To address this, an automation tools are created, presenting an innovation methodology integrating Hexagonal Fuzzy Analytical Hierarchical Process (AHP) with GIS to conduct the site suitability modelling of EVCS. This approach involves five stages considering criteria like Perceived Safety, Accessibility, Public Facilities, and Population Density, based on Malaysian EVCS development standards. Spatial data representing the criteria need to be collected to establish nine criterion maps through data editing, rasterization, and reclassification processes. Weightage of each criterion were determined by using the pairwise-comparison matrix obtained from industrial and academician experts, followed by weighted overlay analysis to identify the suitable sites. However, this process can be tedious and lengthy which brings to the main objective of this study is to develop an automation GIS tool for site suitability modelling by leveraging specified criteria and weights provided by the experts. Ultimately, this tool aims to help in identifying suitable EVCS location with a single button thereby accelerating the deployment of EVCS and supporting sustainable urban transportation.

Keywords: EVCS; site suitability; hexagonal fuzzy-AHP; GIS; GIS automated tools.

1. INTRODUCTION

EV provide an affordable, environmentally friendly, and reducing dependency on fossil fuels to address climate change and sustainable transportation systems (Hernández et al., 2018). However, the major use of EV is dependent on the availability of a reliable charging infrastructure, necessitating on a comprehensive approach to determine site suitability for EVCS. This study aimed to identify potential sites based on various criteria including community impact, economic feasibility, environmental effects, and compatibility with urban planning goals (Ghosh et al., 2023). The main objective is to create GIS automation tool for locating suitable EVCS deployment sites. By integrating Multi-Criteria Decision Analysis (MCDA) with GIS, this study addresses challenges identified by the MyEVOC, including range anxiety and inadequate charging infrastructure. A better decision-making becomes possible by integrating MCDA with GIS which leads to dependable EV charging infrastructure. To accelerate the process of identifying suitable locations for EVCS deployment, this study aligns

infrastructure development with economic and environmental goals. This is by the creation of a Graphical User Interface (GUI) in a GIS software, as a tool that helps to evaluate the site suitability and gives benefits to developers. Through this development of comprehensive tool for EVCS site selection, it supports positive social change by promoting enhancing accessibility and equity, improving public health through reduced emissions, creating economic opportunities, and promoting sustainable practices (Li et al., 2022), in the same time addressing range anxiety with a reliable charging infrastructure.

2. METHODOLOGY

The research aims to tackles research question on how to measure the degree of importance of the criteria, suitable method, and how successful the tool in finding suitable location of EVCS. Figure 1 illustrates the methodology used to identify and develop tool for EVCS site suitability.

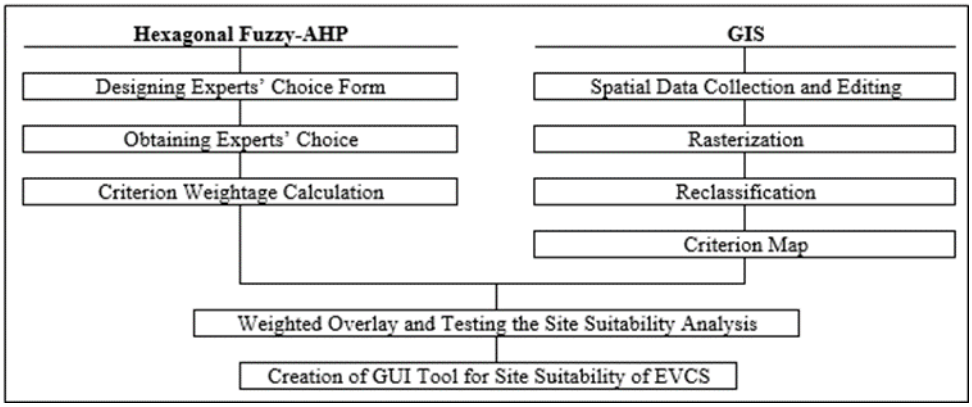

Figure 1. Research Flowchart

MCDA is a structured approach in making decisions when there are various criteria to be evaluated. Making a better decision, it is required to evaluate and compare alternatives using multiple criteria. However, uncertainties frequently occur in MCDA as a result of biased evaluations and ambiguous data that leads to difficulties in assigning weights to criteria (Malczewski et al., 2015). AHP is a widely utilized MCDA method that structures decision problems into hierarchical and involves pairwise comparisons to determine criteria importance through three different levels, goal, criteria, and alternatives (Saaty, 1987). The Fuzzy-AHP is the extended of AHP that helps in handling the uncertainties by introducing fuzzy logic, most commonly presented in matrices of three fuzzy number (FN) (Denis et al., 2000). However, Hexagonal Fuzzy-AHP offer more adaptable representation as it contains of six FN. The goal is to identify suitable EVCS location and develop a GIS tool with GUI. Criteria selection aligns with Malaysia's EVCS standards, involving nine criteria of street lights, pedestrian trails, public car parks, shop lots, malls, restaurants, public parks, sports arenas, and population density (Energy Commission, 2023). Pairwise comparison matrices determine criterion weightage based on the evaluation from academic and industrial experts. By the integration of GIS and MCDA, it enables precise site suitability evaluation using modern GIS modelling. The research involves data editing, rasterization, reclassification, creation of criterion map, assign weights into weighted overlay, and developing a tool for EVCS site suitability. However, this process is repetitive which tend to be lengthy and prone to human error. To address this, a tool was created by using ModelBuilder to automate all processes. Raw data for each criterion are required to be imported and final result are set in the tool. This approach eliminates the need

for manual process while making it more efficient and accelerate the process in identifying the site suitability for EVCS.

3. RESULTS AND DISCUSSION

Hexagonal Fuzzy-AHP is preferred for its capability in handling uncertainty and ambiguity in expert judgments, offering precise judgment through fuzzy linguistic terms suitable for complex decision-making. It surpasses traditional methods of AHP in providing higher precision for criterion weights. This study derive weightage based on experts' choice. The weightage are malls (20%), public car parks (15%), sport arenas (12%), public parks (10%), street lights (10%), population density (10%), pedestrian safety (9%), shop lots (8%), and restaurants (6%). The criteria and their weightage were then used in the modeller tool as fixed parameters as they are considered as the best practice in modelling the site suitability for EVCS. GIS automation enables the integration of custom scripts or GUI-based to streamline data imports and ensure consistency. Initially, the process starts with carrying out the process that were required. However, certain criteria require different processes, such as Euclidean Distance while others do not. To reduce mistakes caused by these multiple procedures and chain all processes together, a ModelBuilder need to be created, followed by the development of a tool for quicker site suitability evaluations. Since the process is continuous, one main dataset for each criterion must be imported and it is set as the parameter. The tool does not display intermediate process since the workflow is continuous. This tool simplifies the processes by presenting the output of the site suitability result. The name, data type, and filters are all configured correctly. Its success was evaluated with sample data from Shah Alam, Selangor. The developed model classifies site suitability using a colour scale ranging from least suitable (orange) to most suitable (dark green). Based on the result, the successful creation of the tool in a shorter timeframe demonstrates its potential use for wider range or other location.

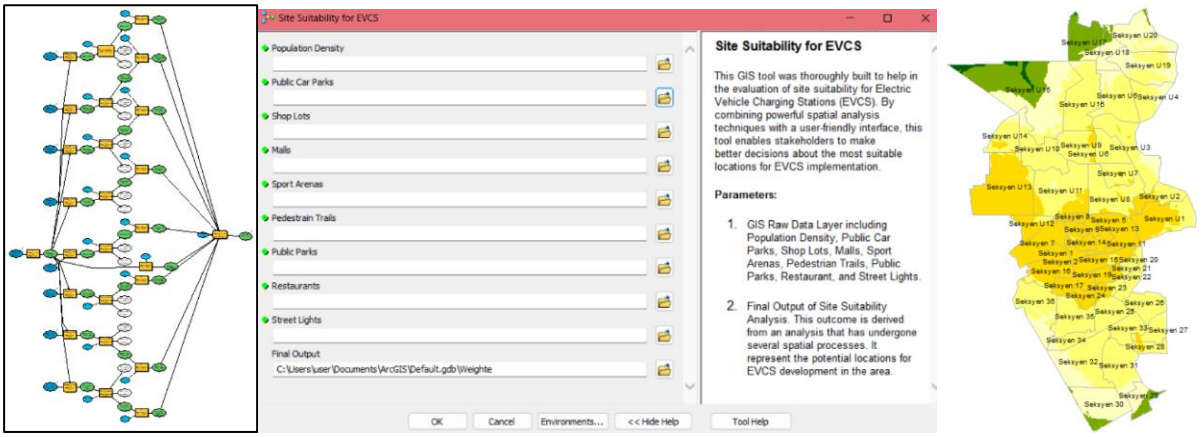

Figure 2. Model Builder, GUI of Site Suitability Tool, and Result Testing

4. CONCLUSION

In conclusion, the research integrates Hexagonal Fuzzy-AHP with GIS to determine EVCS locations effectively addressing challenges like range anxiety and inadequate charging infrastructure. The study highlights Hexagonal Fuzzy-AHP's effectiveness in handling uncertainty in criteria weighting. The successful implementation of the tool, demonstrates potential for widespread use, accelerating site suitability analysis. Generally, for research

purposes, this research provides a robust methodology that may be modified and expanded to include more criteria and advanced algorithms. On the other hand, the implication of the practices is that this research supports future advancements in sustainable infrastructure development. In reality, urban planners and developers may use this tool to make better, faster, and more accurate decision-making that ensures the efficient and equitable development of EVCS. For society, the adoption of this tool can benefit society by increasing accessibility and distribution, improving public health through reduced emissions, and encouraging sustainable practices that contribute to a more resilient and environmentally friendly transportation network. Future recommendations could focus on enhancing accuracy through real-time data integration and stakeholder collaboration for improving profitability and sustainable urban transportation initiatives.

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Cycle Tour Path using the Integration of Fuzzy-AHP and ELECTRE in GIS Network Analysis

Nur Maisarah Abd Ghany and *Nabilah Naharudin

School of Geomatics Science and Natural Resources, College of Built Environment, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

*Corresponding author: nabilahnaharudin1290@uitm.edu.my

ABSTRACT

Cycle tourism can have many positive effects on the local economy, including good effects on the environment and the nature preserve, as well as the ability to spread good behaviours and habits. The technique addresses the challenges and opportunities in cycling infrastructure and tourism. It aims to determine the criteria for safe cycling paths, identify potential cycle tour paths using Fuzzy-AHP and GIS method, and analyse the suitability of these paths through the ELECTRE method. The objectives of this technique are to determine the degree of importance for factors influencing the design of cycling paths, to derive potential paths for cycling tour and to analyse the suitability of potential paths for cycling tours. This technique is intended to integrate Fuzzy-AHP and ELECTRE method within a GIS network analysis framework. The technique's findings reveal a systematic methodology integrating Fuzzy-AHP, Traveling Salesman Problem (TSP), and ELECTRE methods within GIS which facilitating the identification of the most suitable cycle paths for tourism purposes. This technique offers a visual representation of optimized paths and enhancing sustainable cycle tourism while promoting economic and environmental benefits for the local community. In conclusion, this technique highlights the importance of integrating advanced methodologies such as Fuzzy-AHP, TSP, and ELECTRE within GIS for identifying optimal cycle tour paths. By implement of these techniques, it can enhance cycle tourism experiences and offer valuable insights for policymakers and stakeholders seeking to develop and promote sustainable tourism initiatives centred around cycling.

Keywords: cycle tourism; ELECTRE; fuzzy-AHP; GIS; TSP.

1. INTRODUCTION

In the last few decades, transport options that are good for the environment have become very important in urban planning and research. Non-motorized forms of transportation, like bicycle riding, are becoming more popular. This shows how important it will be in the future of sustainable transportation. Most people these days choose to settle in newly developed cities as the economy shifted from an agricultural to an industrial base, seeking employment and better living conditions. As a result, there is now more urban change, more road traffic accidents, more urban isolation, and more air pollution due to the intensive use of biodiversity. Thus, bicycles can be used for transportation, which not only cuts down on carbon emissions but also helps people stay fit by encouraging them to move around (Jamaludin et al., 2019). The aim is to integrate Fuzzy-AHP and ELECTRE in GIS network analysis to find cycling paths for tourism. The objectives are to determine the degree of importance for factors influencing the design of cycling path, to derive potential paths for cycling tour and to analyse the suitability

of potential paths for cycling tours. Problem statement that wanted to be solved are what are the degree of importance of the criteria used in determining the safety of cycling paths, how can the potential paths for cycle tours be derived and how can the suitability of the potential paths be analysed. Fuzzy-AHP method is selected for determining the weightage value for each criterion and sub-criterion which will be utilised to rank each one's importance. The process of conducting Fuzzy-AHP involves creating a hierarchical structure and designing and acquiring the expert's preferences. The ELECTRE method is a commonly used decision-making technique for conducting multi-criteria analysis. The ELECTRE method can be employed to evaluate and prioritise potential cycle path options based on different criteria in the context of designing a suitable path.

2. METHODOLOGY

Figure 1 shows the methodology employed for this study. It incorporates the integration of Fuzzy-AHP and ELECTRE in GIS Network Analysis to find the cycle path that fits the need and demand of end users, based on perspective of public and experts.

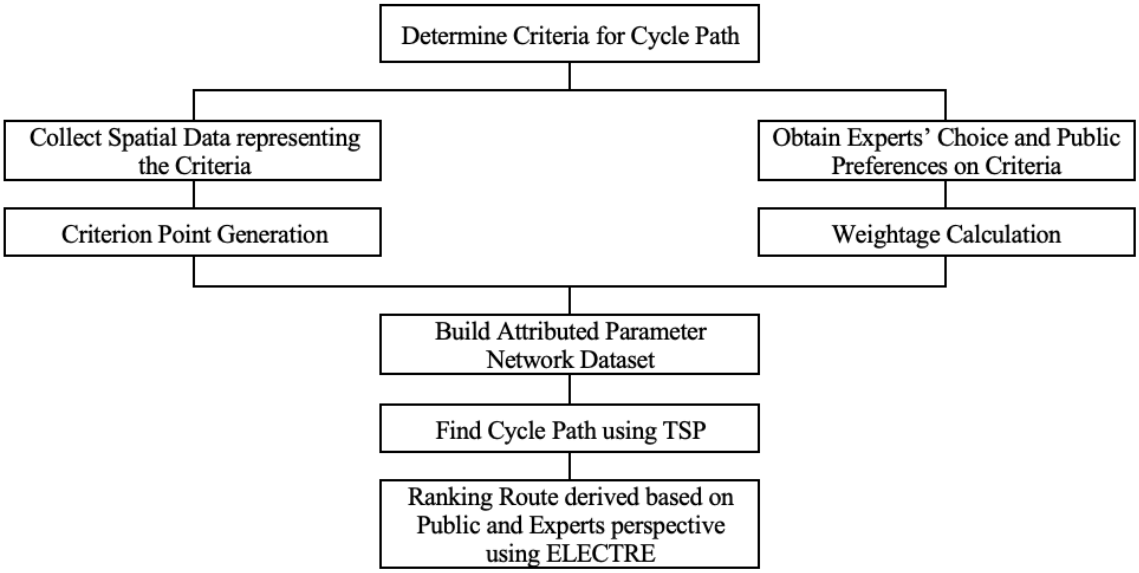

Figure 1. Methodology

Firstly, the aim of finding the most suitable route for cycle tour paths was determined by implementing the spatial MCDA ad GIS network analysis. The crucial step at the beginning stage is to determine the selection of criteria for designing cycle path which this study will concern on four (4) main criteria which are safety, connectivity, attractive and built environment.

The next step is to gather spatial data including all the criteria that been chosen based on previous study which are Safety (represented on ground using Speed, Pavement Marking and Street Lighting), Connectivity (represented on ground using Accommodation, Rest Area, Parking Spot and Public Transport Stops/Station), Attractive (represented on ground using Waterscape and Scenic Point) and Built Environment (represented on ground using Historical Area, Manufacturing Area, Cultural Area). The criteria were verified by the experts which relates to the field.

Then, Fuzzy-AHP approach will be used to get the weightage value for each criterion and sub-criteria in this technique framework. Thus, this technique will use the Fuzzy-AHP approach to calculate the weightage value which needs complex computations between each criterion and sub-criteria. In order to ensure greater results, the evaluation of cycle path safety will involve three (3) parties which are from industry professionals, academics, and public users who are actively engaged in cycling.

For spatial data editing, there will be the usage of proximity analysis which near tools will be used as in to get the Near X and Near Y coordinates of the criteria on road data. Then, do the spatial join as in to combine the road data with the criteria. The relationship used is one-to-many relationships. Then, continue by doing the summary statistical as in to obtain the final weightage for every road. Next, build the network model by using the road data that been spatial join before. Continue the step with attribute settings by choosing the restriction that been preferred. Then, implement the TSP (Traveling Salesman Problem) method as in to obtain the loop of cycle tour path. Afterwards, the ELECTRE will be used to outrank the three (3) alternatives of cycle path that been produced by using different weightage value from the different judgment of experts.

3. RESULTS AND DISCUSSION

The first results consist of the weighting of main criterion and sub-criteria which been determined using Fuzzy-AHP method. The second result that been obtained relates to the potential cycle path that has been scaled from three (3) different perspectives (industry, academia, and the public). Next, the most suitable cycling path had been determine using the ELECTRE method. The findings reflect that all objectives had been achieved. First, the criteria and sub-criteria found from previous studies had been verified by the expert (Industry and Academia). Also, this technique had considered the perspectives from the Public. Their weightage surprisingly Attractive is the most important criteria. Due to the purpose of tourism, Scenic Point is the highest rank from the overall sub-criteria. After the Attractiveness, Safety is also considered as the second most important criteria for the cycling path to be designed. Therefore, with this, the first objective of this technique had been achieved. The second objective is about deriving potential paths for cycling tour. By using TSP method, the cycling paths were found. And lastly, the suitability of potential paths for cycling tours had been obtained. The cycling path were chosen out of three (3) different alternatives whereby the Academia alternatives is the 1st rank among the other alternatives which it helps in achieving the third objectives.

4. CONCLUSION

In conclusion, the integration of Fuzzy-AHP and ELECTRE within GIS network analysis has proved to be a valuable technique for identifying optimal cycle tour paths. The findings from the valuable technique for identifying cycle tour paths are presented and analysed. The optimal routes are determined based on weighted criteria (safety, connectivity, attractive and built environment). The weightage value can be determined through expert judgment. The final output will produce the highest ranked path that meet the balance between the criterion which may offering cyclists diverse and enjoyable routes while considering practical constraints. The ELECTRE method reveals the validity of the chosen paths relate to the criteria weightage which providing confidence in the decision-making process. Moving forward, further research can

build upon these findings to enhance the methodology and address specific challenges in cycle path design, ultimately contributing to the promotion of cycling as a healthy, eco-friendly mode of transportation and recreation.

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Rubber and Oil Palm Empty Fruit Bunches (EFB) as a Composite Material for Cement Roof Tile

Muhamad Ezwan Muhamad Azmi, *Nur Aini Mohd Arish @ Arshad, Nuramidah Hamidon, Nor Maizzaty Abdullah and Nurul Husna Jurani

Department of Civil Engineering Technology, Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia, 84600 Pagoh, Johor, Malaysia

*Corresponding author: nuraini@uthm.edu.my

ABSTRACT

This study delves into the environmental advantages of incorporating recycled rubber and oil palm empty fruit bunches (OPEFB) into cement roof tile composites. The integration of these materials not only benefits the environment but also proves economically advantageous by minimizing expenses related to landfill and incineration. The study focuses on developing composite samples (labelled A to D) with varying percentages of OPEFB fibers, subjecting them to tests for density, thermal conductivity, and water absorption. Fabricating cement roof tile moulds tailored for specific testing further enhances the study's comprehensiveness. The findings elucidate the intricate interactions between cement, rubber, and OPEFB fibres, impacting the tiles' physical characteristics. Increasing EFB fiber content from 0 to 15 wt. % in the composite material results in a gradual decrease in density from 336.944 kg/m³ to 327.778 kg/m³. Water absorption shows a peak at 5 wt. % EFB fiber (13.08%), with a subsequent decrease at 10 wt. % (10.77%), followed by a rise at 15 wt. % (13.87%). The thermal conductivity varies among compositions, with the sample without EFB fiber having the highest value of 0.141 W/m°C. While offering promising advantages, variations in water absorption and unexpected trends in thermal testing underscore the need for further research and refinement to optimize material properties and ensure compliance with industry standards, thereby enhancing the practical applicability of these sustainable composite materials.

Keywords: sustainable composites; recycling rubber; oil palm empty fruit bunches (OPEFB); cement roof tile.

1. INTRODUCTION

There has been extensive study about thermal and physical properties of cementitious composites reinforced with natural fiber or rubber tire waste, including many ways to modify the fiber surface to increase the fiber's compatibility and bonding to the cement matrix (Abdullah et al., 2011). The coefficient of heat conductivity decreases as the fiber content increases (Kroehong et al., 2018). However, As the amount of fibre in the composite grows, so does its porosity (Lertwattanaruk & Suntijitto, 2015). For the best outcomes, they even suggested that the fibre aspect ratio should fall between 100 and 200 (10-30mm). The addition of fibre is increasing the composite's heat conductivity. The coefficient of heat conductivity decreases as the fibre content increases (Kroehong et al., 2018). At greater fibre contents, OPEFB composites have a slightly lower thermal conductivity than coir fibre composites; at lower fibre levels, both composites have the same thermal conductivity (Lertwattanaruk & Suntijitto, 2015). As for the effect of rubber content, the rate of heat transfer was found to

decrease with the increasing rubber content. Comparing the same size, the smallest value is found at 30%, and increased gradually at the rubber content of 20% and 10% (Raut & Gomez, 2016).

2. METHODOLOGY

The samples were treated using an alkaline treatment to improve their mechanical and durability properties. OPFEB fiber is treated with 5% NaOH and soaked for 12 hours. The size for recycled rubber crumbs is 20 mesh (Raut & Gomez, 2016). The rubber particles pretreated with NaOH have better bonding relationships with cement matrixes and higher compressive strength.

First, water with plasticizer was added to the cement powder and blended for 2 minutes. A plasticiser is a substance or material added to concrete to make it softer, improve workability and strength, and reduce water requirements. Then, when applicable, the 30g modified rubber particles were gradually added into the mixer and blended for 3 minutes and/or the treated fibers were added and blended for another 5 minutes. The mixture was poured into a mold and cured for 24 hours. Afterward, the composite was taken out from the mold and cured for 28 days. The sample mixed with different percentage OPEFB fiber as shown in Table 1.

Table 1. Composition of Samples

Sample	Portland cement type I (g)	Modified rubber (g)	OPEFB fibre (g)	Plasticize (g)	W/C ratio
A (C+MR30%)	100	30	0	0.8	0.5
B(C+MR30%+OPEFB5%)	100	30	5	0.8	0.5
C(C+MR30%+OPEFB10%)	100	30	10	0.8	0.5
D(C+MR30%+OPEFB15%)	100	30	15	0.8	0.5

3. RESULTS AND DISCUSSION

The appearance of Rubber-EFB (Empty Fruit Bunch) fiber cement tiles is influenced by the combination of rubber, EFB fibers, and cement, resulting in a distinctive and versatile building material. Adherence to MS 797 standards reveals that water absorption percentages for EFB fiber composites surpass the specified limit of 4.4%, ranging from 10.51% to 13.87%. The increase in porosity due to the fiber content results from internal structural pores present within the fiber itself (Rao & Ramakrishna, 2021).The sample without EFB fiber (0 wt. %) exhibited the highest thermal conductivity at 0.141 W/m°C, surpassing values for samples with 5, 10, and 15 wt. % EFB fiber. Table 2 shows the full results for U-value (thermal transmittance) and R-value (thermal resistance).

Table 2. U-value (thermal transmittance) and R-value (thermal resistance) of sample

EFB fibre	U-value (thermal transmittance) (W/m^2K)	R-value (thermal resistance) (m^2K/W)
0 wt. %	344.83	0.0029
5 wt. %	185.19	0.0054
10 wt. %	96.15	0.0104
15 wt. %	217.39	0.0046
Standard	0.60 (maximum)	1.67 (Minimum)

4. CONCLUSION

The study examined the physical properties of Rubber-EFB fiber cement tiles, focusing on appearance, density, water absorption, and thermal conductivity. The study found that EFB fiber content significantly influenced color variation, texture evolution, and pattern development. Density decreased with increasing EFB fiber, but this necessitates a comprehensive evaluation of mechanical and thermal properties for specific applications. Water absorption exceeded Malaysian Standard MS 797 limits, suggesting potential limitations in practical applicability, especially in moisture-sensitive environments. Thermal testing revealed unexpected trends, highlighting the need for a nuanced understanding of the material's behavior. The assessment against MS 2680:2017 standards revealed challenges in meeting insulation criteria, emphasizing the need for material composition adjustments for future research exploration.

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Exploring Third Spaces Design Framework Based on The Experience of Residents That Helps To Reduce Psychological Stress And Support Community Well-Being In Low-Cost Public Housing In Malaysia

*[1,2]Wan Aishah, [1]Wan Srihani Wan Mohamed and [3]Noor Syahida Md Soh

[1]Faculty of Design & Architecture, Universiti Putra Malaysia, Serdang, Selangor, Malaysia
[2]Public Private Partnership Unit, Prime Minister's Department, Malaysia
[3]Centre of Foundation Studies, Universiti Teknologi MARA, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: wanaishah0705@gmail.com

ABSTRACT

The basic human need for a home that provides more than simply shelter underpins the need to understand the relationships between housing, health, and well-being. There is more emphasis on the quality of the home, with an agreement that the home is the foundation for resilience and well-being. There is a complex relationship between home and mental illness, as the environment in which a person lives can significantly impact their mental health. Some ways in which home can influence mental health include stressful living conditions. Therefore, having a safe and supportive home environment can help to protect people from mental illness. This research applied phenomenology in qualitative research methodology. The data were collected through semi-structured interviews and analysed using ATLAS.ti version 8 software. The results show that residents in Malaysia's low-cost public housing have unique needs and preferences, benefit from the supportive and inclusive environment, enjoy activities contributing to social and skill development, are involved in activities for spiritual growth and spiritual healing and creative for innovation and flexibility in the third space design.

Keywords: housing; public housing; third spaces; psychology; community well-being.

1. INTRODUCTION

The basic human need for a home that provides more than simply shelter underpins the need to understand the relationships between housing, health, and well-being in ways that go beyond apparent problems such as dampness and cold (Rolfe et al., 2020). A home that lacks basic needs such as access to clean water, food, and healthcare can significantly impact a person's mental and physical health. There is likely more emphasis on the quality of the home, with a broad agreement that the home is the foundation for resilience and well-being (Samuel, 2020). There is a complex relationship between home and mental illness, as the environment in which a person lives can significantly impact their mental health. Some ways in which home can influence mental health include stressful living conditions (Perreault et al., 2022). Living in a chaotic, cluttered, or overcrowded home can be stressful and overwhelming, contributing to mental health problems such as anxiety and depression (Gonyea et al., 2018). A lack of social support and connections within the home can lead to feelings of isolation and loneliness (Agarwal et al., 2021), increasing the risk of developing mental health problems. On the other hand, a supportive home can provide a sense of security, stability, and comfort, improving

mental well-being. It can also offer a sense of belonging and connectedness that can help promote social support and reduce feelings of isolation. Low-cost housing is a cheaper shelter solution for a particular economic group. The term low-cost refers to the prices of housing development materials and the housing units as the product (Aishah et al., 2023). In Malaysia, the low-cost public housing is an initiative by the government to fulfil the housing needs of lower-income groups. Though the specification is expected to meet the basic housing needs of a specific target group of citizens, there is much literature about limited living conditions in low-cost public housing in Malaysia (Gonzalez-Longo & Mohd Sahabuddin, 2019). Therefore, this research explores the contributions of third spaces that help reduce psychological stress in the context of low-cost public housing residents in Malaysia. The aim is to propose further a design framework of related third spaces for low-cost public housing. Thus, this paper aims to explore third space experience to propose a design framework that supports community well-being for low-cost public housing in Malaysia with the following research question (RQ): How to formulate a framework for third spaces design based on the experience of residents that helps to reduce psychological stress and support community well-being in low-cost public housing in Malaysia?

2. METHODOLOGY

Phenomenology is a qualitative research method that aims to understand and describe the subjective lived experiences of individuals (Moustakas, 1994). It is rooted in the phenomenology philosophy, which emphasizes the study of conscious experience and perception. In qualitative research, phenomenology is used to gain insight into the meaning and essence of a particular phenomenon, such as the lived of a specific group of people or how individuals understand and make sense of a particular event or situation. This approach typically involves collecting in-depth, personal narratives from participants and using interpretive methods to analyze the data, which best follows Moustakas (1994) for a psychological perspective (Creswell & Poth, 2018). Therefore, this research adapts semi-structured interviewing in phenomenological research in accordance to Moustakas (1994).

3. RESULTS AND DISCUSSION

The recorded interviews with 7 participants from 5 low-cost public housing areas were transferred into 7 verbatims. The interview verbatims were uploaded into ATLAS.ti version 8 software and analysed accordingly. The analysis involved coding, categorising, and finding the final theme. The initial coding are 200 open codes, later merged and grouped into 78 similar codes. The 78 final codes were then grouped into 6 categories and 5 final themes.

3.1 Finding 1: Third Spaces Experience That Helps to Reduce Psychological Stress and Support Community Well-being for Low-Cost Public Housing in Malaysia

The results show that residents in Malaysia's low-cost public housing have unique needs and preferences according to locality. Some people might have a high tolerance to the available physical condition, but others might feel mentally disturbed by the surrounding and the built environment. The research found that low-cost public housing residents and communities highly utilize shared spaces. The availability of community hubs, halls, praying places, fields, playgrounds, and gazebos extensively benefited the low-cost public housing residents and communities. The research also found that low-cost public housing residents enjoyed activities

contributing to social and skill development. Apart from socialising and hanging out with families, friends, and neighbours, the low-cost public housing community hosted feasts, ceremonies, financial aid and mutual aid programs, urban farming, and voluntary patrol and firefighting schemes. The residents of low-cost public housing in Malaysia are involved in many religious activities. With Islam as the national religion, Malaysia allowed other faiths to be practiced. Therefore, people can openly conduct religious movements in the third space. In fact, Malaysian, including the low-cost public housing residents, are very respective to the religion practiced by others and sometimes get invited to festival ceremonies like Hari Raya Aidilfitri, Chinese New Year, and Deepavali celebrations in communities. Finally, the architects and designers should allow room for innovation and flexibility in the third space design for low-cost public housing residents and communities. Creative individuals and low-cost housing communities created third spaces that suited local needs and preferences. Examples from this research are a hall converted into praying places, an outdoor kitchen prepared by the low-cost public housing community, and a jetty to park boats and do fishing activities developed by the low-cost public housing residents.

3.2 Finding 2: A Framework for Third Spaces Design Based on the Experience of Residents That Helps to Reduce Psychological Stress and Support Community Well-being in Low-Cost Public Housing in Malaysia

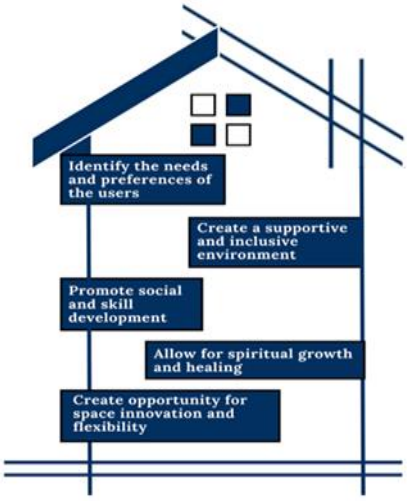

Figure 1. The Low-Cost Public Housing Third Spaces (LUHOTS) Design Framework

The final framework is a design framework for third spaces that help to reduce stress and support community well-being for low-cost public housing in Malaysia. The framework for designing third spaces is elaborated as follows: (i) Identify the needs and preferences of the users: Before designing a third space, it is crucial to understand the needs and preferences of the users. This can be done through user research and observation, which can help to identify the types of activities and interactions that users are interested in. Natural lighting, ample seatings, and biophilic design that involve nature in built environments are among the common preferences of third spaces design for the low-cost public housing in Malaysia. (ii) Create a supportive and inclusive environment: Based on the needs and preferences of the users, designers should design the space in a way that is accessible, friendly, welcoming, and inclusive. This can involve creating spaces for different activities, such as gathering, socializing, sports, or learning. (iii) Promote social and skill development: The third space

should encourage interaction and networking between users and promote social and skill development. This can involve creating spaces for group activities. Activities such as urban farming improve skills in gardening, and sports activities are suitable for physical and mental health. (iv) Allow for spiritual growth and healing: Praying places allow the user to socialize, network, and enhance religious knowledge. The space should facilitate spiritual growth through observation and learning, such as by providing spaces for people to meet and greet with others, join community programs, and learn through religious classes and speeches. (v) Create opportunity for space innovation and flexibility: Finally, it is crucial to continuously iterate and improve the design of the third space based on the needs and preferences of the users. It creates the opportunity for space innovation and flexibility, leaving room for future changes and improvement. To finally complete this paper, the researcher has developed The Low-Cost Public Housing Third Spaces (LUHOTS) Design Framework to contribute to the body of knowledge and reference in the design and architecture field. The LUHOTS design framework is illustrated in the Figure 1.

4. CONCLUSION

The framework anticipated to shorten the gaps in current third space design at the low-cost public housing in Malaysia with the residents third space experience. It is hoped that this framework will benefit the government sectors by serving as a reference for policymaking and implementations by government authorities, government bodies, and related agencies. Additionally, this framework is projected to guide Architects, Landscape Architects, and Town Planners in designing third spaces for low-cost housing. Finally, this research might inspire ideas about third spaces for Non-Governmental Organizations (NGOs) to conduct activities and contribute to the low-cost public housing community.

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CATEGORY C
(Foundation/Matriculation)

EYE (i) ROBOT: AI-Driven Approach to Home Assistants

*Muhammad Safrul Rosli and Raudzatul Fathiyah Mohd Said

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: muhdhdsafrul@gmail.com

ABSTRACT

A technological invention, called smart home assistant, originally held the potential to improve quality of life. However, the idea was long buried by the masses due to its underlying unreliability. Hence, EYE (i) ROBOT serves as an AI-Driven solution to home assistants. Feature includes automatic speech recognition, face recognition, home automation and home monitoring. Made to offer a better solution than existing home assistants in the market. The goal is to create a home assistant that is reliable, natural-like, and capable of securing private spaces. This can be achieved by utilising various Artificial Intelligence (AI) technologies. Findings shows that EYE (i) ROBOT is able to identify humans. Moreover, it is able to control a smart light within reasonable timeframe. That being said, EYE (i) ROBOT is targeted for building owners whether it's a house or office, seeking security and assistance within their private spaces. In conclusion, EYE (i) ROBOT is a further step towards our mission to benefit humanity.

Keywords: artificial intelligence; raspberry pi; python.

1. INTRODUCTION

The scope of this paper is to improve the existing smart home assistants by implementing latest AI technologies. The objective is to facilitate a more natural and intuitive interaction between users and EYE (i) ROBOT. Recent review of pertinent literature has shed light in several key areas of focus in enhancing user interaction and experience with smart home assistants. These include natural language processing (NLP), computer vision, context-aware interaction paradigms, and human-robot interaction (HRI) research. The advancements mentioned greatly contributes to our mission. To ensure fluidity in development, the methodology involves Requirements Analysis, Software Architecture Design, Development and Testing, Hardware Design and Integration, and lastly Testing and Evaluation. Initial evaluation of EYE (i) ROBOT demonstrates promising results. It is able to respond within a reasonable timeframe and exhibits high accuracy in recognizing faces.

2. METHODOLOGY

This methodology outlines the systematic approach taken in EYE (i) ROBOT development process. The system comprises both front-end and back-end features written in Python (Python 3.11). It is housed within a meticulously designed casing with carefully selected internal components.

2.1. Requirement analysis

Detailed requirements for software and hardware components were gathered to establish clear objectives and constraints. Key functionalities including facial recognition, speech recognition, home automation, and language model processing were identified for the back-end, while front-end features such as simulated 'awareness' through a digital eyeball, user-to-robot text display and robot-to-user text display were delineated.

2.2. Software architecture design

The software architecture was designed for a seamless join between back-end and front-end features. Furthermore, modular design principles were applied to ensure scalability, maintainability, and efficiency. Each module was defined to encapsulate specific functionalities, promoting ease of development and future enhancements.

2.3. Development and testing

Back-end features were developed iteratively, utilising advanced algorithms and models for tasks such as facial recognition, speech recognition and Generative AI integration. Rigorous testing were conducted to validate functionality, reliability, and performance. Front-end features were implemented concurrently, with careful attention to user experience.

2.4. Hardware design and integration

The casing is 3D printed out of PETG+ filament and designed in FreeCAD. The internal components such as Raspberry Pi 4B, IPS display, and audio I/O system, were selected to complement the software functionalities.

2.5. Testing and evaluation

Hardware components were assembled and the software is deployed on-device. Several testing was then performed to solicit benchmarks to ensure compatibility, functionality, and reliability before go-live.

3. RESULTS AND DISCUSSION

3.1 Speech comprehension proficiency

EYE (i) ROBOT exhibits a more nuanced understanding compared to traditional smart home assistants. Through advanced speech recognition algorithms and natural language processing capabilities, the robot accurately interprets user commands, enabling seamless interaction. As of this writing, Gemini is chosen as the LLM-model. In tabulated benchmark (Table 1), Gemini's Pro model achieved comparable but slightly inferior to OpenAI's models. However, Gemini is more cost effective.

Table 1. Model Benchmark (Akter, S. N., et al., 2023)

	Model				
Task	**Dataset**	**Gemini Pro**	**GPT 3.5 Turbo**	**GPT 4 Turbo**	**Mixtral**
Knowledge-based QA	MMLU (5 shot)	65.22	67.22	**80.48**	68.81
	MMLU (CoT)	62.09	70.07	**78.95**	59.57
Reasoning	BIG-Bench-Hard	67.53	71.02	**83.90**	60.76
Mathematics	GSM8K	76.42	78.01	**92.72**	71.65
	SVAMP	81.10	82.30	**92.60**	81.60
	ASDIV	85.31	89.07	**92.75**	83.16
	MAWPS	96.50	98.00	**98.67**	96.00
Code Generation	HumanEVAL	59.76	74.39	**76.83**	45.12
	ODEX	39.86	**52.62**	45.79	40.55
Machine Translation	FLORES	53.31	52.43	**54.00**	40.97
	Unblocked	21.68	40.00	**48.24**	30.27
	FLORES All				
Web Agents	WebArena	7.12	8.87	**14.90**	1.39

3.2 Responsiveness

EYE (i) ROBOT demonstrates the ability to recognize users with remarkable precision and speed. It consistently identifies faces even under varying lighting conditions and facial expressions.

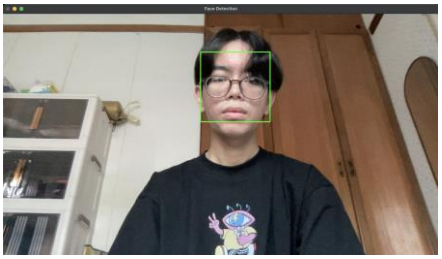

Figure 1. Face Detection

3.3 Robustness of software

EYE (i) ROBOT demonstrates the ability to recognize users with remarkable precision and speed. It consistently identifies faces even under varying lighting conditions and facial expressions.

Table 2. Tkinter and PyQt Performance Benchmark

Framework	CPU Usage (%)	RAM Usage (MB)
Tkinter	4.6%	1540.0
PyQt	2.8%	184.0

4. CONCLUSION

EYE (i) ROBOT is a further step towards our mission to benefit humanity. However, despite the capabilities shown, we should note that there are limitation to the use of these AI technologies. There is a continued need for ongoing research and development in "hallucinations" generated. Be that as it may, we are enthusiastic to push towards our broader future to develop the best AI-assistant.

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Thermoelectric Powered Watch

Nur Allysa Sofea Muhammad Jeet Iskandar, Nur Shahirah Sohaimi, Nurul Iman Mohamad Zaki, Zulisha Sofia Zulkifli and *Nurkhaizan Zulkepli

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: khaizan2821@uitm.edu.my

ABSTRACT

Nowadays, wearing a watch is like an essential item for everyone, whether it is to remind people of the time or for accessories. However, watches sold on the market are still using non rechargeable batteries, which could lead to an increase in e-waste as users have to change their watches's batteries every time they run out of energy. Moreover, if these e-wastes aren't disposed of properly, they will harm the environment. Therefore, we have decided to create a ZAIS watch, a thermoelectric-powered watch where a thermoelectric generator will be installed within our watch mechanism. Then, it will collect the heat from our body, generate the heat energy to electric energy, and power the watch. Next, the electric energy will be stored in a rechargeable battery that will also be installed in our watch mechanism. This product is made to reduce the cost of changing our watches' batteries, reduce e-waste, and practice the usage of renewable energy sources in daily appliances. We believe that this innovation would bring a lot of benefits to everyone.

Keywords: thermoelectric; electric generator; rechargeable battery.

1. INTRODUCTION

A thermoelectric generator module is a solid-state device that converts thermal energy directly into electrical energy (Progress in Energy and Combustion Science, (2022)). Thermoelectric is defined as relating to, or dependent on phenomena that involve relations between the temperature and the electrical condition in a metal or in contacting metals. When two metals are placed in electric contact, electrons flow out of the one in which the electrons are less bound and into the other. There will be a current if the temperature of one of the junctions is raised with respect to that of the second. To maintain the temperature difference, heat must enter the hot junction and leave the cold junction. The problem statements are battery dies quickly and e-waste will increase. Battery waste is one of the problems that the world faces today. Based on watches sold in the market, the batteries that power the watch don't really last long, for this reason we created this thermoelectric powered watch. This watch will convert thermal energy directly into electrical energy. Aside from that, the cost to recycle e-waste will increase is one of the problem statements. If these E-wastes aren't disposed of properly, it will harm the environment. Our lives are becoming ever more electrified. All of those electronic devices will end up as e-waste sooner or later, letting the e-waste stream grow immensely and making it the fastest-growing waste stream worldwide. If the amount of e-waste is increasing, we need to use a lot of energy and money to make sure the e-waste is disposed of properly.

2. METHODOLOGY

For the mechanism of our thermoelectric powered watch, thermoelectric generators are used. Thermoelectric generators are solid-state semiconductor devices that convert a temperature difference and heat flow into a useful DC power source (Alfred, 2022). These thermoelectric generators are placed at the base of the watch and under the watch strap. The base of a thermoelectric generator is a thermocouple. A thermocouple is made up of one p-type semiconductor and one n-type semiconductor. The semiconductors are connected by a metal strip that connects them electrically in series. The thermoelectric generator utilizes the Seebeck effect. The Seebeck effect is the direct energy conversion of heat into electrical energy. The Seebeck effect occurs due to the movement of charge carriers within the semiconductors (Alfred, 2022). In doped n-type semiconductors, charge carriers are electrons and in doped p-type semiconductors, charge carriers are holes (Libre texts, 2021). Charge carriers diffuse away from the hot side of the semiconductor to the cold side of the semiconductor. This diffusion leads to a buildup of charge carriers at one end. This buildup of charge creates a voltage potential. The voltage potential is then stored in the rechargeable battery. The voltage that is stored in the rechargeable battery is then used to power the watch. Through our invention, the problem of needing to change watch batteries often and increasing e-waste can be reduced.

3. RESULTS AND DISCUSSION

Thermoelectric powered watch has a thermoelectric generator and a rechargeable battery that allows us to generate electricity continuously without needing to change the battery at all. This battery can be charged with the renewable energy source which is our own body heat. The thermoelectric generator converts heat flux (temperature differences) directly into electrical energy. Using a thermoelectric generator as an electricity generator has many benefits. First of all, thermoelectric generators are the direct energy conversion. This makes thermoelectric generators less mechanically complex than some other energy conversion technologies (Alfred, 2022). Other than that, thermoelectric generators are more reliable. Thermoelectric generators are solid-state devices. Having no moving parts to break or wear out makes them very reliable. Plus, thermoelectric generators can last a very long time (Alfred, 2022). To add on, thermoelectric generators are also compact in size (Alfred, 2022). This leads to greater design flexibility and saves more space. So, by using a thermoelectric generator as an electricity producer for our watch we can create a better watch that can work more efficiently and productively in our lives. Our target people for this product are nature lover people and people that do not have time to spare for changing their battery. This product has high marketability since watches are always growing in its versatility and function throughout the passage of time. Our product offers a great innovation that can contribute a great impact in protecting our world.

Figure 1. Front view

Figure 2. Side view

4. CONCLUSION

To conclude, this watch innovation was created to reduce the cost to change our watches' batteries as we are using a thermoelectric generator powered directly by our body's heat. After that, this innovation can reduce e-waste because this watch is generated by a thermoelectric generator instead of batteries. Then, this innovation could practice the usage of renewable energy as the thermoelectric generator is powered by heat which is a renewable energy as we could obtain it through our body's heat. This watch could be more convenient for users as they won't need to change their watch's batteries every time the batteries run out of power.

ACKNOWLEDGEMENT

The authors would like to thank UiTM for the opportunity to participate in the Creations de UiTM International Mega Innovation Carnival 2024 and to Dr Nurkhaizan Bte Zulkepli for the encouragement.

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Instant Fire Extinguishers (I.F.E)

Muhammad Thaqif Aqil Ismail, Muhammad Syahwal Fitri Mohd Sufian Syah, Alisha Mohd Fadzli, Irdina Wani Fatini Abd Zaini, Muhammad Danish Zainal Akma and *Nurkhaizan Zulkepli

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: khaizan2821@uitm.edu.my

ABSTRACT

Instant Fire Extinguishers (I.F.E) are one of the effective methods to operate in severe disaster situations. Fire disasters have become a serious issue in recent years, causing countless deaths and injuries. Common fire extinguishers often suffer from various malfunctions like rust, or at worst, frequently missing pins. Considering the problems, an Instant Fire Extinguishers (I.F.E) prototype was made in this research, to represent a futuristic fire extinguisher for firefighting purposes. I.F.E's intention is to be less time consuming, be maintained easily and reduce the amount of fatalities at its best. This product also was crafted from match “head”, austenitic steel, hydroxyl-terminated polybutadiene, biodegradable plastic, acetone, hydrogen peroxide, hydrochloric acid, monoammonium phosphate powder and gunpowder. The idea to make this product eco-friendly and safe was prioritised as this product was set to be used limitless on all ages. High authorities of the government worldwide were expected to get hold of I.F.E as it may reduce casualties during fire breakouts. In summary, I.F.E was created to save lives and maximise the termination of fire.

Keywords: fire extinguisher balls; disaster; emergency.

1. INTRODUCTION

Nowadays, fires in Malaysia are becoming more prevalent especially in home, forest and industrial areas. Fire is a destructive force that can cause great damage to property and pose a serious threat to human safety. In order to fight fires effectively, it is important to understand the principles behind fire extinguishers. Normal fire extinguishers cannot withstand environments with extreme temperatures, humidity, or excessive vibrations (QRFS, 2019). Not only that, improper maintenance can cause rust and leakage (QRFS, 2019). When the fire extinguisher was used for a very limited time, the extinguishing agent may clog the pipe of the fire extinguisher and prevent it from coming out, leading to disturbance during future use (QRFS, 2019). This product acts as an alternative for these fire extinguishers applications. Our objective in making this is to achieve a fire extinguishing success rate exceeding 80%, minimise maintenance requirements, and reduce preparation time for tackling severe fire situations.

2. METHODOLOGY

From our observations, common fire extinguishers often exhibit drawbacks alongside their benefits. To counter the drawbacks effectively, we came out with an innovation of this product, Instant Fire Extinguishers (I.F.E). Our goal is to achieve a fire extinguishing success rate

exceeding 80% while minimising maintenance requirements compared to common fire extinguishers. We also aim to reduce the preparation time for firefighting.

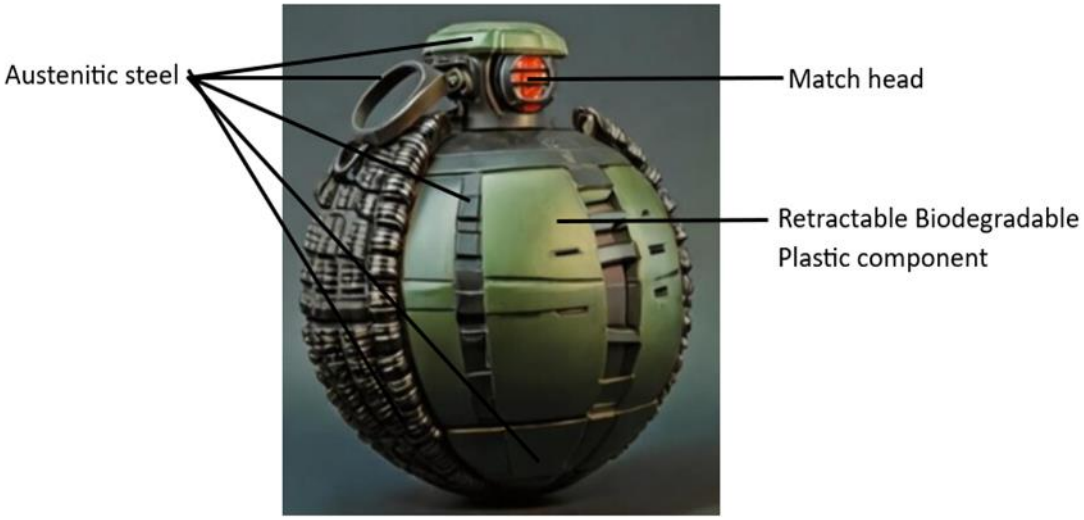

Figure 1. Innovation Prototype

Austenitic steel, the key component, has a high specific heat capacity and corrosion resistance, ensuring durability (Kumar S. & Tushar J, 2018). The shell can withstand high pressure during explosion, allowing only the monoammonium phosphate powder to seep out through the pit. We use a match "head" to ignite the I.F.E, as friction produces a spark to ignite the TATp mixture. A protective cap is added on the match "head" to avoid it getting ruined by moisture and heat.

3. RESULTS AND DISCUSSION

I.F.E is a convenient product that could be used easily by anyone. It is decided that our main target market is the government. I.F.E should be mandated in government buildings for enhanced fire protection, as its ease of use makes it accessible to all. Exporting this product worldwide can help minimise fire damages globally and contribute to boosting our country's economy. I.F.E has a high marketability among the government. Thus, we believe that I.F.E will receive high demands from the government as I.F.E can effectively save citizens and their belongings during a fire break out.

4. CONCLUSION

In conclusion, I.F.E has the potential to increase the fire extermination success rate as short preparation time is needed. Fires can be put out quickly and reduce the risk of fire injuries. Furthermore, I.F.E is well-secured to maintain the content inside and minimise the amount of maintenance needed compared to common fire extinguishers. There are ways to improve this product in the future. Firstly, to ensure the functionality in small spaces, we would like to make a smaller version of I.F.E. Next, replace the match "head" with a detonating cord to increase efficiency as it gives a longer time interval before I.F.E explodes.

ACKNOWLEDGEMENT

We would like to thank Allah SWT for guiding us through a challenging project. They benefited from guidance from our lecturer, fellow teammates, and family support. We brainstormed ideas for innovative products, ultimately developing Instant Fire Extinguishers (I.F.E). We believe this product will benefit the industry and reduce victims of fire events. We also thank Universiti Teknologi MARA Dengkil for supporting the project. The team believes this product will significantly impact fire depletion.

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Travellers Toiletries

*Muhammad Hakim Sugiman, Nor Hazwani Alieya Mohd Hamdan, Farah Nabihah Mohd Isam, Muhammad Luqman Hakimi Mohd Faizal, Muhammad Farid Izzat Hishamuddin, Mohd Helmy Yusof

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023684606@student.uitm.edu.my

ABSTRACT

Travellers Toiletries is a travelling container with different compartments that can store soap, shampoo and other types of toiletries such as toothbrushes. This product was made to overcome the difficulties faced by travellers whenever they wanted to bring along their toiletries. In a recent survey we have done, it is found that many people face trouble with bringing along their toiletries as many soap and shampoo bottles are too large to fit inside their luggages or travelling bags. Travellers Toiletries is made out of High-Density Polyethylene (HDPE) because it is highly durable, lightweight and easily recyclable, which contributes to waste reduction and helps protect the environment. Additionally, it also includes a handle on the top made out of liquid silicone rubber (LSR) to make carrying it much easier. This way, travellers won't have any issue bringing along their toiletries during travels to maintain their hygiene.

Keywords: travellers toiletries; container; durable; lightweight; hygiene.

1. INTRODUCTION

Emerging trends in global travel indicate a shift towards more sustainable practices, with a rising demand for products that align with these values. Recent studies, such as those presented by ŞENYAPAR in 2024, show that we are indeed living in what can be termed 'post-inconvenient times,' where consumers increasingly demand products that do not sacrifice convenience for sustainability (Durmuş Şenyapar, H. N, 2024). Travellers Toiletries is the ideal companion for travellers, designed specifically to cater to the modern traveller who seeks both convenience and a commitment to environmental sustainability. Our unique product set includes multiple reusable containers that can be used to store multiple types of toiletries. This not only simplifies your travel routine but also significantly reduces environmental impact, echoing the growing demand for green products in an era where ecological concerns are paramount.

Travellers Toiletries not only meets the practical demands of maintaining personal hygiene on the move but also respects and enhances the travellers' desire to uphold their environmental values. By simplifying the packing process and eliminating the need to compromise between quality and sustainability, our toiletries set a new benchmark in travel-related products.

2. METHODOLOGY

This product is equipped with several user-friendly features, including a handle integrated into

the product's body. We use strong and soft material on the handle side of our products, which is liquid silicone rubber (LSR) so that users feel comfortable and make it easier for users to hold them. Liquid silicone rubber (LSR) is favoured for its skin-safe properties, durability, flexibility, and soft texture (Casco Bay Molding, 2016).

Furthermore, our product bodies are made from High-Density Polyethylene (HDPE) with 13 cm height and 8 cm width. We chose HDPE because it is a robust and durable plastic that is also eco-friendly. It falls into the SP2 category, which means it is safe for use in bath gel containers, shampoos, and other cosmetic products. Our products consist of three main sections which are bath gel, shampoo, and conditioner. Additionally, the bottom of the shower gel and shampoo section features an extra compartment for storing other small bath items.

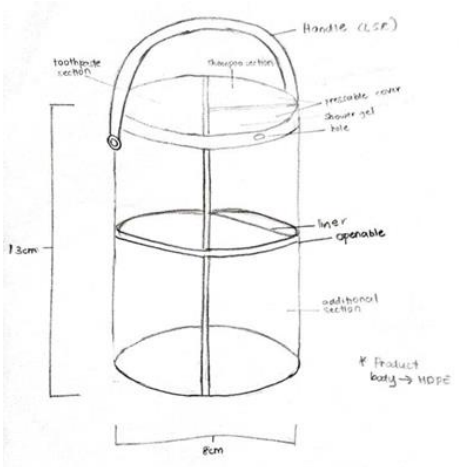

Figure 1. Traveller toiletries design

3. RESULTS AND DISCUSSION

3.1 Relevance of the invention

Travellers Toiletries are relevant to the problems faced by travellers when it comes to bringing bottles of toiletries. It is because of the bottle's design that people find it space consuming when travelling. This product helps to address this problem by its travellers friendly feature. This product features including its small size to fit inside a traveller's bag pocket, minimising the use of storage space. There is also its feature where three different compartments were built in one bottle to fit three different body hygiene products. This helps travellers to have more spare space to fit other important things for their travels plus its built-in strap to make it easier to carry around. This product is very simple and easy to use.

3.2 Contribution to environment or society

Travellers Toiletries contribute to the environment with its eco-friendly material. This product also helps to reduce the manufacturing of toiletries bottles where usually a traveller has to have three different bottles for their body hygiene products or even more. Travellers Toiletries also contribute to the society by helping them to reduce the occurrence of garbage disposal as well as reducing our environmental pollution, promising a better quality of environment for the society.

4. CONCLUSION

In conclusion, Travellers Toiletries would be a product that is beneficial for many people as it makes it easier for them to bring along their toiletries. The market potential for our product is high. In a recent survey, we have found that many people around the age of 19 have trouble with packing their toiletries for travelling [3]. Our product will be highly sought after by them and also by those that take care of their hygiene. Future improvement that could be done is making the smaller versions to fit different needs for travellers.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the following people for their invaluable support and contributions in the achievement of developing Travellers Toiletries product; University of Technology MARA, Dengkil Campus, the group members of the project being, Muhammad Hakim bin Sugiman (Leader), Nor Hazwani Alieya Binti Mohd Hamdan, Farah Nabihah binti Mohd Isam, Muhammad Farid Izzat bin Hishamuddin, Muhammad Luqman Hakimi bin Mohd Faizal, our supportive mentor, Mohd Helmy bin Yusof and most importantly University of Technology MARA(UiTM), Dengkil Campus provided us with the opportunity to complete this project.

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Hydrobreeze

Siti Aisyah Aqilah Ibrahim, Nur Alyaa Nadhirah Kamarudin, Nurdina Sharifuddin, Siti Qistina Balqis Aliff Adam, Hawa Dasyifa Mohd Jefri and *Nurkhaizan Zulkepli

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: khaizan2821@uitm.edu.my

ABSTRACT

Hydrobreeze is an eco-friendly fan which uses renewable energy. The main idea of inventing the Hydrobreeze fan is to save the earth from non-renewable energy and reduce cost in electricity. This is due to news concerning global warming in our country because of non-renewable energy usage and complaints about rising electricity bills because of its high usage in life. Therefore, the Hydrobreeze fan is introduced, which uses water as renewable energy to generate electricity. The usage of hydroelectric energy in this invention is hoped to contribute to the well-being of this planet and give benefits to individuals. This Hydrobreeze fan will be an attention grabber for everyone to buy and benefit from its functions. In conclusion, Hydrobreeze fans will be useful to protect our drowning earth and cut the electric bills.

Keywords: hydrobreeze fan; renewable energy; hydroelectric energy; generate electricity.

1. INTRODUCTION

In a world where environmental consciousness is becoming increasingly crucial, our daily choices have a profound impact on the planet. Traditional appliances, while providing comfort and convenience, often contribute to energy consumption and carbon emissions. That is where our Hydrobreeze fan steps into a refreshing breeze powered by the force of sustainability (Handheld Fans Market Size, Share, 2024). Imagine a fan that not only cools your surroundings but also cools the planet. By harnessing the power of renewable sources, which is water, this fan becomes a beacon of eco-friendliness. It taps into the abundance of renewable energy, minimizing your carbon footprint and making a tangible difference in the fight against climate change (Hydroelectric Energy - How Hydroelectricity Works, 2024). As we navigate the challenges of a changing climate, it's evident that we need innovative solutions to continue enjoying modern comforts without compromising the future of our planet. This fan isn't just a product; it's a commitment to a greener, more sustainable lifestyle. It's a breath of fresh air, both literally and figuratively, as it ushers in a new era of responsible and conscious living.

In the summer, many people incur high electricity bills, primarily due to their frequent use of air conditioners. Plus, most of our country's electricity comes from nonrenewable sources, causing pollution and global warming. So, our group is jazzing up the fan with special features. The goal is to make the Hydrobreeze not just cool for customers, but cool for the country by saving energy and being more environmentally friendly. In summary, our decision to enhance the fan was motivated by high summer electricity bills and environmental concerns. Our Hydrobreeze aims to cut costs for users and contribute to a greener, cooler country with its energy-efficient feature.

Our project is fundamentally driven by a dual purpose: first and foremost, to champion environmental conservation by harnessing the potential of renewable energy sources, and secondly, to provide users with a practical means of economising on their electricity expenses. In essence, we're on a mission to contribute to the well-being of the planet while also offering a tangible benefit to individuals through cost savings on their energy bills.

Many people face substantial electricity bills in the summer due to frequent air conditioner use, exacerbated by the fact that much of our country's power is derived from nonrenewable sources, contributing to pollution and global warming. That was what made us decide to come up with our Hydrobreeze project.

2. METHODOLOGY

Based on observation and research, hydroelectric energy is applied in this product using the physics concept of induction. Electricity is converted from the kinetic energy of the water using a hydro turbine generator. This energy is called hydroelectric energy. By the material that we have, the body and base of the fan is made of Acrylonitrile Butadiene Styrene (ABS) plate that is a thermoplastic polymer. We chose to use this type of polymer as this due to its high resistance of chemicals, easily recyclable and light.

Moreover, we use water flow pumps to generate hydroelectric energy. The water will flow inside it making the turbine spin causing the relative movements in the electromagnetic field (Induction Generators, 2024). This action will cause the generator to generate the current for the fan propeller to move (Serway, R. A., & Vuille, C., 2017). This pump also has mechanical noise less than 55dB, SO there would be less noise when using this product. This pump also has a life span >3000h, thus, it can be used for a long time (Working Principle of Electric Generator, 2016). Lastly, the water tube will be connected to the water tank to continuously supplying water for the generator to keep generating hydroelectric energy.

3. RESULTS AND DISCUSSION

Hydroelectric energy is a renewable energy source which harnesses the power of moving water to produce electricity. In Hydrobreeze, the water potential energy from the water reservoir inside the water tank is converted into mechanical energy. As the water flows, its kinetic energy is used to turn the water flow pump or a hydro turbine generator. It is a model 12 V voltage regulator output that can give the 12 V radio power, charge and power supply with the max current ≥220mA and max output voltage 80V. This water flow pump acts as a generator in our Hydrobreeze which functions to generate electricity by converting kinetic energy into electricity.

Apart from that, in Hydrobreeze, the water will flow from the water tank which is designed to be located above so that it is said the head of the water reservoir is high. This is due to the higher the tank, the greater the water flow, more electricity can be generated. Thus, in this product, we have to carefully design the location of the water tank so that the water cycle is efficient to do the work.

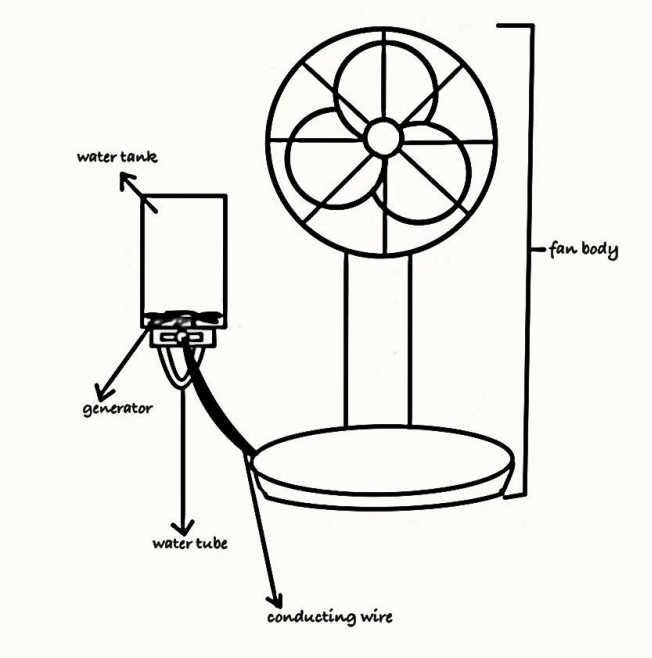

Figure 1. Innovation Prototype

Moving a magnet in front of a conductor results in the flow of electricity. Electromagnets in generators are created by passing direct current through wire loops wound around magnetic steel lamination stacks. These are installed around the rotor's periphery and go by the name of field poles. A set speed is rotated by the rotor, which is fixed to the turbine shaft. The field poles, or electromagnets, move past the conductors installed in the stator as the rotor rotates. As a result, power starts to flow and a voltage starts to build at the generator's output terminals. Therefore, the electromagnetic induction in the electric generator that transforms the mechanical energy of a rotating turbine into electric energy and lastly, spin the propeller fan in our hydrobreeze product.

4. CONCLUSION

To sum up, hydrobreeze can reduce electricity costs while simultaneously protecting the environment through the use of renewable energy. Other than that, our product has portable and adjustable fan speed that can ease users. We also have a variety of colours to attract people to buy this innovative product.

ACKNOWLEDGEMENT

The authors would like to thank Dr Nurkhaizan binti Zulkepli for the support and encouragement.

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Intelligent Walking Shoes for Blinds

Putri Zafirah Hamdan, Alia Khadijah Azman, Nur Aleeya Natasya Omar,
Umie Umairah Mohd Farid @ Zulkifli and *A'bir Wardati Abd.Latif

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: abirwa2887@uitm.edu.my

ABSTRACT

The World Health Organization estimates that 80% of vision impairment is preventable. As a result, many services and tools are offered to those who have them to assist them live normal lives alongside everyone else. Tactile pavement is one of the government's efforts to help the disabled be seen, and it is mostly found in pedestrianised zones. Intelligent Walking Shoes for Blinds are introduced to help the blind walk normally without complications even in a non-provided tactile pavement. Furthermore, these shoes are designed to solve the issue smarter than the conventional walking stick approach. This product contains a built-in obstacle-detection sensor and a Global Positioning System (GPS) that can be linked to electrical devices, like headphones, to assist with direction. The user's shoes are always linked to the application on their cellphones or the devices of their close friends or guardians. This makes it possible for the guardian to constantly track the user's whereabouts and guarantee their safety. This product is primarily designated for use by the government and medical fields to lessen their burdens. This product has a low cost, and it can be marketed globally as visually impaired people are not limited to this country. To sum up, Intelligent Walking Shoes for Blinds are more useful for enabling the blind to lead regular lives, and it is guaranteed that any visually impaired individual can own a pair.

Keywords: GPS; Intelligent Walking Shoes; Obstacle-detection Sensor; Visually Impaired.

1. INTRODUCTION

Visual impairment is a term experts use to describe any kind of vision loss, whether it's someone who cannot see at all or someone who has partial vision loss. Based on the National Eye Survey, 1996, (ieeexplore, 2013) in Malaysia prevalence of blindness for all ages is 0.2% while the prevalence of blindness among children 7 to 15 years is 0.1%, based on Refractive Error Study in Children, 2003. They are frequently referred to as visually blind because they have trouble interacting with and sensing their surroundings and the people around them (How to Make Reflective Shoes, 2021). Physical activity has been their largest issue because they have little contact with their surroundings. Visually impaired people frequently find it difficult to walk from one location to another and to recognize the impediments in their path. As a result, blind people have limited mobility since they require assistance with mobility and other daily activities (Braille Technology, 2022). To avoid obstacles like obstructions on sidewalks, walls, or other people, blind persons must always be aware of their surroundings. They may use white canes to assist them in getting around but it is generally made for outside use. They also can ask for sighted support to assist them in getting around but they may not always be available which can restrict their freedom and independence. Additionally, the standard accessibility

features for the blind, such as tactile pavement and textured surfaces to direct and warn persons about routes and crosswalks are not available in all areas. Therefore, we made these intelligent walking shoes to help them move everywhere easily.

2. METHODOLOGY

Intelligent blind shoes provide features that help visually impaired people arrive safely at their desired destination. First of all, the special feature that differentiates between casual and sports shoes is the ultrasonic sensor, as shown in Figure 1, located at the toe cap, central, and behind the collar padding embedded inside the shoes. This sensor has the same function to detect ground-level obstacles of different heights as well as ground pits and holes. This sensor works by sending out a sound wave at a frequency above the range of human hearing and using a transducer to send and receive ultrasonic pulses that relay information about an object's proximity (What is a Buzzer, n.d).

Figure 1. Ultrasonic sensor

In addition, the sensors are connected to a buzzer 12 V as shown in Figure 2. The main function of it is to convert the signal from audio to sound (Aminah B.M.K, 2012). It has high sound output, good power efficiency, and a rapid response to the object detected by the sensors. As a result, visually impaired people can avoid colliding with any obstacles that could be dangerous to them.

Figure 2. Buzzer 12 V

Furthermore, the shoes are made with braille labels on the side of the shoes (viziglow.co, 2021). Braille is a system of writing that uses raised dots or bumps on some surfaces to represent letters and numbers. These labels can help the wearer differentiate between right and left shoes. To ensure the user's safety at night, the shoes are made with a reflective element (maxbotix.com, 2023). For example, white midsoles coated in white reflective paint appear normal in daylight but reflect a brilliant white when light shines on them at night. Other features are also added to this shoe to offer the best quality and comfort to the user, such as a combination of synthetic mesh for lightweight and breathability and GORE-TEX for water resistance. Other than that, ethylene-vinyl acetate (EVA) is used for shock absorption.

3. RESULTS AND DISCUSSION

The intelligent blind shoes are designed, as shown in Figure 3, to help blind people navigate to their destination safely. These intelligent blind shoes contribute by providing innovative solutions, such as sensors, to enhance mobility and accessibility for blind people. This product

also incorporates the latest technology from various countries to deliver a better user experience. Moreover, these shoes promote environmental sustainability for society by facilitating social interaction for blind people, improving health, and reducing greenhouse gas emissions by using solar panels as the main energy source.

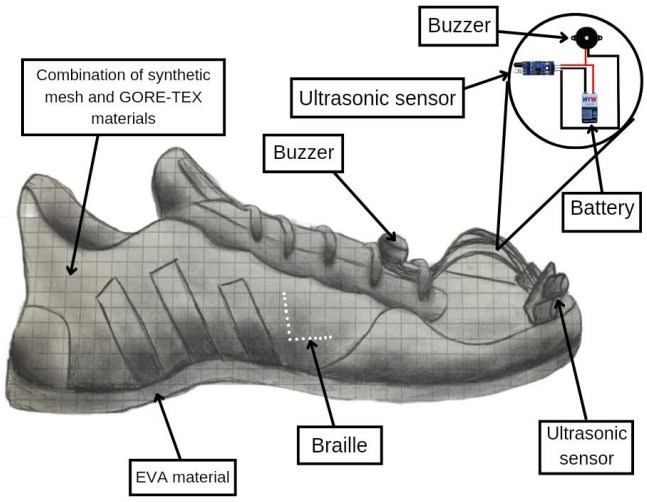

Figure 3. Intelligent Blind Shoes Prototype

The benefits of intelligent shoes are that they help blind people reach their destination safely by identifying an area that is free of obstacles or walls. These intelligent shoes use sensors to detect obstacles that may hinder them. When they encounter objects, the sensors make noises to alert the wearer. Furthermore, these shoes can be likened to a light that brightens the darkness and aids walking. By using these shoes, there is no need for blind walking sticks that can be lost or broken. Additionally, these intelligent shoes implement different technologies for visually impaired people. The most reliable way of obtaining information for blind people is through listening, which the intelligent shoes will provide through sound. Lastly, these intelligent shoes also improve the system performance and reduce the user's burden.

4. CONCLUSION

These intelligent walking shoes help blind people walk safely without worrying about running into other people or solid objects because the sensor on this shoe will beep when approaching an obstacle in front that prevents blind people from stopping or changing direction. Other than that, this intelligent walking shoe is a smarter way to use than using a traditional method of walking due to the possibility of missing. This product has worldwide, global, or worldwide market potential and is expected to have high demand. First, there are many impaired or blind people in the world, which are expected to increase due to ageing, urbanisation, and diseases. Second, the challenges and risks they face in their daily lives, such as mobility, safety, accessibility, and social inclusion. Third, the limitations and drawbacks of the existing products or services that aim to assist visually impaired people, such as canes, guide dogs, smartphone apps, or wearable devices. Four main groups are targeted to buy these intelligent blind shoes. First, the product is specifically created for blind people. Blind people can walk safely along the road since the products include sensors and buzzers that help them avoid obstacles. The second target for the product is elderly people (age 50 and older). As people age, their vision

tends to deteriorate or decline. This increases the risk of accidents for elderly people. This shoe has a variety of sizes and a lightweight design, so it is suitable for kids to wear it everywhere. Kids can use these shoes to go to school since they are adaptable to all conditions, such as dry and wet. When it is raining, the shoes are water-resistant.

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First, we would like to express our gratitude to the organisers, CDU 2024, for their hard work in making this innovation programme a success. We would also like to express our gratitude to UITM Dengkil Campus for giving us such a huge opportunity to join this innovation competition. It is beneficial in bringing to light the latent abilities of today's youth and in leading the country in the direction of success. Next, we would like to convey our special gratitude to our advisor, Mrs. A'bir Wardati binti Abd. Latif, for her willingness to lead us through this innovation process. Your useful advice and suggestions were helpful to us during the project's completion. Lastly, thank you to the entire group for constantly putting in their best efforts to complete this innovative product, from brainstorming the idea to product completion.

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AiCee

Ahmad Daniell Bukhari, Aida Rafieqah Mohd Rizal, Muhammad Muizzuddin Mahadhir, Aliyah Sofiya Abdul Muiz, Ameena Safiyyah Zaihan and *Siti Aisyah Zawawi.

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: aisyah.zawawi@uitm.edu.my

ABSTRACT

AiCee is a brand-new fancy product for individuals who desires to enjoy their favourite drink cold for a long time. Since, global warming has caused an increase in global temperatures, individuals would need a way to store their produces and beverages more effectively. Thus, we believe that AiCee itself can solve the current issue. This is because AiCee is equipped with the function of maintaining the temperature of its contents for a long period of time by applying the concept of specific heat capacity and thermodynamics. We instilled the concept of thermodynamics by pumping out heat from inside of the AiCee. This function enables the inside of the AiCee to stay cold. The AiCee is suitable for people who are constantly under hot weathers such as athletes, outdoor people and fishermen. In a nutshell, the AiCee is a revolutionary product that is beneficial for the quality of life of individuals.

Keywords: thermodynamics; specific heat capacity; hot; cold.

1. INTRODUCTION

Due to the extremely hot weather that has been hitting us lately, everyone in this world is affected by this situation. This extremely hot weather is mainly caused by global warming. Global warming is not interchangeable with climate change, but these terms are caused by human activities and the greenhouse gases that are released to our surroundings.

The main issue is global warming has caused weather itself has become increasingly warmer thus, the need for people to be able to transport cold produces is needed. Although there are already existing ice boxes, these ice boxes would require ice in order to create the cool environment and the ice itself would need to be replaced periodically. Depending on how the ice boxes are placed, stored, and how often it is opened can cause the efficiency of the ice boxes to lower (Charter Boat Icebox and Refrigerator Basics and Best Practices | Modern Sailing, n.d.). Thus, if not stored used properly, the content of the icebox itself would heat up thus, resulting in the wastage of resources.

Therefore, as a team, we came up with an idea to modify the existing icebox to make it more efficient and effective to all communities and the Earth. We decided to upgrade the iceboxes that are commonly used among the fishermen nowadays since everyone must deal with an extremely hot weather that could cause the fish and seafood that have been caught becoming not fresh. Not just fishermen, but people who are active in sports also really needs our invention, AiCee. This is due to the heavy weight of the existing icebox that is inefficient to carry it to the middle of the field. The existing icebox is only capable of maintaining heat for a short period

of time and not able to create a cold environment to make the ice last longer. Therefore, our objective creating this AiCee are to retain its heat and always keep it cold and make sure that our icebox could be used by a huge range of demographics.

2. METHODOLOGY

The main underlying issue that we wish to solve is the fact that most people would have to deal with the brutal hot weather. Thus, a way to solve this is by introducing a product that can carry cold produce and ensure that the produces stay cold for a long period of time. The variables that are considered in producing this product is how exactly it would benefit to the users and the environment. We've also taken consideration on which component itself should be introduced into our product, thus, ensuring that we produce an efficient product.

AiCee is a cutting-edge product that allows people to store cold food and beverages for extended periods. It applies several physics theories to achieve this. The first part of AiCee is a plastic ice box. Plastic containers conduct less heat than materials like metal or glass, making them more comfortable to handle when they contain hot or cold substances (James R. Watson, 2014). With AiCee, we can be sure that all the food and beverages stored in this product will remain cool and fresh for longer periods.

Next, AiCee has been innovated to become a portable air conditioner using three mini exhaust fans. By applying the second law of Thermodynamics, we use the concept heat pumps where heat is expelled out to the surrounding from the icebox (Urone & Henrichs, 2020). The product has a switch that makes it easy to open or close the electrical circuit, which can turn the mini exhaust fans on or off. These fans help lower the temperature inside the ice box by expelling hot air and bringing in cooler air from the surroundings. The fans use lithium batteries for the source of energy.

Other than that, we have installed a thermal sensor inside our ice box that detects the temperature inside. If the temperature goes beyond 10 degrees Celsius it will send an electrical signal (Kester et al., 2005) and the exhaust fan automatically turns on to dissipate the heat and maintain the temperature inside the ice box. This helps to keep the items inside the ice box cool and prevents them from getting damaged.

Besides that, we put dynamo to our product as one of the battery chargers. To charge the battery, a dynamo is placed on the tire and connected to it using wires. As the dynamo spins, it creates an electric magnetic induction thus generating energy (Chuan et al., 2020). This ensures that the battery always has enough energy to be used whenever and wherever needed. Finally, we also added a handle to our ice box to make it more user-friendly. This feature allows users to easily move the ice box to any location they desire by simply pulling the handle to transport the ice box.

Table 1. List of Material and Purpose

Material	**Purpose**
Plastic Ice Box	Contain contents of Ice box and ensure the temperature remains in the box
Exhaust Fans	Act as air conditioner by expelling hot air from the box
Thermal Sensor	Detect Temperature inside of the box
Lithium Battery	Source of energy
Dynamo	Generates energy when spun
Tire and Handle	Helps transport the ice box easily
Switch	Turn the on or off the exhaust fan

3. RESULTS AND DISCUSSION

The market potential of the AiCee covers a huge part of the market. One group of people that would benefit from the AiCee are people who are active in sports. This is due to the AiCee's capability of keeping beverages cool for a long period of time and it has a design that is easy to carry. The average person can also use this product in cases where they want to go camping, go out for a picnic or go out with friends in general. Not only the AiCee is suitable to store beverages, but it can also be used to store cold produce such as fish and meat. Due to this, fishermen can use the AiCee to store their fishes in a huge amount and not having to worry about carrying heavy boxes as the freshness of fish lasts 2 hours out of water (Nutrition, 2024). As a result, there is no doubt that the AiCee will receive high demands from a wide spectrum of people.

As the problem related to the heat conservation of the icebox, the AiCee is made out of plastic which is good at reducing heat conduction. This ensures that no heat from the outside enters the AiCee and the cool temperature inside maintains. It is worth highlighting that plastic is a light material thus, it can be easily carried around. In addition, the AiCee has a built-in mini fan that functions as a way to pump out hot air from the box itself. This enables us to create a cold environment inside of the icebox ensuring whatever is being put inside of the AiCee is able to stay cold for a longer period of time. The fans use lithium-ion batteries since they are able to last long. Finally, the AiCee has a built-in thermos sensor that can detect the temperature inside the box and automatically turn on the fan. Whenever the inside of the AiCee reaches the optimal temperature, it will automatically turn off the fan saving energy for another time.

3.1 Figures and Images

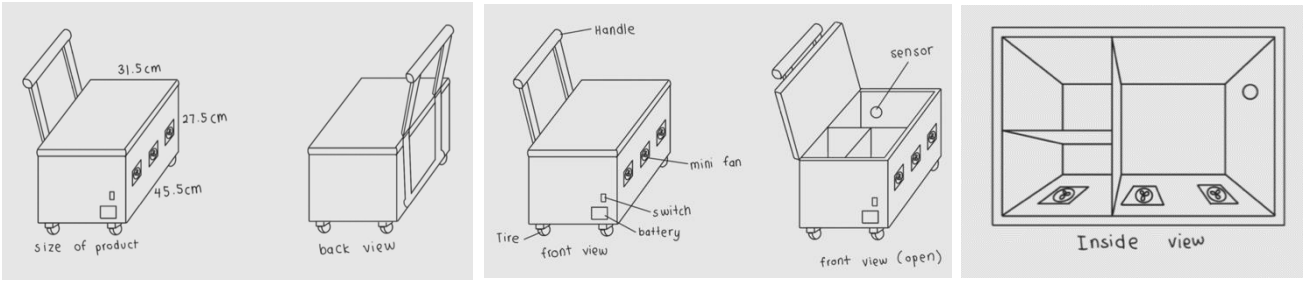

Figure 1. Image of AiCee

4. CONCLUSION

Maintaining consistently cold temperatures in an icebox or freezer for an extended period is crucial for preserving the quality and safety of stored perishable items. This works due to heat movement in the ice box by flowing air from inside the ice box out. With this, the temperature in the ice box can remain at a low temperature. The exhaust fan is used to suck air in the ice box. The battery is used to supply electricity to turn on the fan. Dynamos are also used to distribute power as a battery charger. With this the fan can always be used even if there is no source of electricity from the electricity supply. Not only the product itself is suitable for fisherman and athletes, but it is also suitable for regular individuals as well. As for the future, we plan to create a more environmentally safe innovation thus giving it better commercial potential.

ACKNOWLEDGEMENT

We were successful in developing a completely original, cutting-edge product. In this day and age, when individuals must deal with hot, humid weather virtually every day, we think that our product will be useful. In addition, we want to express our gratitude to Dr. Siti Aisyah Zawawi. We appreciate the guidance and support provided by our instructor in helping us complete this Creations de UiTM innovation project. Furthermore, without the work of our group members Ahmad Daniell Bukhari, Aida Rafieqah Mohd Rizal, Ameena Safiyyah Zaihan, Aliyah Sofiya Abdul Muiz, and Muhammad Muizzuddin Mahadhir, this task could not be finished.

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A Comparative Study of Ant Tunnelling and Foraging Behaviour in *Camponotus Albosparsus* and *Solenopsis Geminata*

*Aiman Firdaus Ahmad Azman, Nur Alisya Nazira Mohd Fauzi, Yasmin Aleeya Natasha Rosman Izru, Qaisara Nurdini Muhamad Nizam and Tengku Norbaya Tengku Azhar

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023486264@student.uitm.edu.my

ABSTRACT

As one of the most varied and essential insect groups for the environment, ants display a wide range of behaviours vital to the survival of their colonies and the environment. Despite the ecological importance of ants, limited knowledge exists regarding how different species' behaviours contribute to ecosystem dynamics, hindering effective conservation and management strategies. The objective of this experiment is to compare the structural aspect of tunnel constructed and examine the foraging strategies employed by *Camponotus alboparsus* (Carpenter ant) and *Solenopsis geminata* (Fire ant). These species are classified into separate genera and occupy diverse ecological niches; fire ants are known for their aggressive foraging and stinging behaviour, whereas carpenter ants typically nest in wood-based buildings. The experiment took place in a formicarium for five days. Both *C. alboparsus* and *S. geminata* were provided with a soil-based set-up and anti-escape measures. The tunnels' structural aspects, construction methods, and architectural intricacies were thoroughly examined and compared across both species. The foraging behaviour was also investigated by monitoring the recruitment and foraging activities. The response of both ant species to food sources, foraging efficiency, and their food distribution are examined. The result revealed a significant difference between *C. alboparsus* and *S. geminata* tunnelling and foraging behaviour. *C. alboparsus* exhibited a more detailed, shorter, and larger radius tunnel, while *S. geminata* exhibited a more extensive tunnel, longer and smaller in radius. In conclusion, this research enhances our understanding of nature and helps in developing efficient algorithms for tasks like route planning and excavation.

Keyword: ant behaviour; tunnelling; foraging; *Camponotus alboparsus*; *Solenopsis geminate.*

1. INTRODUCTION

Ant species exhibit a wide range of behaviors and ecological roles that are crucial for understanding their impact on ecosystems. *S. geminata* (Fire ant) is known for its aggressive foraging behaviour and significant impact in natural and urban environments. This species is highly adaptable and efficient in resource acquisition, often outcompeting native ant species and affecting local biodiversity (Wetterer, 2020). On the other hand, *C. alboparsus* (Carpenter ant) is recognized for its complex tunnelling behaviors and preference for nesting in wood. *C. alboparsus* plays a vital role in in forest ecosystem by aiding in the decomposition process and nutrient cycling (Hölldobler & Wilson, 1990). The selection of these two ant species for comparison is significant due to their distinct ecological niches and behaviors. *S. geminata* is an invasive species that poses ecological and economic challenges in many regions (Vinson &

Sorenson, 2022). Its rapid colonization and aggressive nature make it a critical subject for studying competitive interactions and resource exploitation. Conversely, *C. alboparsus* is less aggressive but exhibits sophisticated nesting and foraging behaviors that contribute to forest health. Understanding the differences in their behaviors can provide insights into how they influence their environments and interact with other species. Despite the extensive research on the individual behaviors of these ant species, there is a limited comparative analysis of their foraging and tunnelling strategies. Understanding these differences is essential for comprehending their ecological impacts and interactions with other species. Previous studies have highlighted the importance of foraging and tunnelling behaviors for colony survival and resource acquisition (Lanan, 2014). However, a direct comparison between the foraging strategies and tunneling structures of *S. geminata* and *C. albosparsus* remains underexplored. This study aims to compare the tunnelling and foraging behaviours of *C. albosparsus*(Carpenter ant) and *S. geminata* (Fire ant) to enhance understanding of their ecological roles. The objective of the experiment is to investigate their tunnelling behavior, construction methods, foraging strategies, and responses to food sources. Observational and experimental methods were employed in controlled settings, involving the setup of formicariums with soil-based substrates to meticulously observe ant behaviors over a specified period.

2. METHODOLOGY

Two-meter wooden sticks were cut using a hand saw into 30.0cm lengths and glued at both edges and between acrylic sheets. Subsequently, an A3 clear acrylic sheet was glued to the base of the assembly. Ensuring there were no gaps or holes between the wood and acrylic, organic soil was added to the formicarium until it reached a depth of 15.0cm. The soil was then moistened by applying water using a dropper. Following this, the anti-escape solution was applied to the lid of the formicarium, approximately 10.0cm from its edge, and left to dry for 5 to 10 minutes. Replicating these steps, another formicarium was produced, labelled as formicarium A, and formicarium B. After that, each ant colony was delicately placed into its respective formicarium, with formicarium A housing the *C. albosparsus* colony and formicarium B accommodating the *S. geminata* colony. Food was provided daily for each colony on designated food trays, comprising a water-sugar solution and mealworms for both formicariums. The length and the radius of the tunnel constructed by both ant species within the formicarium were measured using a thread and a ruler. To investigate the foraging strategies of both ant species, food baits (sugar and protein) were placed at equal distances from the nests. The foraging behavior was monitored by observing the recruitment and foraging activities of the ants. A camera was used to continuously record the foraging activities, and the footage was analysed to determine patterns such as tunnelling behaviour, responses to the food source and optimal foraging period.

3. RESULTS AND DISCUSSION

3.1 Figures and images

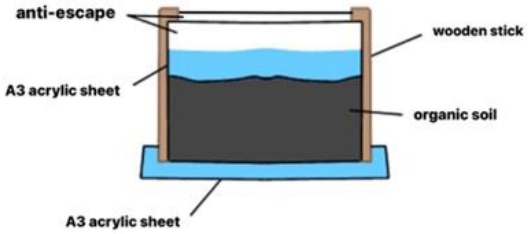

Figure 1. Day 1 of the experiment

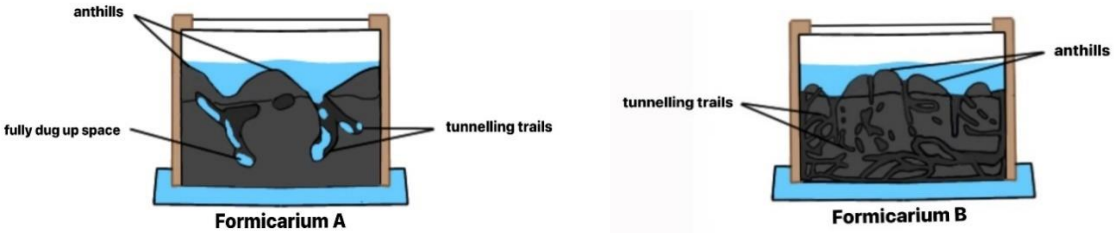

Figure 2. Day 5 of the experiment

3.2 Table

Table 1. Tunnelling and foraging strategies

	Formicarium A	**Formicarium B**
Tunnelling behaviour	*C. albosparsus* constructed detailed and intricate tunnels with a larger radius. Over the five days, *C. albosparsus* dug tunnels totalling 7.5 cm and a radius of 1 cm. There is 1 main tunnel dug by *C. albosparsus*. These tunnels were generally shorter but displayed a more complex architecture with few chambers and branching pathways. This species showed a methodical approach to excavation, with tunnels appearing well-organized and structurally robust.	*S. geminata* exhibited a more extensive tunnelling system with a smaller radius. Over the five days, *S. geminata* dug tunnels totalling 18 cm and a radius of 0.25 cm. There are 7 main tunnels dug by *S. geminata*. These tunnels were longer, often extending over a larger area with multiple branches and chambers compared to *C. albosparsus*. The excavation was rapid and less structured, resulting in simpler tunnel networks.
Response to the food sources	*C. alboparsus* preferred protein-based baits, showing higher recruitment and collection rates for mealworms compared to sugar solutions.	*S. geminata* showed a balanced preference for both sugar and mealworms, with quick discovery and high recruitment rates for all food types.

Foraging strategies	The ants use the tandem running strategy and pheromone to allocate food (Goy et al., 2021). Ants from the *C. albosparsus* colony exhibited a slower but more systematic foraging pattern. The recruitment process was gradual, with a steady increase in the number of foraging ants over time. Foraging efficiency was high, with ants making fewer trips but collecting larger quantities of food per trip	S. geminata ants rely on pheromone trails for quickly recruiting others to food sources. They detect these pheromones through their sensitive antennae (Chalissery et al., 2019). These ants demonstrate a swift and aggressive foraging strategy, recruiting a significant number of ants rapidly to food. Although they collect less food per trip, their overall collection rate is higher due to the larger number of foraging ants involved.
Optimal foraging period	*C. albosparsus* foraged primarily during the early morning and late afternoon	*S. geminata* was most active at midday

4. CONCLUSION

The study found distinct trailing and foraging behaviors in each colony of C. alboparsus and S. geminata. Future research should delve into the reasons for these differences and their ecological impacts. Insights gained can optimize route planning, excavation methods, and resource allocation across industries. Overall, our study highlights the commercial potential of understanding ant behavior.

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RiceCycle EcoFertiliser

Alia Maisarah Hamdan, Wan Amnah Nabihah Wan Kamaruzzaman and *Faiezah Abdullah

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: faiezah2892@uitm.edu.my

ABSTRACT

This project tackles the critical issues of the food waste and plastic bottles that contribute to significant environmental pollution that can have effects on ecosystems, human health, and the economy. The objective is to recycle and reduce pollution caused by food leftovers such as rice, fruit peels and tea dregs. Simple methods by placing the food waste in biodegradable tea bags and putting it in a recycled plastic bottle containing rice filtering water to boost decomposition and nutrient release, promoting sustainable agricultural practices. The usage of this liquid fertilizer along with chemical fertilizer showed a difference in the plant's height and its stem diameter. Reused plastic bottles serve as fertilizer containers not only reduce plastic pollution but also promote the 3R concepts (reduce, reuse, recycle). Moreover, the materials used in this project can improve soil quality, promotes healthier plant growth, and promotes sustainable planting. It aligns with Sustainable Development Goals (SDGs) to benefit the community through its contribution to a sustainable economy and promote environmental sustainability goals by providing a workable solution to food and plastic waste.

Keywords: rice; food leftovers; plastic bottle; organic fertilizer; Sustainable Development Goals (SDGs).

1. INTRODUCTION

Food and plastic waste are becoming a global issue that cause serious threats to food security and environment concerns. In Malaysia, about 16,688 tonnes of wood waste are generated daily (SWCorp Malaysia, 2019) while globally, one million plastic bottles are bought every minute and end up as waste (The Guardian, 2017).

Chemical fertilisers are commonly used in agriculture but with drawbacks. It can cause soil hardening, pollute air and water, and affect human health and animals (Faiqa and Jilani, 2024). In contrast, organic fertilisers, derived from natural sources like plants or animals are biodegradable and can recycle the nutrients back into the soil (Imwene et al., 2021).

This project focuses on two problems, to reduce food waste (leftover rice, dregs and fruit peels) and plastic wastes and turn them into organic fertilizer (Mandal et al., 2024). The usage of recycled mineral plastic bottles is also being emphasized to be the medium for the fermentation to occur. These solutions offer benefits for both the environment and agricultural sustainability. The innovation in this project is by using tea bags filled with food waste eliminating the process of manual filtering and makes this process user-friendly. Moreover, tea bags can decompose and release nutrients to soil and eventually enrich and promote fertile soil (Dewi et al., 2022).

This project aligns with several United Nations Sustainable Development Goals (SDGs), including creating a better environment and lowering the risks of chemical exposure to human health (SDG 3), reducing waste management and engaging communities in small-scale gardening (SDG 11) and reducing greenhouse gas emissions and soil damage brought on by chemical fertilisers (SDG 13) (United Nations, 2024).

2. METHODOLOGY

2.1 Materials

a. Rice Waste
b. Rice Filter Water
c. Tea Dregs
d. Fruit Peels
e. Container/ Mineral Plastic Bottle
f. Tea Bags
g. Molasses
h. Effective Microbes
i. Spray Head

2.2 Methodology

The procedure begins by preparing Content A, which involves placing tea dregs and fruit peels into a tea bag. Next, Content B was prepared by mixing solutions of molasses, rice wash, and effective microbes. The tea bag containing Content A was then placed into a plastic bottle, followed by pouring Content B into the same bottle. The bottle was closed and stored in a well-ventilated area, allowing the mixtures to ferment for 5-7 days. During this period, the bottle was periodically opened and shaken to promote oxygenation. After a week, the tea bag was removed from the bottle, and the concentrated solution obtained was diluted with water at a 1:10 ratio. This diluted solution was then used as a plant booster, while the leftover Content A was planted in the soil.

3. RESULTS AND DISCUSSION

Based on the title of this research, “RiceCycle EcoFertilizer”, the objective is to utilize the household waste and the process is considered a success depending on the success rate of fermentation. These wastes were placed in the tea bag and inserted into plastic bottles with rice wash water, molasses and effective microbes (MOL). Molasses act as a nutrient provider for the microorganisms and the sources for protein, carbohydrate, vitamins and fiber (Sari et al., 2023) while MOL acts as a starter in the fermentation process consisting of carbohydrate, glucose and microbes. After 7 days, a cloudy white color of liquid fertilizer was obtained with the smell of tape (tapai) which indicates the success of the fermentation process (Dewi et al., 2022). Experiments conducted by Yerizam et al. (2022) indicated the duration of fermentation eventually affects the nitrogen (N), potassium (K) and phosphorus (P) content in the liquid organic fertilizer. In general, the longer time taken for the fermentation process, the higher the contents of N, P and K in the liquid organic fertilizer.

Table 1. Comparison of Different Fertilizers Type on Plant Height and Stem Diameter After 28 Days

Treatment	**Plant height (cm)**	**Stem diameter (cm)**
Control	13.77	7.13
NPK	19.56	8.13
½ NPK + Liquid Organic Fertilizer	22.66	8.33
¾ NPK + Liquid Organic Fertilizer	21.72	8.2

(Syamsiah and Herdiansyah, 2022)

Table 1 showed the impact of using different fertilizers towards the growth of the plant in terms of its height and stem diameter. It indicated that combining chemical fertilizer along with liquid organic fertilizer can maximize the growth of the plants (Syamsiah and Herdiansyah, 2022).

Overall, this study's findings highlight the many advantages of using liquid fertilizer made from fermentation processes in farming. In the future, more investigation is necessary to improve application techniques, evaluate long-term effects on soil health, and investigate approaches for increasing production and uptake of this sustainable agricultural input.

4. CONCLUSION

The project used food waste and plastic to produce liquid fertilizer in recycled plastic bottles. This project not only minimizes waste but also contributes to soil health and agricultural sustainability. Simple methods such as fermentation and decomposition produced organic liquid fertilizer, offering a sustainable alternative to chemical fertilizers. The results and discussions highlight the effectiveness and benefits of using fermented liquid fertilizer in agriculture. From improving soil fertility to reducing environmental pollution and supporting financial resilience in rural areas, the potential impact of this approach is significant. In conclusion, the project aligns with global sustainability goals, addresses multiple environmental and agricultural challenges, and offers a practical solution that can be adopted at both community and industrial scales. Further research and implementation efforts are encouraged to maximize the benefits and promote widespread adoption of this sustainable agricultural practice.

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FRIEZAR 0: The Thermodynamic Jacket

*Haredz Shafry Redzuan Shafry, Amier Daniel Azizan, Fadzlee Adam Mohd Nazlee, Muhammad Danial Afiq Aziz, Wan Ahmad Zaim Wan Zahran and Siti Aisyah Zawawi

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023829546@isiswa.uitm.edu.my

ABSTRACT

The research introduces "Friezar 0: The Thermodynamic Jacket", an innovative jacket equipped with advanced climate control technology. Utilizing microtubes circulating heating and cooling fluids, the jacket offers optimal comfort across diverse climates. Through a blend of wool and cotton, it ensures thermal regulation while revolutionizing the jacket market. The study explores the integration of physics to enhance functionality and comfort, highlighting its potential for global adoption. With a focus on adaptive temperature regulation, "Friezar 0" presents a novel solution for maintaining comfort in varying weather conditions. This innovation represents a significant advancement in textile technology, offering users a seamless and personalized experience. Through continuous research and development, thermodynamic clothing like "Friezar 0" holds promise for addressing comfort, energy efficiency, and health concerns in various industries.

Keywords: technology; temperature; heating; cooling; thermal.

1. INTRODUCTION

Global weather patterns exhibit considerable diversity due to geographical location and prevailing climatic conditions. For instance, Malaysia boasts a typical hot and humid tropical climate, characterized by consistently elevated temperatures and humidity levels year-round. Conversely, regions such as Antarctica, Russia, and Switzerland undergo distinct seasonal changes, featuring extreme temperature fluctuations. Successfully navigating such varied weather conditions necessitates the development of effective strategies to ensure optimal comfort and well-being. (Siliverstovs, et al., 2010). Introducing "Friezar 0", an innovative jacket equipped with advanced temperature control technology. This garment empowers users to regulate their thermal comfort irrespective of external environmental factors. Whether combating harsh winter conditions or seeking warmth during chilly evenings, wearers can effortlessly adjust the jacket's temperature with a simple button press. The underlying mechanism comprises a network of microtubes integrated within the fabric, facilitating the circulation of specialized heating and cooling fluids. These fluids efficiently absorb excess body heat to cool the wearer or emit warmth to provide comfort in colder climates.

2. METHODOLOGY

The "Friezar 0" jacket utilizes advanced climate control technology through a system of microtubes that circulate heating and cooling fluids within the garment. Strategically placed, these microtubes efficiently transfer heat to regulate the wearer's body temperature (James

Nelson, 2018). When warmth is needed, heating fluids absorb heat from the surroundings and deliver it to the wearer. Conversely, in hot conditions, cooling fluids absorb excess heat from the wearer and release it, maintaining a comfortable temperature. The jacket's temperature adjustments are user-controlled, typically through a built-in button or panel, allowing for personalized comfort. Constructed from materials like wool and cotton, it offers insulation and breathability, enhancing overall thermal comfort. In summary, the "Friezar 0" jacket adapts dynamically to keep wearers comfortable across varying climates and conditions.

2.1 Thermodynamics Clothes Prototype

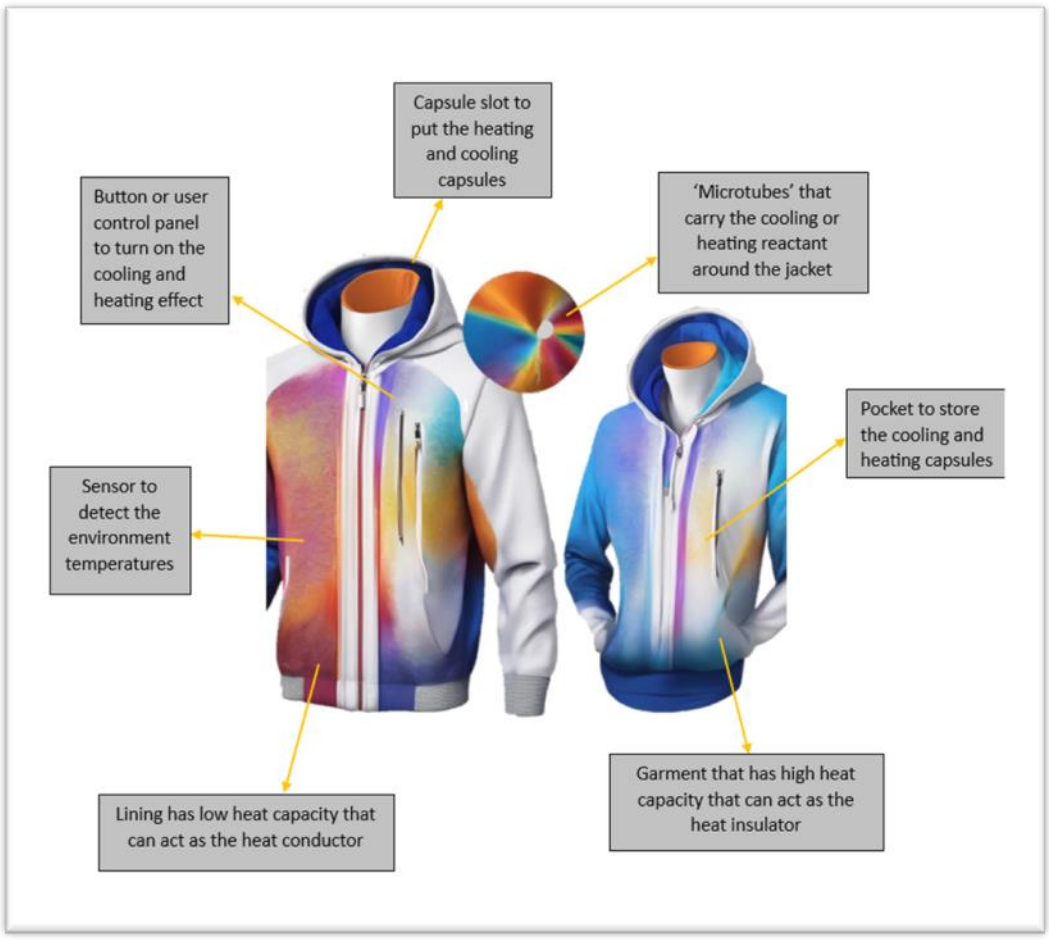

Figure 1.

2.2 Relevance to Theory and Practice

This research enhances our understanding of how clothing influences body temperature regulation, focusing on material properties and garment design. By reviewing existing literature, we expand current knowledge and offer insights for future research directions. Our findings have profound implications for developing and refining thermodynamic clothing. Identifying effective materials and design elements allows manufacturers to create garments that offer exceptional comfort and functionality in diverse environmental conditions (L. Kaounides, 2007). This research also empowers consumers to choose clothing wisely,

prioritizing comfort and optimal temperature control. In summary, our study bridges theory and practice, advancing clothing technology and enhancing user comfort.

2.3 Reasons of The Chosen Method

We opted to employ a method in our jacket that combines heating and cooling capsules with microtube circulation, guided by several key considerations. Firstly, integrating these capsules allows us to finely tune the garment's temperature, catering to wearer comfort in various environmental conditions. These capsules enable quick adjustments for both warm and cold climates. Secondly, microtube circulation ensures even distribution of heating or cooling fluids throughout the jacket, maintaining consistent thermal comfort across the wearer's body and optimizing heat transfer (James Nelson, 2018). This method not only supports our goal of creating an advanced garment but also emphasizes practical usability, allowing users to adjust the jacket's temperature with ease. Moreover, this approach aligns with our design aesthetics and material choices, facilitating a blend of functionality with a sleek appearance. The durability and thermal conductivity of selected materials for the microtubes and capsule housing ensure the jacket's long-term effectiveness. Overall, our chosen method effectively addresses the challenge of regulating body temperature in diverse climates, offering precise control, even distribution, user-friendly operation, and alignment with our design goals for innovative thermodynamics clothing.

3. RESULTS AND DISCUSSION

Our focus is on introducing the innovative "Friezar 0" jacket, which excels in advanced climate control to provide comfort across varied weather conditions. By integrating cutting-edge materials and sophisticated design, we aim to redefine thermal comfort in clothing. The jacket's microtube system circulates heating and cooling fluids to efficiently regulate the wearer's temperature, enhancing comfort in both cold and hot environments. The combination of wool and cotton not only improves insulation but also overall comfort. 'Friezar 0' stands out in the market for its ability to meet consumer demands for versatile outerwear that adapts to fluctuating temperatures (Yunsheng Fang, 2021). Its user-friendly temperature control and eco-friendly features, like refillable capsules, further appeal to environmentally conscious buyers. However, potential drawbacks include initial cost, technical reliability in extreme conditions, maintenance needs, design preferences, and effectiveness variations among users, which could influence its widespread appeal and functionality (Smith, 2024). Ongoing enhancements could mitigate these concerns and strengthen the jacket's market position.

4. CONCLUSION

The development of "Friezar 0" marks a significant advancement in conquering climate challenges through innovation and scientific expertise. This effort goes beyond creating a new jacket; it symbolizes our commitment to pushing boundaries and achieving remarkable achievements. By integrating advanced climate control technology with a blend of wool and cotton, using microtube circulation of specialized heating and cooling fluids, "Friezar 0" establishes itself as a leader in comfort, adaptability, and sustainability in the garment industry. Looking ahead, "Friezar 0" holds promise for transforming outerwear and setting new consumer standards. As we refine this jacket, addressing limitations and listening to user feedback, we aim for a future where comfort is paramount. With our dedication to quality and advancing

clothing technology, "Friezar 0" is poised to exceed global customer expectations, paving the way towards a more comfortable, sustainable, and technologically advanced era in clothing design.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to all those who have supported us in conducting this research and writing this paper. First and foremost, we thank our lecturer, Dr. Siti Aisyah Zawawi, for her invaluable guidance, encouragement, and feedback throughout the project. We also thank the UITM Dengkil for providing us with the necessary facilities and resources. Finally, we thank our groupmate for the ideas and suggestions to improve this product in the future.

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MyMushaf

Mohamad Nazmi Aiman Abdullah, Ahmad Hafizul Khalis Ahmad Hadiri, Fakhri Nazmi Mohamad Farizan Zaini, Muhammad Azim Azmi, Shukri Aizat Shuazrin and *F.H.Muhammad

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: fadiatul@uitm.edu.my

ABSTRACT

MyMushaf is an application developed to assist people who need help in reading the holy verses of the Quran. By using this application, users only need to scan the verses of the Quran, and MyMushaf will identify the position of the verses of the Quran that do not have surah references in the al-Quran, provide listening to the reading while giving Tajwid evidence, offer the interpretation of the verse, and provide the gist of the relevant verse. This MyMushaf application was developed as a result of the inspiration from the digital Quran. However, compared to the digital Quran, MyMushaf can make it easier for users to utilize the features of the digital Quran just by using a digital phone. MyMushaf can reduce the burden for someone to better understand the Quran, especially for revert and those who are less able in reading al-Quran. This application is developed by using 'flutter', which is a free software to be used to develop an application. The cost of developing MyMushaf is null. This application can be downloaded in Play Store for free and there is a premium subscription which only costs RM10.90 per subscription. Our profit is from the premium subscription and ads in the application.

Keyword: MyMushaf; tajwid description; digital al-Quran; al-Quran guidance; interpretation of the verse.

1. INTRODUCTION

The Quran is the word of God revealed to Prophet Muhammad SAW in Arabic, delivered in stages through the mediation of Malaikat Jibril. It is delivered consecutively, considered miraculous, and reading it is deemed an act of worship (Faridah M.S., 2023). This study aims to develop an application to assist the community in identifying verses lacking Surah references in Mushaf, listening to recitations with Tajwid support, providing verse interpretations, and offering summaries. Given the repetition of phrases and verses in the Quran, the application's algorithm must effectively match these instances (Samhaa R.E., 2021). The objective of the study is to develop a prototype application capable of; scanning Quranic verses to identify their positions within the Quran, providing audio for the recitation of scanned Quranic verses, providing explanations of Tajweed rules for the scanned Quranic verses, providing meanings and interpretations for the scanned Quranic verses and providing summaries of the scanned Quranic verses.

2. METHODOLOGY

The development of this innovation is inspired by digital Quran applications. MyMushaf was developed using the computer software 'Android Studio'. This application's creation was aided by the theories found in (Samhaa R.E., 2021). Furthermore, looking through Muslim-friendly apps on the "Play Store," it's clear that the majority are only available online. Consequently, users are unable to utilize these features when they are in areas without an internet connection. In contrast, MyMushaf operates partly online and partly offline. Relevant information related to the application is stored in an organized database. Furthermore, the audio feature utilizes readings from a trusted source, namely GitHub (github.com, n.d.), ensuring there are no Tajwid errors in the recitations. Moreover, summaries of verses are sourced from a reliable website (quran.com, n.d.) to prevent any confusion.

3. RESULTS AND DISCUSSION

We have created an application called MyMushaf with the aim of providing benefits and positive impact to users so that they become proficient in reading the Quran. One of the special features of the MyMushaf application is its ability to provide convenience to users in translating Quranic verses from Arabic to Malay. Furthermore, individuals who wish to learn the rules of Tajwid and the correct pronunciation of Quranic verses spontaneously are strongly encouraged to use the MyMushaf application. Relevant and appropriate teaching methods for Tajwid learning are needed in today's challenging era (researchgate.net, n.d.). After considering the cost and selling price aspects for a product or application, we have agreed to set RM10.90 as the special subscription price within our application.

Table 1. The selling price per subscription

Item	RM per subscription
Premium subscription	10.90
Ad	0.10
TOTAL	**11.00**

Table 2. The application cost per subscription

Item	The percentage of special subscription (%)	Cost (RM)
The Play Store service fee	15	1.64
TOTAL		**1.64**

4. CONCLUSION

In conclusion, this application can reduce the burden for individuals to better acquaint themselves with the Quran, especially for converts and those with limited abilities. Additionally, there is no charge for users to download this application from the Play Store. However, users can subscribe to a special subscription for as low as RM10.90 per month. A suggestion for

future research prospects to further enhance such applications is to enable users to recite Quranic verses, with the application itself detecting any errors in recitation. Additionally, users could communicate with artificial intelligence (AI) to gain deeper insights into Quranic surahs.

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InsomLamp

*Natasha Ellya Mohd Noorhazli, Nur Imanina Hamdzan, Nurul Auni Syafiah Mohd Amin, Nurul Ayuni Omar, Umairah Jasmie and Mohd Helmy Yusof

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023668144@student.uitm.edu.my

ABSTRACT

InsomLamp is a sleep lamp destined for those who suffer from insomnia, with adjustable brightness and soft color temperatures such as calming orange or red to help relax in the evening. The lamp is equipped with built-in white noise, such as nature sounds, gentle music, or a rhythmic sound. An in-built timer gradually decreases the light brightness and the volume of white noise over time, which makes it easier to fall asleep. The lamp's smart alarm mechanism gradually raises light intensity and sound to gently wake users at the moment they choose, promoting a more natural wake-up process. This study describes the design process, technical specs, and user input, demonstrating its potential as a useful tool for improving sleep quality and general health. In conclusion, the InsomLamp, created for those experiencing insomnia, is user-friendly and offers several additional benefits to help them improve their sleep quality in everyday life.

Keywords: sleep lamp; people with insomnia; improve sleep quality.

1. INTRODUCTION

Insomnia disease is defined as symptoms that we may have difficulties falling asleep, wake up during the night, or wake up earlier than usual and can't get back to sleep easily (American Psychiatric Association, 2013 as cited by Van Someren, 2021) We decided to develop a new solution to solve the common problem of insomnia, and we called it InsomLamp. InsomLamp was developed with empathy for those experiencing sleep difficulties, offering a unique blend of gentle lighting and soothing sounds to create a peaceful sleeping environment, ensuring a restful night’s sleep and refreshed awakening.

We have integrated white noise into InsomLamp to intensify the state of relaxation and significantly reduce the time it takes to fall asleep. According to Riedy et al. InsomLamp utilizes white noise to decrease the likelihood of external noise to affect sleep. InsomLamp’s gentle lighting supports better sleep by influencing sleep quality and circadian rhythm.

1.1 Innovation Development

InsomLamp can be further developed to other features such as:

i. Wireless Sleep Lamp: The lamp can be modified to be wireless by using a rechargeable battery, or it can be made to use solar energy using solar panels.

ii. Motion Night Light: In the event that the user has to wake up in the middle of the night, a motion sensor will be fitted to the lamp to turn on a gentle light. By doing this, the users won't use strong lights, which might interfere with their sleep.

2. METHODOLOGY

This product is made of eco-friendly materials. For the body and the hood of the lamp we use recycled plastic as it is renewable. For the bulb, we use LED as it is more energy efficient and safe for the users.

2.1 Prototype

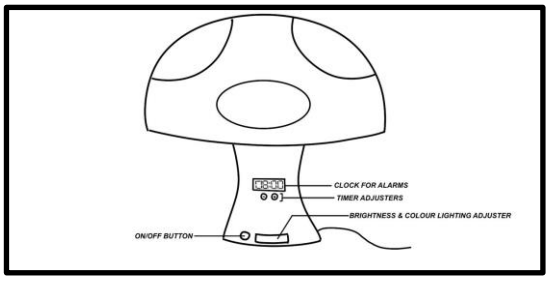

Figure 1. Front view

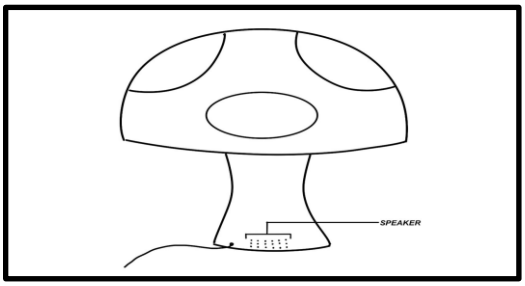

Figure 2. Back view

InsomLamp is designed to be simple and easy to use for all ages. The main features for InsomLamp are:

i. Adjustable lighting: The brightness and colours of the light are made to be adjustable, so it can function well according to the user's needs and situations. For example, warm colours like red and orange are added to help the body wind down, especially in the evening.

ii. Built-in white noise machine: Calming sounds such as nature and gentle music are implied into the sleep lamp to mask unexpected noise that can disrupt users sleep.

iii. Automatic sleep routine: The sound of the noise and the light will dim after a certain period of time to assist the users in falling asleep while also saving electricity.

iv. Smart alarm feature: The lamp will gradually increase the light intensity and sound level according to the alarm set by the users to help them wake up naturally.

3. RESULT AND DISCUSSION

Bar Chart of Difficulty to fall asleep and Waking Up in The Middle of the Night

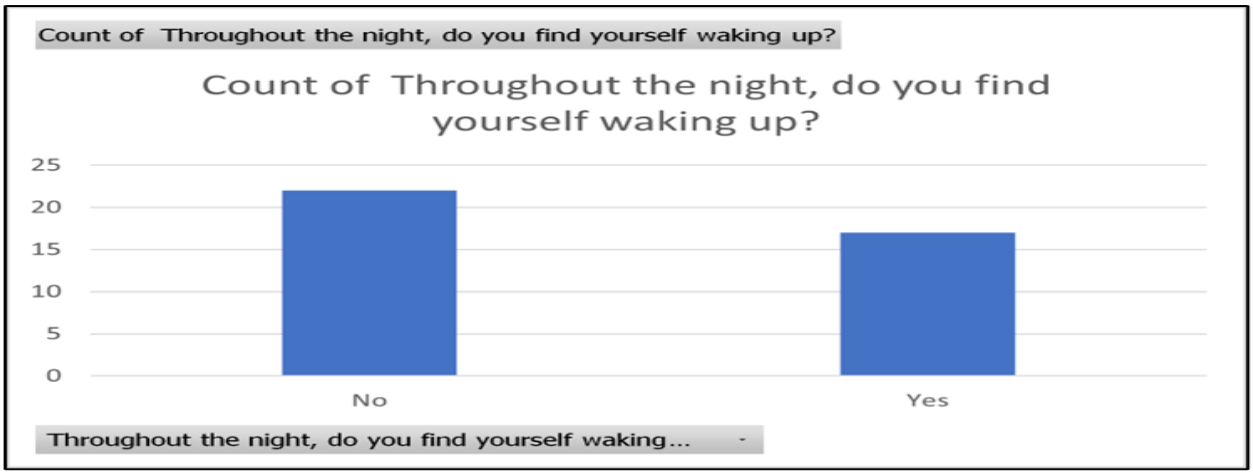

Figure 3.

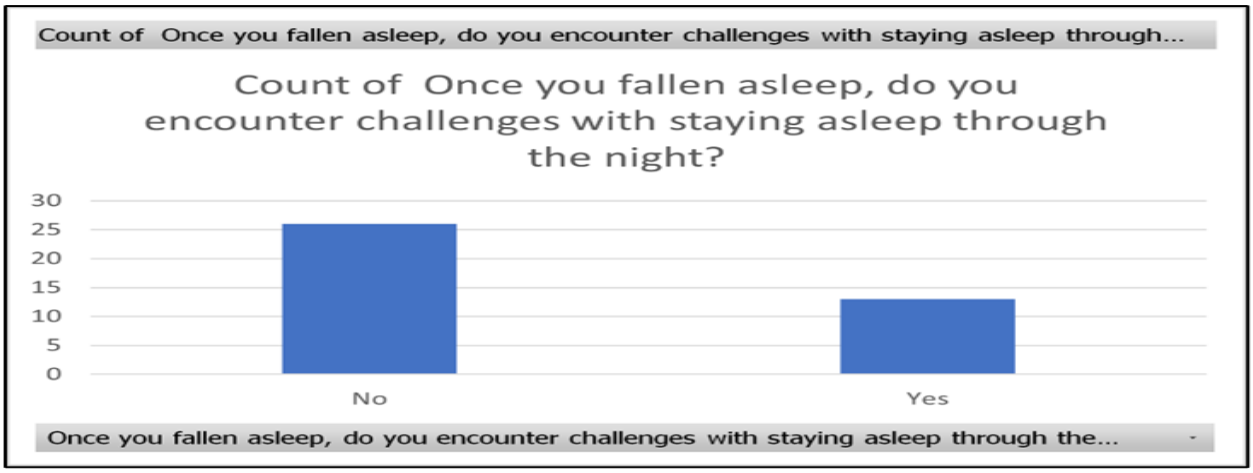

Figure 4.

3.1 Relevance of the invention

InsomLamp is relevant towards people who are facing sleeping disorders. This product focuses on people who have insomnia. InsomLamp has a lot of useful features such as the adjustable brightness of warm light, built in white noise and an implemented timer that can help the user to overcome insomnia better. The product is very simple for public people to use and handy.

3.2 Contribution to environment or society

InsomLamp can contribute to all of these aspects by contributing to new knowledge about how to overcome sleeping problems and cope with this problem efficiently. Additionally, by using this product, the target audience will manage to develop a healthy sleeping habit. Next, in the technology aspect, we have built new technology and innovations like the adjustable brightness of warm light, white noise and automatic timer in one product that will help the target audiences to cope with insomnia.

4. CONCLUSION

In conclusion, the InsomLamp offers a huge step forward in managing insomnia and fostering better sleep quality. Furthermore, the combination of a progressive sleep timer and a smart alarm system has proven effective in promoting normal sleep-wake patterns. Our findings indicate that the InsomLamp not only enhances sleep quality but also promotes the establishment of appropriate nighttime habits, which are critical for general well-being. Next, future suggestions might include connectivity choices for smart home integration, broader white noise selections, and better sleep tracking capabilities. These innovations have the potential to elevate the InsomLamp to a more comprehensive sleep solution that meets a broader spectrum of user demands.

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We would like to express our special thanks and gratitude to the following people for their invaluable support and contribution in the achievement of developing the InsomLamp product: University of Technology MARA (Dengkil Campus), the group members of the project being Umairah Jasmie (leader), Natasha Ellya Mohd Noorhazli, Nur Imanina Hamdzan, Nurul Auni Syafiah Mohd Amin, Nurul Ayuni Omar, and our supportive mentor, Mohd Helmy Yusof. We are proud to present InsomLamp to the world with the hope that this product will not only improve people's sleep quality but also enhance their overall health.

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THERMOFUSION KETTLE

*Muhammad Haikal Mansor, Amni Hazziq Ahmad Nazam, Haikal Fitri Moffek Rizal, Muhammad Haziq Fitri Muhamad Nazir, Muhammad Azim Fawwaz Aminuddin and Mohd Helmy Yusof

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023688506@student.uitm.edu.my

ABSTRACT

Introducing an innovative jug kettle redefining beverage preparation. This dual-functionality kettle seamlessly heats and cools liquids, providing users with unprecedented versatility. The heating element employs electrical resistance and conduction to elevate liquid temperatures efficiently, while the integrated Peltier cooling module ensures rapid and precise cooling by absorbing excess heat. A sophisticated thermostat maintains the desired temperature, offering a user-friendly experience. Enhancing convenience, the jug kettle features a small, intuitive screen displaying real-time temperature readings. This digital interface empowers users to monitor and adjust temperatures with ease, adding a new dimension to beverage customization. Crafted with thermal insulation for energy efficiency, the kettle embodies a harmonious blend of cutting-edge technology and practical design. This appliance not only elevates the traditional kettle's capabilities but also opens avenues for diverse culinary applications, making it a pioneering solution for those seeking a dynamic and efficient liquid temperature management system. And the integration of a thermostat allows set temperature to be achieved that turns the kettle off once it achieved desired temperature.

Keywords: thermostat; ThermoFusion kettle; dual-functionality; desired temperature.

1. INTRODUCTION

Drinking a favourite beverage is one of the best pleasures in life which is only improved by desired temperature and that is why it is with great pleasure and enthusiasm (iqsdirectory.com, n.d). We present the Thermofusion Kettle, the most revolutionary invention that will change the world of brewing as we know it. Where the ordinary kettles have consistently disappointed beverage enthusiasts, our high-tech solution not only promises to meet all your needs but also to surpass all your expectation. Thus, the ThermoFusion Kettle comes with a very easy-to-set-up console that enables the user to set the rest of the temperature requirements effortlessly. With this kettle, you no longer have to struggle guessing the brews, considering that you are guaranteed a brew with precise desired temperature.

The life of a student makes them incapable to find cold beverages easily let alone keep them cold for a long period of time. The ThermoFusion Kettle presents a useful solution for students struggling to keep cold beverages due to a lack of refrigeration. Unable to bring and maintain a refrigerator in dormitories or study rooms, students are often unable to maintain cold beverages, which are particularly vital during lengthy studies hours or while sitting in overnight study groups. The unit’s cooling capability, which is based on Peltier cooling technology [2], keeps

students supplied with chilled water that they can pour and enjoy cold drinks directly at the study desk.

In addition, a traditional kitchen often experiences the inconvenience of requiring separate appliances for heating and cooling water. Our kettle combines both functions, creating a sophisticated and stylish appliance. The ThermoFusion Kettle has a strong heating function; it quickly brings the water to the desired temperature for hot beverages. Moreover, thanks to the revolutionary Peltier cooling technology (Yan-Wei et al., 2017), the kettle has a cooling function that allows it to cool the water, providing cold drinks without the need for additional devices.

2. METHODOLOGY

2.1 Material

The following material are the chosen material to make this product, the stainless steel, plastic, silicone rubber, heating coil, peltier cooling module and temperature display.

2.2 Design

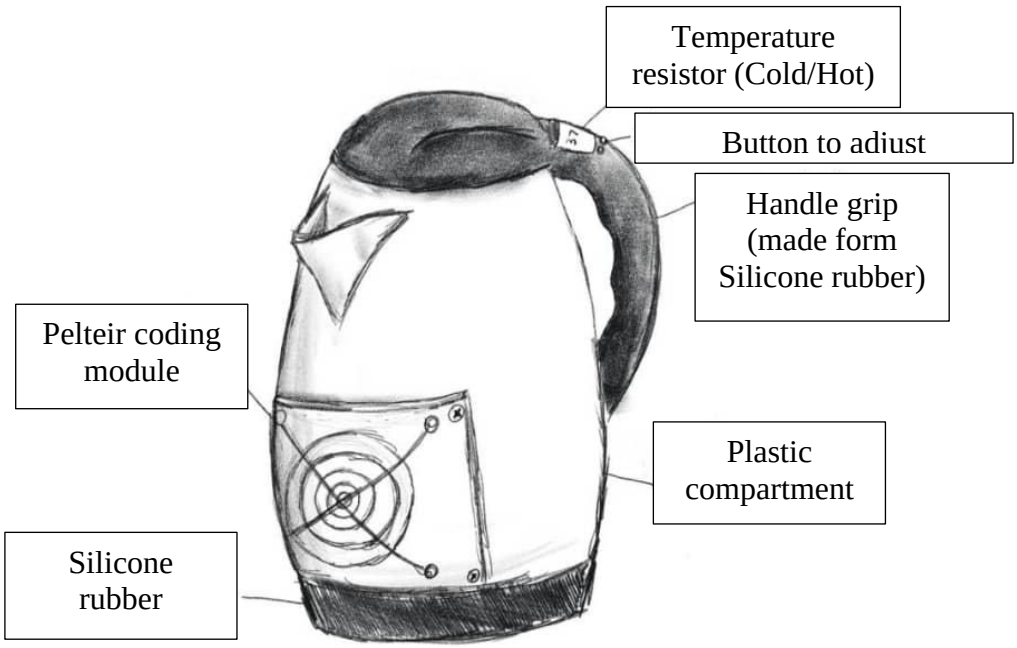

Figure 1. The prototype model of ThermoFusion Kettle.

3. DISCUSSION

3.1 Heating up

The heating coil within the Thermofusion Kettle facilitates the process of heating water through the Joule heating effect, which involves the conversion of electrical energy into heat energy (Jiawei Zhou et al., 2022).

3.2 Peltier Cooling Module

A Peltier cooling module, also known as a thermoelectric cooler or TEC, is a semiconductor device that utilizes the Peltier effect to transfer heat from one side to the other when an electric current is applied.

3.3 Thermostat Operation

Thermostat is crucial to be integrated into the product for its function to regulate temperature and detect temperature using sensors like thermistor to carry out certain orders such switching the kettle off (Jorge Tabanera et al., 2022).

3.4 Temperature Display

The temperature display allows the user to tell the temperature without touching the kettle encouraging safety (Cyril Hilsum, 2010).

3.5 Commercialization Potential

3.5.1 Relevance of Product

The Thermofusion Kettle possesses a high potential for commercialization due to its innovative characteristics and relevance to a modern lifestyle while combining consumer comfort and meeting societal needs. The kettle is multifunctional and combines heating and cooling functions in a single device. That is, when using this appliance, one does not have to boil water or cool it before being able to prepare a drink which significantly saves time and energy. This product is intended towards students that live in colleges or even campers.

3.5.2 Contribution to Society

Contribution to New Knowledge or Society The integration of new advanced technologies such as Joule heating for rapid water heating and Peltier cooling to offer efficient cooling is significant in the appliance design and thermodynamics field. This technology incorporation either improves the user experience or enables energy efficiency and sustainability. The screen display of the Thermofusion Kettle and the thermostat operation incorporating core temperature control mechanism created a new way of understanding by users which creates awareness and educate users on the thermodynamics in their daily living.

3.5.3 Marketability

The broad demographic of the ThermoFusion kettle, as well as its apparent ease of use, make the product a highly marketable item. It cools and heats, which makes it suitable for many tastes and needs, such as homes, offices, hotels, and outdoor settings. ThermoFusion kettle is a more convenient solution for consumers and businesses in the beverage preparation sector.

4. CONCLUSION

To sum up, the Thermofusion kettle is a novel product in beverage preparation offering distinct advantages in versatility, convenience, and energy savings. This already makes this product attractive for its commercial potential. Nevertheless, there are opportunities for enhancement that can increase its value for consumers. One of the main areas for improvement is increasing the cooling module's cooling rate, which is currently too slow to deliver a cold beverage experience upon request. The maximal approach would be developing advanced temperature regulation systems for precise regulation. These will improve the product quality and its appeals for consumers who will be offered a fully precision tool. Another room of improvement is the integration of smart home technology enabling features like remote control, schedule, and monitoring via mobile apps.

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ISHRAT.EY: Women & Children's Preserved Rights Under Provisions of the Islamic Family Law (Federal Territories) ACT 1984 (ACT 303) PART V (Dissolution of Marriage) & PART VI (Maintenance of wife, children and others)

*Puteri Marissa Damia, Ahmad Danish, Nurul Amilin, Nurhidayah Fathiah, Karenina Alessandrine and Khairah Ismail

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2024959447@student.uitm.edu.my

ABSTRACT

Islam guarantees the rights and well-being of women and children comprehensively, which historically was unprecedented before Islam. However, contemporary socio-cultural norms often fail to adequately protect these rights. Alamgir (2014) emphasizes the importance of women understanding their rights and needs to combat societal discrimination. Similarly, Harlina Siraj (2015) underscores the significance of women being aware of gender equality and their societal roles. In predominantly Muslim Malaysia, safeguarding women's and children's rights is crucial yet often overlooked, leading to issues like domestic violence, child neglect, rising divorce rates, and emotional/physical abuse. This study aims to educate women and children about their legal rights, particularly under Sharia law, through ISHRAT.EY, a linktree innovation. ISHRAT.EY serves as an accessible platform providing legal information, empowering users to assert their rights effectively and efficiently. It facilitates quick access to essential legal knowledge, benefiting not only individuals seeking protection but also aiding law students in researching Islamic law. Using a qualitative approach with document analysis, this study examines primary sources such as the Islamic Family Law Act of 1984 (Act 303) and secondary sources like these, articles, journals, and books. The goal is to enhance awareness and understanding of Sharia-based rights among women and children. Ultimately, ISHRAT.EY aims to promote empowerment and proper protection for women and children within the framework of Sharia law, offering a straightforward solution to accessing legal information.

Keywords: Islamic family law; syariah law; women's rights; children's rights; legal awareness.

1. INTRODUCTION

Studying and understanding Syariah law is a fundamental obligation for all Muslims. The right of a mother to custody in Islam is crucial for the well-being of the child, as emphasized by Cholil (2017). However, traditional methods like books often fail to engage people effectively in learning about this subject. Tiwari (2021) highlights that Islamic Jurisprudence prioritizes mothers for child custody, recognizing their special bond and sacrifice for their children's upbringing. According to Section 81-87 of the Islamic Family Law Act (Wilayah-Wilayah Persekutuan) 1984, custody priority is given to the mother, followed by maternal grandparents, and then the father, with other factors also considered. Ishrat.ey, a linktree platform, aims to address issues such as limited access to Syariah law information, lack of immediate assistance

hotlines, and insufficient Syariah-compliant resources for women and children's rights (Orakzai, 2014). It provides a participatory learning approach to Syariah law, enhancing public awareness and understanding, particularly among women and children. Ishrat.ey serves not only as an educational tool but also advocates for the rights of women and children in Islam, focusing on post-divorce rights as embedded in Islamic Jurisprudence.

2. METHODOLOGY

Most people have heard that half of all marriages end in divorce, but is there more to the story.The development of this innovation is inspired by the recent spike of divorce rates due to factors such as the prevalence of social media,financial restrains like rising cost of living.toxic marriages that increases the push for divorce,negligence,abuse,mental health issues such as depression,baby blues,fear of abandonment and etc,and also noted that for muslims,problems arising pertaining from polygamous marriages may have contributed to the rise in divorce cases in the countries statistics typically in the state of Selangor as it factors contributes to the high divorce rate among muslims in the state.The disparity between income growth and the rising cost of living can have various negative implications on the psychology and social well-being of couples,leading to divorces.(Patoari, M. H.,2019). Due to busy schedules,quality time spent is reduced,eventually impacting family institutions and leading to divorce.Therefore,Ishrat.ey is a linktree designed to enhance users understanding of Syariah Law,offering additional features that differentiate it from similar products on the market.The linktree also offers helpline services from organisations such as Talian Kasih 15999 Hotline,Buddy Bear Child-line (For children of abused parents,child abandonment and more).Women Tribunal Malaysia,Women's Aid Organisation (WOA),and all Women Action and a legal Aid Service provided by partners of law firms set by the Ishrat.ey Team. Every consultation is subjected of a fee amount of RM 35 per session conducted.How does the Ishrat.ey linktree works,1)Click the link/Scan the Ishrat.ey Qr code provided on our website or any social media platforms,2)The link/Qr code will direct you to the provided linktree page,3)You can now begin to explore the articles/helplines/Legal References/Q&A via Google Form provided in the Ishrat.ey linktree.

3. RESULT & DISCUSSION

Since the major goal of establishing ISHRAT.EY is to guarantee that users may improve their grasp of Syariah law, this linktree has been especially designed to meet this requirement as well as offer extra features that set it apart from other comparable products on the market. The inspiration for this linktree came from issues revolting concerning women and their children's general understanding of Syariah law. (Doi, A. R.,1992). The most common issues that women face in Syariah law are divorce, polygamy, child custody, domestic violence, mahr, and so on. As a result, our group discussed creating a linktree that would provide Syariah-compliance of information and assistance regarding women and children's rights. The reason we chose to spread Syariah law insights to women and their children is that having a linktree means users can always find us - anytime, anywhere. We can list all the information, display images of Syariah and Islamic law knowledge, and use contact forms to facilitate user inquiries or feedback (Parachute, n.d.). Hence, this product has attained an adequate objective in providing and act as a platform to ease the usage of users to access information and details pertaining the sole preserved rights of women and children that has been stated in the statutes of the Islamic Family Law (Federal Territories) ACT 1984 (ACT 303) in Part V and Part VI as legal references.

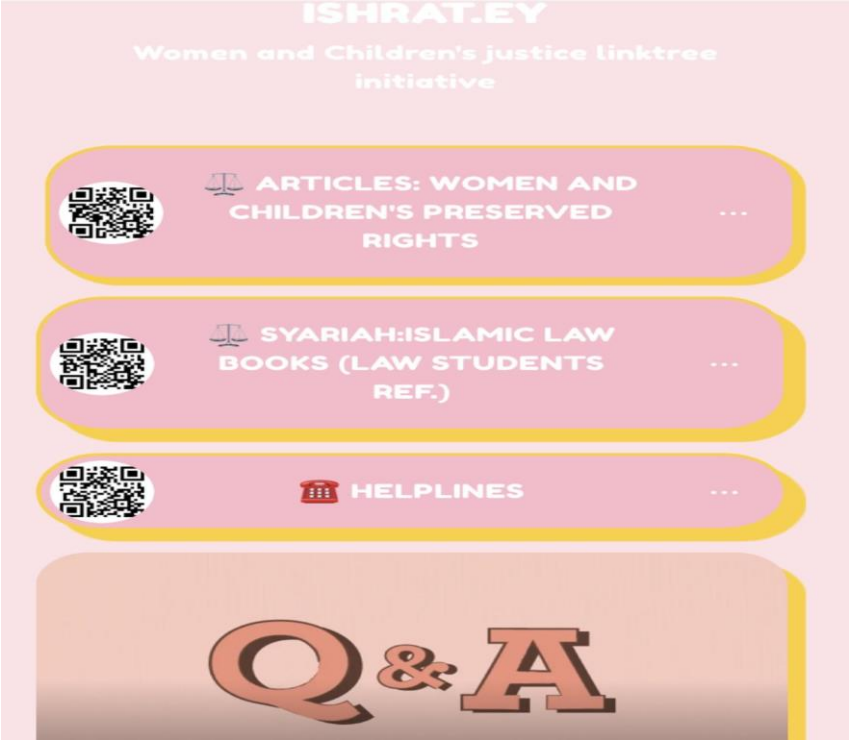

Figure 1. Articles: Women and Children's Preserved Rights

4. CONCLUSION

Islam is a thorough practice of life and comprehensive life rule that addresses all elements of human existence from birth to death. Women have the same rights as males in all aspects of life, according to Islam. Only the pious do not differentiate between men and women. It also prohibits male dominance over females. (Tiwari, A.,2021). Moreover, this linktree assists individuals in understanding women and children's rights from the standpoint of syariah law. As a result, we want to strengthen our linktree in the future based on feedback and suggestions from our users. To summarize, it is apparent that ISHRAT.EY might be of interest to everyone, particularly women in general, since it emphasizes the need of recognising women and their children's preserved rights under Syariah law. As a result of today's widespread socio-cultural norms and behaviours, there is a significant deal of confusion concerning Syariah law and women and their children's rights. Many Malaysians, particularly women and their children, are unaware of one another's cultural traditions and regulations. As a result, we founded Ishrat.ey to educate women and their children about their rights under Syariah law. As a conclusion, Ishrat.ey was developed to remind and educate women and their children the significance of recognising their preserved rights under the Syariah law so that they may deal with situations concerning their rights under Syariah law professionally and in a respectful manner of conduct. This linktree is for anybody interested in learning about Syariah law as well as women and children's rights.

ACKNOWLEDGEMENT

The team of researchers' views on the necessity to produce a linktree that may assist provide a better explanation about women and children's rights based on Syariah law inspired the creation

of ISHRAT.EY. But, without a medium of platform to build on and test the notion, efforts would have been futile. As a result, we would like to convey our heartfelt thanks and gratitude to our lecturer, Ustazah Khairah Ismail for her guidance and this appreciation is also addressed to the PI005 Law Programme as a representative of the UITM Foundation Studies Center, who has contributed their thorough ideas and extended great support and cooperation in the success of producing our innovative project entitled ISHRAT.EY. We would also like to bid our heartfelt gratitude to our organizer, the Centre of Foundation Studies, Universiti Teknologi MARA (UiTM), Cawangan Selangor, Kampus Dengkil Universiti Teknologi Mara (UiTM) for conducting and sponsoring our innovative project in Creations De UITM 2024, which allows the opportunity of our work on this invention to be recognised and acknowledged. Moreover, the Centre of Foundation Studies at UiTM financed the study participants so that the monetary incentive gives motivation and eases the financing of research to promote the concept to the wider audience. Gratitude is also extended to other students and lecturers in the Center of Foundation Studies at UiTM's Dengkil Campus in Selangor who contributed ideas and lent a helping hand in the development of ISHRAT.EY.

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TeddyGuard: A Multifunctional Personal Safety Device for Women, Children, and Individuals with Disabilities

*Anis Nur Aleya Fariza Mohd Basri, Najihah Najmuddin, Nor Alya Diyana Mustapar, Ainaa Amani Abdullah, Khairah Ismail and Noor Syahida Md Soh

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2024959561@student.uitm.edu.my

ABSTRACT

Safety is of paramount importance for everyone, especially women and children. However, despite its significance, guaranteeing safety remains a challenge due to prevalent cases of theft, rape, and robbery. Consequently, women and even handicapped individuals must be well-equipped with safety tools to mitigate such dangers effectively. While the market offers various safety tools, yet, none comprehensively address the multifaceted needs for personal security. Hence, this research focuses on developing a safeguard device specifically to protect women, children, people with disabilities, and senior citizens from criminals, especially when they are walking alone. The design of the study uses a quantitative design approach through the survey method. The survey study was carried out based on references on matters related to sampling, measurement, and data analysis. This study aims to identify TeddyGuard's ability to protect users and the new features available in TeddyGuard casing. The result shows that this device combines four essential functions into one tool: an alarm, pepper spray dispenser, retractable blade, and sim-card GPS. The first function serves as an alarm, warning people nearby with a 110 dB sound wave, indicating the danger faced by the user. The second function, the pepper spray dispenser, acts as a long-range defense by temporarily blinding the criminal with pepper spray powder. By developing inclusive safety tools tailored to the specific needs of women, children, and handicapped individuals, we can enhance overall safety and security for everyone in our communities.

Keywords: safety tools; women and children; personal safety tools; tools; handicapped individuals.

1. INTRODUCTION

TeddyGuard is an innovative personal safety device designed specifically to protect women, children, people with disabilities, and senior citizens from criminals, especially when they are walking alone. Statistics from the Social Welfare Department (JKM) last year showed that a total of 7,520 children nationwide needed preservation and protection. Reports in Negeri Sembilan recorded an increase, from 302 in 2022 to 405 last year (Mohd Amin, 2024). Although the issue of security and safety for women, children, the disabled, and the senior citizens often receives attention, the increase in crime cases against them is still rampant. Thus, this study has produced a personal protective tool that is easy to carry around.

This device combines four essential functions into one tool: an alarm, pepper spray dispenser, retractable blade, and sim-card GPS. The first function serves as an alarm, warning people

nearby with a 110 dB sound wave, indicating the danger faced by the user. The second function, the pepper spray dispenser, acts as a long-range defense by temporarily blinding the criminal with pepper spray powder. However, it's important to note that this effect is only temporary. The final function is the knife integrated into the device, which can be used for self-defense in close-range attacks. By combining all four functions, women, children, people with disabilities, and senior citizens can defend themselves in various ways and thereby reduce the risk of becoming victims of crimes such as mugging, bullying, kidnapping, and sexual harassment. In conclusion, TeddyGuard has a positive impact on both individual users and society as a whole by providing them with an effective tool to protect themselves in potentially dangerous situations. Child safety is an increasingly important aspect in today's dangerous era.

2. METHODOLOGY

This research employs a quantitative research design approach through the survey method. The survey study was carried out based on references on matters related to sampling, measurement, and data analysis. This study aims to identify TeddyGuard's ability to protect users and the features available in TeddyGuard.

2.1. Sampling of locations and respondents

In this study, the research respondents consist of local residents from SMK Panchor and its surrounding areas. 20 research respondents were randomly selected and were divided into age categories as in Table 1.

Table 1. Respondents

Gender/Age	7 to 12 years old	13 to 17 years old	18 years old and above	Total
Male	3	3	10	16
Female	1	3	0	4
Total				20

2.2. Research instrument

A research instrument is a precise tool used to measure and gather specific data and information. Acquiring knowledge about research tools is crucial when designing a study to gather data (Cresswell, 2008). The study will utilize questionnaires and data obtained from two types of parameter measurement studies as research instruments. During the survey, participants are required to indicate their responses by selecting either "Yes" or "No" for a total of 8 questions in questionnaire 1 and 7 questions in questionnaire 2. Meanwhile, the measured outcomes of the trials are displayed in Table 2 below.

Table 2. Measurements

Tested Device	Tested Parameters	Unit
Alarm	Sound Wave	Decibel (dB)
Pepper Spray Dispenser	Distance	Metre (m)

3. RESULTS AND DISCUSSION

3.1 Alarm testing

Table 3. The Alarm Test Data

Application	Original Sound	Enclosed space	10-meter distance
Decibel X	112.3 dB	68.6 dB	83.0 dB
Decibel Meter	100.0 dB	77.0 dB	82.0 dB
Decibel	106.0 dB	72.0 dB	85.0 dB
Average	**106.4dB**	**72.86dB**	**83.33dB**

The average sound strength conducted resulted from using 3 types of smartphone applications. The average original sound is 106.4dB, the strength in an enclosed space is 72.86dB, and the sound strength at a distance of 10 meters is 83.33dB. In conclusion, all three average sound levels exceed the normal human hearing threshold and align with the purpose of TeddyGuard, which is to produce a loud sound to startle criminals and attract the attention of bystanders. This conclusion is drawn based on Steven W. Smith's study on sound strength.

3.2 Pepper spray distance testing

Table 4. The Pepper Spray Test Data

Sample	Label	Unit	Formula

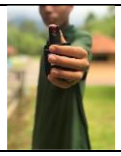
The average spray distance used is 0.89 meters. This distance is suitable for long-distance defense between the victim and the perpetrator.

3.3 Product description

TeddyGuard is a personal security device (pepper spray) holder (case) that has 3 in 1 feature. These innovations allow a person to save themselves in various emergencies. TeddyGuard has a special feature which is a single pull system where it will work with only one pull. The system also allows people with disabilities to use it easily. Table 4 below shows the step by step on how to use TeddyGuard:

Table 5. Steps to Use TeddyGuard

Step	Description
	1. Attach TeddyGuard casing to the desired area.
	2. Pull TeddyGuard and the alarm will go off immediately

	3. Point the nozzle at the criminal and press the pepper spray.

4. CONCLUSION

TeddyGuard is essential for various groups in society, particularly children, individuals with disabilities, working women, senior citizens, university, and school students. It provides protection against abduction for unsupervised children, aids individuals with disabilities with weak physical strength, and offers GPS functionality for monitoring elderly parents with conditions like dementia. Additionally, it safeguards working women who travel alone at night from potential mugging or robbery.

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I would like to express my sincere gratitude to everyone who contributed to the completion of this research project. Firstly, I am deeply thankful to my supervisor for their invaluable guidance, support, and encouragement throughout the research process. Their expertise and insights have been instrumental in shaping this study. Most importantly, to both of our parents for being very supportive throughout this journey of completing this research. Umi and Abah, this is for you.

We are also grateful to the Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil Universiti Teknologi MARA (UiTM) for sponsoring this innovative project to help encourage students to participate. This appreciation is also addressed to the team members and friends of the PI005 law department at the UiTM Foundation Centre, who have contributed ideas and extended great cooperation in the creation of TeddyGuard innovation.

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Muashir Calendar

*Afif Adzhan Norazman, Muhammad Faiz Aiman Norhayazi, Wan Amirul Thaqif Wan Amir and Khairah Ismail

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2024959609@student.uitm.edu.my

ABSTRACT

As a Muslim, fulfilling the demands of ibadah as prescribed in their daily lives is a given. The ibadah needs to be performed individually or collectively which is called fardu ain and fardu kifayah. It is divided into two parts which are al-'ibadah al-'ammah and al-'ibadah al-khassah. The Maqasid Shariah of the ibadah is to make a Muslim always closer to God by doing good deeds and staying away from vices and sins. However, Muslim society nowadays has always been distracted by the enjoyment that this world provide. Most people are not taking seriously on how to improve themselves to become a better Muslims day by day. This is why the crime rate nowadays has been increasing rapidly. Hence, it has led us to create a calendar that is called Muashir Calendar. The objective of this product is to give an exposure and ways on how to improve our daily self by doing a sunnah that has been forgotten by most of the Muslim's society. The main target audience of this calendar are students, teenagers, and people who are struggling to get their 'deen' on the right path. This study uses a qualitative methodology with document analysis approach. This involves collecting the research data using previous studies and primary sources analysis such as Al-Quran and Hadith, and other sources such as thesis, articles, journals and Fiqh books related to ibadah for the purpose of information analysis. In conclusion, everyone should not take lightly on the lonely struggles and the feeling of confusion while not knowing how to start improving themselves; rather, we need to help them to accomplish it. Through the innovation of this Muashir Calendar, the Muslim community can be more conscious of the Islamic ibadah, which has highly practical and realistic values for the goodness and well-being in the life of a Muslim.

Keywords: *Ibadah*; Islamic Education; innovation; Islamic Calendar.

1. INTRODUCTION

Muashir Calendar is an extraordinary calendar that provides a feature that cannot be found in another calendar. The main purpose of this calendar is to help Muslims society to become a better and well-mannered Muslims every day. This is because Muslims nowadays have been struggling to stay in the right path, that is, to get closer to Allah SWT. It is also evident that Muslims nowadays do not feel guilty for committing sins. Our calendar can guide and help Muslims on how to do sunnah *ibadah* properly and therefore, can help Muslims gain more knowledge about it.

This idea of innovation was created due to several factors or problems that Muslims often faced in their daily lives. Among them, Muslims often miss on the important days to perform *ibadah* due to the lack of religious understanding and the lack of knowledge on the days where

additional *ibadah* can be performed based on Islamic months. In addition, Muslims around the world do not take the days in Islam seriously and neglect them because they are not obligatory. This happens because they believe that only the obligatory *ibadah* needs to be taken seriously and refuse to learn about additional practices or *ibadah* that serves to complete the obligatory *ibadah*. In fact, sunnah *ibadah* is highly encouraged and part of it is highly demanded as it is the sunnah practices of Rasulullah SAW and a sign of obedience to Allah SWT, as well as able to give an impact for shaping a noble personality and character (Al-Ghazali, 2011). Thus, following the implication of the above problems, Muslims who neglects this very important sunnah *ibadah* will be further away from the mercy of Allah SWT and are easily influenced by the western way of life and culture that is not in line with the demands of Islamic teaching.

According to Nurul Husna (2016), *Ibadah* in Islam is one of the mechanisms that is acknowledged to be influential in shaping human behaviour. Accordingly, many studies shows that the current problem of sexual misconduct among teenagers is identified as caused by the neglect of *ibadah* aspects.

In addition, studies have found that neglecting the *ibadah* is one of the factors that predispose teenagers to sexual misconduct such as sex before marriage (Khadijah Alavi et al. 2012; Salasiah Hanin Hamjah et al. 2012; Salmi Ahmad Sudan 2013) and the other sexual misconduct such as addiction to browsing pornographic websites (Nor Azah, 2009).

Abdul Ghafar Don & Zaleha Mohd. Ali (2008) also said that *ibadah* as a whole is an important element that needs to be emphasized for the physical, mental and spiritual development of a Muslim. Therefore, Muashir Calendar is expected to help Muslims to know more details about the practice of sunnah *ibadah* in Islamic teachings.

2. METHODOLOGY

The purpose of this research is to assist Muslims worldwide in returning to the fundamental principles of Islam. Being aware of what a Muslim should and should not do can greatly benefit them in all aspects of their everyday lives. The Muashir Calendar will serve as a guide by outlining the dates and ways for performing specific *Ibadah*. Hence, it will be much easier for all Muslims to get back on their feet and improve their *Iman* (Faith). This study uses a qualitative methodology with document analysis approach. This involves collecting the research data using previous studies and primary sources analysis such as *Al-Quran* and *Hadith*, and other sources such as thesis, articles, journals and Fiqh books related to *ibadah* for the purpose of information analysis. The use of this product is very easy and beneficial because it has three features in one. First, a complete Islamic calendar for twelve months. Second, it includes information on important days in sunnah *ibadah* for each Islamic month. Third, there is also information on how to perform the *ibadah* as well as the benefit and rewards for the practice.

2.1. Highlighting the important dates

By highlighting of the specific dates pertaining to the important *ibadah* dates, Muslims will find it easier to do the *ibadah* on such days. Their faith will rise as a result, and they will be able to grow without burdening themselves. Hence, it can prevent a lot of unpleasant things thanks to their life that is full of *Barakah*.

2.2. Showing the ways on how to do it

Some people experience discouragement and laziness whenever they attempt to perform the *Ibadah* that they are unsure of how to perform. By providing a step-by-step guide, Muslims will not feel burdened and discouraged when doing *Ibadah*. Thus, it may grant them extra deeds and blessing from Allah SWT.

2.3. Highlighting the benefits

Muslims may also feel courageous when they understand the benefits and rewards of their *ibadah*. They will be more motivated to perform them and will not plan on living and missing out on that particular *ibadah* when they understand the true benefit of the *ibadah*.

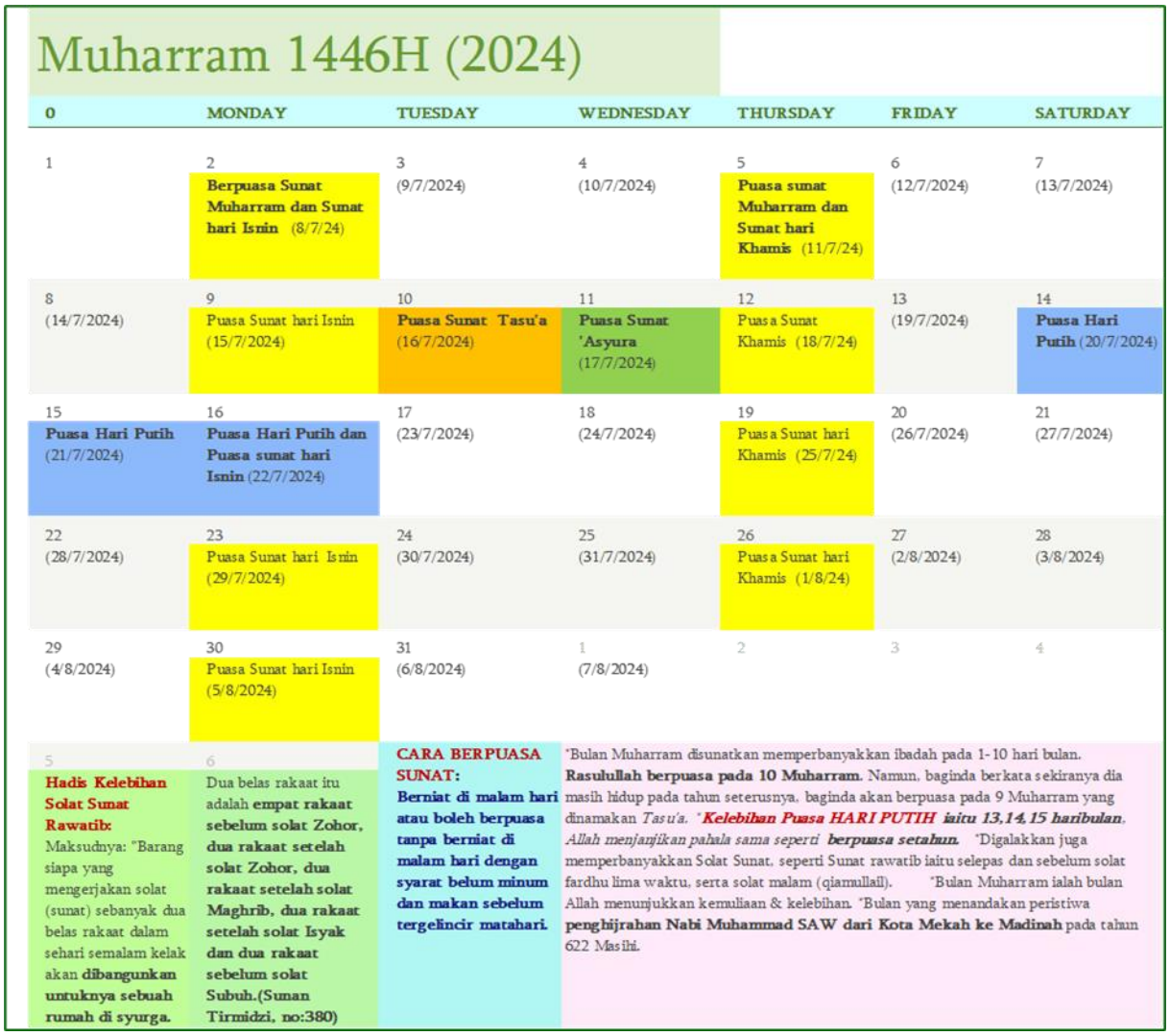
3. RESULTS AND DISCUSSION

Islamic calendar is an important tool in the life of Muslims as it offers guidance and lays out the *ibadah* that can be performed to increase practice and to strengthen faith in oneself within a meaningful month or days. Apart from the existing Islamic calendar that highlights the important days in Islamic months such as Ramadan and *Eidul-fitri*, we also wish to develop a calendar that can provide additional practices that can be performed in Islamic days or months such as the fasting on the day of *Asyura* on the tenth of *Muharam* and more.

This idea was developed as a result of several issues or concerns that Muslim frequently deals with on daily basis. Among them, Muslim often miss important days to perform ibadah due to the lack of religious appreciation (Al-Ghazali, 2011). This issue arises from Muslims's lack of sensitivity and knowledge of the days on which they are encouraged to perform the additional *ibadah* in Islam. Furthermore, as it is not obligatory, Muslims around the world do not take these Islamic days seriously and neglects them. This is a result of their belief that only the obligatory act should be implemented as Muslims and refuse to learn the practices or *ibadah* that can be performed as an addition to their next day routine (Al Juzairi, 1990). In the end, Muslims are getting further from the mercy of Allah SWT due to the influence of Western culture that dominates their minds. It exists because the majority of Muslim students engaged in hedonism culture and transgress the prohibition of Allah SWT by partaking in drinking alcohol and gambling (Jasmi, 2011).

Therefore, our purpose of creating this Muashir Calendar is to overcome such problems. We also have objectives to achieve when we introduce this product. Among these includes promoting Islam or the provision of remarkable reward. The objectives can be achieved because we will provide more thorough information about the additional *ibadah* that can be performed in Islamic months so that Muslims can practice it on a daily basis. Next, we will also highlight *ibadah* in certain months or days for Muslims. In addition, it is also to give encouragement and guidance for Muslims to improve themselves. Through the production of this innovative product, the society and country will indirectly experience a good impact. The reason for this is that more reward can be obtained if a community that is built along the path of Allah SWT and *As-Sunnah*, with additional practices such as fasting to help them reach the Hereafter can be produced (Mustafa Al-Khin, 2011). Therefore, with the three features on this Muashir Calendar, Muslims will be able to obtain clear information about sunnah *ibadah*.

Therefore, the creation of this product will also help in resolving problems that many Muslims face in their daily lives. As a result of adhering to the comprehensive Islamic teachings, it can give birth to a country and society that are harmonious and peaceful.



Muharram 1446H (2024)

0	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2 **Berpuasa Sunat Muharram dan Sunat hari Isnin** (8/7/24)	3 (9/7/2024)	4 (10/7/2024)	5 **Puasa sunat Muharram dan Sunat hari Khamis** (11/7/24)	6 (12/7/2024)	7 (13/7/2024)
8 (14/7/2024)	9 Puasa Sunat hari Isnin (15/7/2024)	10 **Puasa Sunat Tasu'a** (16/7/2024)	11 **Puasa Sunat 'Asyura** (17/7/2024)	12 Puasa Sunat Khamis (18/7/24)	13 (19/7/2024)	14 **Puasa Hari Putih** (20/7/2024)
15 **Puasa Hari Putih** (21/7/2024)	16 **Puasa Hari Putih dan Puasa sunat hari Isnin** (22/7/2024)	17 (23/7/2024)	18 (24/7/2024)	19 Puasa Sunat hari Khamis (25/7/24)	20 (26/7/2024)	21 (27/7/2024)
22 (28/7/2024)	23 Puasa Sunat hari Isnin (29/7/2024)	24 (30/7/2024)	25 (31/7/2024)	26 Puasa Sunat hari Khamis (1/8/24)	27 (2/8/2024)	28 (3/8/2024)
29 (4/8/2024)	30 Puasa Sunat hari Isnin (5/8/2024)	31 (6/8/2024)	1 (7/8/2024)	2	3	4

5 **Hadis Kelebihan Solat Sunat Rawatib:** Maksudnya: "Barang siapa yang mengerjakan solat (sunat) sebanyak dua belas rakaat dalam sehari semalam kelak akan **dibangunkan untuknya sebuah rumah di syurga.**

6 Dua belas rakaat itu adalah **empat rakaat sebelum solat Zohor, dua rakaat setelah solat Zohor, dua rakaat setelah solat Maghrib, dua rakaat setelah solat Isyak dan dua rakaat sebelum solat Subuh.(Sunan Tirmidzi, no:380)**

CARA BERPUASA SUNAT: Berniat di malam hari atau boleh berpuasa tanpa berniat di malam hari dengan syarat belum minum dan makan sebelum tergelincir matahari.

"Bulan Muharram disunatkan memperbanyakkan ibadah pada 1-10 hari bulan. **Rasulullah berpuasa pada 10 Muharram.** Namun, baginda berkata sekiranya dia masih hidup pada tahun seterusnya, baginda akan berpuasa pada 9 Muharram yang dinamakan *Tasu'a*. "***Kelebihan Puasa HARI PUTIH iaitu 13,14,15 haribulan.*** *Allah menjanjikan pahala sama seperti* ***berpuasa setahun.*** "Digalakkan juga memperbanyakkan Solat Sunat, seperti Sunat rawatib iaitu selepas dan sebelum solat fardhu lima waktu, serta solat malam (qiamullail). "Bulan Muharram ialah bulan Allah menunjukkan kemuliaan & kelebihan. "Bulan yang menandakan peristiwa **penghijrahan Nabi Muhammad SAW dari Kota Mekah ke Madinah** pada tahun 622 Masihi.

Figure 1. Muashir Calendar in Muharram Month

4. CONCLUSION

In conclusion, making this calendar allows us to learn a lot about ways to practice a *al-'ibadah al-Sunnah*. We also learn the benefits that we will have if we practice doing this *al-'ibadah al-Sunnah* frequently. Moreover, we will also improve our Muashir Calendar by including more *al-'ibadah al-Sunnah* so that students and teenagers will receive a lot of benefits from purchasing the calendar and also help them to improve themselves day by day.

ACKNOWLEDGEMENT

Our highest appreciation and gratitude to our lecturer, Ustazah Khairah Ismail for her guidance. We are also grateful to the Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil Universiti Teknologi MARA (UiTM) for sponsoring this

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Atomic Adventure

*Aiman Harris Mohd Zamani, Mohamad Hafiz Haziq Matdaim, Muhammad Uwais Najmi Nasri, Dk Marsya Maisarah Awang Alik, Nur Amanina Haziqah Hasan and Aida Fazliza Mat Fadzil

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023835244@student.uitm.edu.my

ABSTRACT

Acquiring the skill of learning effectively is essential for enhancing students' quality. Bringing enjoyment in the learning process is vital to every student. This is attributed to the fact that enjoyment sparks the feel of curiosity and motivates students to explore further. Physics is one of the vital parts of science that demands the learners to master the importance of theory, concept, and consumption of formulas. In this case, majority of students are facing difficulty in memorizing and grasping the abstract principles of physics. Thus, it has led to the production of a hybrid board game called "Atomic Adventure". The objective of this innovation is to ensure that students derive both enjoyment and educational benefits from playing board games and aid the students to memorize and understand the basic physics concept. Atomic Adventure is produced by combining multiple board games and simulation. It is featured with few conventional board games features such as the use of dice. When players step on the box that has a question mark or exclamation mark, the player must answer questions related to the physics concept. Based on our research, students often find it challenging to visualize and conceptualize when learning physics, this game helps students understand physics easily while having fun with their friends. In conclusion, Atomic Adventure is looking forward to expanding and helping students to better understand and deepen the subject of physics to be used in everyday life.

Keywords: enjoyment in learning process; hybrid board game; basic physics concept.

1. INTRODUCTION

As it is known, physics is one of the vital parts of science that demands the learners to master the importance of theory, concept, and consumption of formulas. Physics is a science that deals with structure and interaction between the fundamental constituents when observed. By nature, students have a hard time understanding physics due to its numerous topics whether learning it by heart or for big exam. It might come off as hard for the majority of people, especially those who are interested in diving deeper but do not know where to start. This research group has resolved to come up with a learning innovation to help this particular group of people which is students and new people wanting to familiarise themselves with physics. The researchers decided to make a board game called "Atomic Adventure". This board game allows players to memorize and understand physics with enjoyment while enhancing their knowledge of physics basic concepts. The majority of students face challenges in their learning journey because of their lack of expertise in making strategies, finding sources of information, or managing their time to study. It can cater to a wide audience if it is retained right. The main objective is to

make sure that the students are delighted while playing Atomic Adventure and assist students in memorizing and understanding the basic physics concepts.

The researchers have asked around for some response among UiTM students as to acknowledge problems that they often face in learning the subject of physics. Based on the data collected, most of the students face a problem when it comes to memorizing and understanding the abstract concept of physics. This causes the students to not answer well during the test and eventually fail the test. Without a solid conceptual foundation, students may struggle to understand and they may not be able to distinguish between physically meaningful solutions and those that do not make sense. Therefore, students might lose interest in the subject if they do not see the boarder picture or the real-world applications of the concepts they are studying.

Atomic Adventure is a hybrid board game which is a combination of multiple board games and simulation which are played simultaneously. The board game will determine the movement of the player when rolling both dice. It is featured with few conventional board games features. For instance, the use of dice as the signature element for the board game. There are several physics concepts that have been implemented in this product.

Based on the research conducted during the development of this board game, it has been determined that its objective is effectively met through the positive feedback received from the researchers' target audience. Thus, Atomic Adventure is eager to expand its reach and assist students in comprehensively understanding and applying physics concepts in their daily lives.

1.1. Objectives

- To ensure the students can enjoy playing board games while learning.
- To aid the students to memorize and understand the basic physic concept.
- To reduce the teacher's burden on sacrificing time to make extra classes.

2. METHODOLOGY

The first part of the Atomic Adventure is the mounting board. This board will act as the base for the board game due to its hard material, allowing better gameplay. A4 paper is used to make the design for the board game and the card. The design will contain pictures and words relating to physics concepts. For example, the ladder will act as ruler and snake will become pendulum for this game. By using clay, characters are molded. Top hat, dog, cat, shoes, boat and pan are many of the model for the players. In addition, we used two dice for the board game. The board game will determine the movement of the player when rolling both dice. Each player will roll both dice and make moves along the boxes that contain numbers 1 to 100.

When the players get to one of the snakes (pendulum) box of the mounting board, the players must answer question related to the physics concept. If player fail to answer the question, player will go down the pendulum and get asked a question by another player. If the player still fails to answer the question, a punishment will be given by another player. In this case, the player that gets punishment will always remember the answers to the physics questions that are imposed on him/her. Next, when a player steps on the box that has question mark or exclamation mark symbol (pop quiz), the player must choose between four categories card which carry physics subjects such as force, wave, light and heat. Each stack of card holds fact, question,

experiment and formula for each subject. The difference between an exclamation mark and question mark boxes are, on exclamation mark box, player must answer within certain timeframe while no time limit is set on the other one. But player must beware, the longer they take to answer the question given, they will roll a single dice to be moved backwards.

2.1. Product diagram

Figure 1. Product Diagram

3. RESULTS AND DISCUSSION

Based on the findings during the development of this board game, it is found that the objective of this board game is successfully achieved by the positive feedback from the target audience, Over the course of 2 months, this product was tested among 50 students. It is discovered that by utilizing the role of moderator to facilitate the game, there is a 20% increase of player engagement and 50% improvement in the flow of gameplay. When there is a moderator, the game will run smoother because the moderator will only be focusing on facilitating the game to help players navigate through the board. For example, if the players find it hard to answer certain questions, the moderator can adjust current situation of the game to favor towards the players so that they can enjoy playing while also maintaining the game balance in terms of win-loss conditions.

Furthermore, to fully take advantage of the role of moderator, a feedback mechanism was included through the gameplay. According to the data collected, this feature increases understanding by about 40% for both players and moderators. For each question card, not only is there a question but also an answer so that the moderator can explain back to players when they face difficulty in answering a question. This way not only can players benefit from it, but the moderator will also understand and retain the physics concept. So, both the players and moderator can further enhance their understanding in physics while also enjoying the fun and excitement of playing a board game.

4. CONCLUSION

In conclusion, Atomic Adventure is looking forward to expand and help students to better understand and deepen the subject of physics to be used in everyday life. By combining enjoyment with educational benefits, this hybrid board game offers a novel approach to teaching and comprehending physics concepts. Through our concept of project, which involved careful design and implementation of game mechanics, we have successfully created an engaging learning tool. The incorporation of familiar board game elements, such as dice and player pieces, along with physics-related challenges and questions, has facilitated an enjoyable

learning experience for students. Moreover, the role of the moderator in facilitating gameplay and providing feedback has further enriched the learning process. By ensuring smooth gameplay and offering explanations when needed, the moderator contributes to a supportive and interactive environment where players can deepen their understanding of physics concepts. Moving forward, the researchers aim to expand the reach of this educational tool, enabling more students to benefit from an enjoyable and enriching approach to learning physics. As education continues to evolve, innovative solutions like the Atomic Adventure play a crucial role in enhancing student engagement and comprehension in STEM subjects.

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Easy Bee Trap (BEEZY Trap)

*Muhammad Hazeeq Asyrani Bador Esam, Muhammad Farhat Danial Ahmad Farizal, Amir Harraz Aqil Shaharuddin, Nur Husna Shayra Saim, Ainul Nabilah Mazlizon and Aida Fazliza Mat Fadzil

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023835522@student.uitm.edu.my

ABSTRACT

Bees are important in our ecosystem as they move pollen from one plant to another and ensure growth and reproduction. However, bees can get hostile too, and attack people. This study focuses on the development of a bee trap known as Easy Bee Trap for the use of the community of the Centre of Foundation Studies, Universiti Teknologi MARA. It was designed on the premise that bees are trichromatic creatures and based their colour combinations on ultraviolet (UV), blue, and green colour and their inclination towards blue light. The bee trap is light as it uses a recycled plastic container as its main body. A UV blue, fluorescent torchlight is attached inside the container and powered up by batteries. A small amount of cooking oil is also added inside the trap to further increase the attractiveness for bees to enter the trap. The device is easy to assemble, affordable, and should be able to attract wandering bees and trap them inside it easily and conveniently.

Keywords: bee trap; ecosystem; recycled plastic; trichromatic; ultraviolet (UV).

1. INTRODUCTION

Bees, known scientifically as Anthophilia, are closely related to wasps and ants. There are more than 16,000 species of bees around the world. Some species gather in colonies while others live in solitary. Bees, whether they are honey bees, bumble bees, or carpenter bees, are all important to our ecosystem as they are the agents that actively pollinate food crops. They move the pollen from one plant to another and fertilise them as they move around so that the plants can produce flowers and fruits (Donkersley, 2019).

However, bees can also be dangerous to human beings as their attack can cause an allergy or toxic reaction, or worse, a fatality. Guzman and Ahmed (2020) reported that a swarm of almost 40,000 Africanized bees attacked a group of firefighters and police who were trying to remove a hive in a building. Five people were sent to the hospital to get proper treatment. National Vital Statistics System (2019) reported that a total of 1109 deaths among American residents due to bee, hornet, and wasp stings. In Malaysia, the Fire and Rescue Department (Bernama, 2020) had to handle 3684 cases of deadly insect attacks like bees and hornets between January and May 2020. This indicates that bee attacks may happen more frequently than many of us would have liked to think so.

According to the Fantastic Pest Control website, there are several ways we can get rid of bees naturally. For instance, using vinegar and spraying it on the area around hives or plants where

many of them like to linger around. Mothballs, cinnamon, and fresh cucumber can be used as well to get rid of the bees. However, in the guide provided on the website of Agriculture and Natural Resources of the University of California, it is advised to call for a professional if the hive is large or there are just too many bees swarming the area. Special equipment may be necessary when moving swarms of killer bees trapped between walls.

Bees are trichromatic just like humans (Riddle, 2016). It means bees have three photoreceptors in their eyes and base their colour combinations on three colours – ultraviolet light, blue and green. Humans, on the other hand, base their colour combinations on red, blue and green. In a study reported by Lundeberg (2018) from Oregon State University, the researchers set up traps with different colours of UV light attached to them in the middle of a field. They found that "the bees preferred blue fluorescence" light from any other UV light colours. This is an important finding as it helps manufacturers to produce effective bee traps for the masses. Bee traps become one of the common ways people easily get rid of bees.

2. METHODOLOGY

2.1. Research framework

This project identifies the problem of students being at risk of bee attacks and aims to address it by providing them with a personal safety tool in the form of a bee trap. Therefore, the objective of this project is to determine the best way to minimise bee attacks on students and to develop a simple bee trap for them.

2.2. Product assembly

The first part of the product assembly is the body of the trap. Two 1.5l plastic containers, with the bottom portion cut off, are connected to each other using heavy-duty tape. Next, at the upper part of the plastic container, a UV torchlight was hung through a hole made on the lid. Next, small holes with a minimum width of 4 cm were cut on each of the four sides of the body of the trap. Lastly, 50 ml of coconut oil was added at the bottom lid of the trap. Thus, the assembly of the BEEZY Trap is then complete.

2.3. Functionality

The BEEZY Trap is set up outside of students' enclosed living spaces. When wandering bees come close to the trap, they will be attracted to UV light emitted from the body of the trap. Their attraction to the trap is further amplified due to the fragrance of coconut oil inside the trap. Once the bees are inside the trap, they are expected to continue flying around inside the trap and not attack the students who are going about their activities inside the living spaces.

3. RESULTS AND DISCUSSION

The BEEZY Trap can minimise the risk of students getting attacked by bees. This product has the potential to be an effective tool as it aims to enhance the safety and well-being of students by reducing the risk of bee attacks. This allows students to focus on their studies and activities without the fear of sudden bee attacks. This product also serves as an educational tool for students to learn about bee behaviours, ecology, and conservation efforts. They can observe the

trapped bees, study their species, and understand their importance in the ecosystem. Other than that, by working on a humane solution like this product, students and the community can develop a deeper understanding of environmental issues and the importance of the existing wildlife. It shows a culture of environmental stewardship and responsible pest management practices. This product also serves as an example to other educational institutions and communities to use environmentally friendly methods and prioritise protection.

To enhance the product's effectiveness, future innovations are needed. For instance, a movement sensor could detect objects 1 metre away and activate the UV light only when necessary, conserving energy. Additionally, a fragrance pump could release bee-attracting scents like lemongrass, lavender, and coconut, synchronized with the sensor to optimize attraction. Using pheromone attractants would mimic female bee scents, luring male and worker bees. It is also planned to use biodegradable materials and natural attractants, making the trap eco-friendly. Finally, remote monitoring via a smartphone app or web interface would allow users to adjust UV light settings to attract specific bee species more effectively.

4. CONCLUSION

In conclusion, this project which is BEEZY Trap demonstrates the feasibility and effectiveness of bee traps as an innovative solution that not only helps to manage bee populations but also minimises the risk of getting attacked by bees. Our objectives which are to determine the best way to minimise bee attacks on students and to develop a portable bee trap for students have also been achieved.

All in all, this initiative focuses on students, green areas, government agencies, and research institutions to promote a harmonious relationship between humans and nature. Through the deployment of the BEEZY Trap, individuals can learn to coexist safely with nature's inhabitants while fostering a greater understanding and respect for the surrounding environment.

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EduTales: An Educational Comic to Support Students' Learning Experience at the Centre for Foundation Studies, IIUM

*Amirul Nazmi Azrymi, Azwa Safrina Shuhaimi, Amanati Saffiyah Kamaruzaman, Muhammad Adam Mohd. Adli, Muhammad Faris Fahrizal and Nur Nabila Ahmad Kamal

Department of Languages and Management, Centre for Foundation Studies, International Islamic University Malaysia, 23600 Gambang, Pahang Darul Makmur, Malaysia

*Corresponding author: nazmiazrymi@iium.edu.my

ABSTRACT

Many students at this level struggle to engage with standard educational resources, emphasizing the need for innovative tools to improve comprehension of course contents. This study introduces EduTales, an education supplemental tool tailored for foundation-level students, aiming to address the challenge of disengagement with traditional course materials. For this, EduTales leverages the inherent appeal of comics to create an engaging learning experience. Through incorporating interesting characters, scenes, and storylines, EduTales's objective is to enhance students' understanding of their course contents while ensuring enjoyable learning experience through appealing pictures, conversational delivery, and interesting storylines. It provides learners with crucial contexts for understanding the essence of the subjects, as well as delivering exciting backgrounds and clear graphics to make the plot easy to understand. To assess the effectiveness of EduTales, two instruments are employed to gather efficacy data, namely Pre-Test and Post-Test, as well as a survey to gauge feedback on the innovation. Then, the scores are consolidated in a bar chart format to show the changes between the pre-test and post-test. The findings indicate a positive response from students, who found EduTales both engaging and helpful for understanding complex topics - even surpassing initial expectations. Additionally, EduTales's availability in both online and flip-book formats proved to be popular among students, suggesting its potential for broader usage and commercial success. By offering EduTales to other universities, educators can provide students with an effective tool to improve comprehension and engagement. In conclusion, EduTales provides major benefits, including improved comprehension, ease of access, and the usage of relatable lexicons for the youth, making it a versatile and valuable resource for enhancing educational outcomes in modern learning environments.

Keywords: education supplemental tool; learning aid; comic-based learning; student engagement; comprehension.

1. INTRODUCTION

For the younger generation, word-dense textbooks and traditional resources are becoming difficult to use. Addressing this looming issue, EduTales introduces an innovative approach to learning for students at the Centre for Foundation Studies (CFS), IIUM, incorporating comics to enhance comprehension of course contents. EduTales does so by transforming complex concepts into visually stimulating narratives and utilizing contents directly sourced from

learning materials at the Centre. In doing so, EduTales aims to captivate students' interest, and foster better understanding of key concepts via an alternative to the traditional learning materials. This is based on Raiyn's (2016) study where incorporating visual stimuli in teaching and learning helped enhance students' learning experience. In fact, Akcanca (2020) highlighted that learning through educational comics is a further footstep as it can help open up learners' imagination, which in turn will facilitate better understanding. All in all, EduTales attempts to enhance students' understanding of their course contents through appealing pictures, conversational style (Wallner & Barajas, 2020), and interesting storylines in the form of comics (Bolton-Gary, 2012).

2. METHODOLOGY

This study employs both quantitative and qualitative modes to assess EduTales's efficacy in enhancing students' comprehension. Initially, a set of pre-test and post-test adapted from Rutta et. al. (2021) is administered to assess changes in students' understanding before and after their exposure to EduTales, which is later quantitatively observed via their test achievements. The comics in EduTales are shared with them as a case-based or topic-based material (Roskosz & Wiorogorska, 2016) between the administration of the tests. Subsequently, a feedback survey is given to the participants to collect qualitative feedback in order to gain insight into their experience with EduTales. Through this approach, it is possible to gauge the efficacy of EduTales as a support tool and find areas of improvement.

2.1. Research questions

The study revolves around the following question:

Does the integration of educational comics, such as EduTales, enhance students' understanding in specific subject(s)?

2.2. Framework, methodology and process

2.2.1 Framework

For this study, the overarching philosophy is constructivism in learning, which involves building up on learners' existing or gained knowledge to enhance further understanding. Roskosz and Wiorogorska (2016) agreed that incorporating comics and its aspects such as designs, characters and storylines does involve building on knowledge of the students, and on the students. Thus, this becomes the basis for the operation of EduTales as a support tool for students in CFS IIUM in their learning of respective course contents. This can be seen from the following diagram:

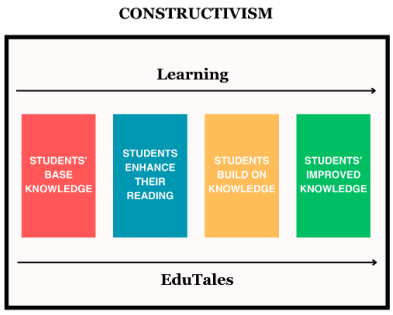

Figure 1. EduTales Framework of Research

2.2.2 Methodology, instrument and process

The framework outlines a strategic approach in creating, using, and measuring EduTales. Its efficacy is measured through a mix of both quantitative and qualitative methods whereby the participants are selected from among students of the Centre for Foundation Studies, IIUM, particularly those who have studied the following subjects: Introduction to English Language, *Pengenalan kepada Bahasa Melayu*, Basic Principles of Tourism, and Civil Law. The participants are then given an instrument of a ten-question pre-test according to their respective subjects, which they answered within 20 minutes. Then, they are provided with their EduTales comics as a revision tool, in which they spent 20 minutes to read through. Afterwards, they are given the exact same instrument as a post-test to measure any improvements in their scores, which they also answered within 20 minutes. A survey followed to gauge their feedback on EduTales and its efficacy in enhancing their understanding. The data are then tabulated and analysed via Microsoft Excel features.

3. RESULTS AND DISCUSSION

This section consists of the findings and the discussion of the data that had been collected during the operation of the EduTales project.

3.1 Changes in understanding of course contents

The participants' understanding of their respective subjects shows an increasing pattern, as demonstrated via their pre-test and post-test results, which are as follows:

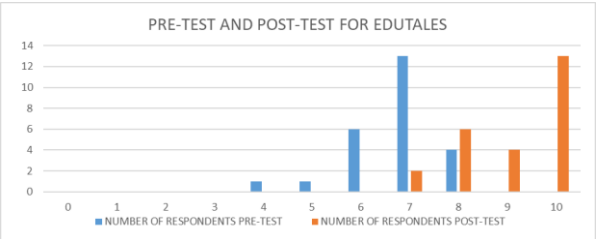

Figure 2. Participants' Pre-Test and Post-Test Results

The bar chart above compares the pre-test and post-test results of EduTales' 25 pilot participants. The horizontal axis represents the score range from 0 to 10 while the vertical axis represents the number of respondents. Pre-test scores (blue bars), peaked at 7 (13 respondents)

with majority scoring around 6 to 8. Post-test scores (orange bars) significantly improved with no scores below 7, This indicates that EduTales can enhance understanding and can be a potent support tool for students to use to tackle specific course contents.

3.2 Participants' perceptions on EduTales

A survey was distributed to obtain the participants' opinions on whether EduTales can help them understand a particular subject better. 98.1% of the participants answered "Yes" indicating that they believe EduTales can help them understand a subject better. Not only that, in the open-ended questions of the survey, all respondents who filled up the sections indicated positive reception towards EduTales as their supplemental educational tool. This data shows that majority of the respondents have a positive perception of EduTales' ability to aid in understanding a subject and is perceived as an effective educational support tool.

4. CONCLUSION

EduTales has proven highly beneficial to supplement learning, seen through positive performances in the tests and the participants' positive feedback. The current data indicate great improvements, thus giving clear evidence of EduTales' positive and potential impact on learning outcomes. Future recommendations include expanding EduTales to science-based courses and publishing it as a manuscript for broader access and commercial potential, making it applicable in other disciplines too. EduTales can also be expanded to other higher education institutions due to its flexible nature that can adopt and adapt to various disciplines. What needs to be done is simply pinpointing targeted content, drafting the storyboard and then adopting the course contents into its comic form via EduTales machinery. This is how EduTales attempt to bridge the learning experience between what is needed and how can the needs be fulfilled when it comes to foundation-level learning.

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EarthSmart Toys: Revolutionizing Playtime with Eco-Friendly Innovations for a Greener Planet

*Nurul Huda Mohd Noor, Nur Irina Suffiah Pairus, Nur Amira Humairah Fahrul Razi, Ahmad Solehin Ahmad Sabri, Ersalina Amni Ezuan and Muhammad Ameen Jasmari

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: huda3632@uitm.edu.my

ABSTRACT

Plastics pollution is a pressing global concern that needs to be resolved quickly as it can cause a serious damage to the earth due to the plastics' inability to be decomposed safely. In this matter, plastic toys play a very big role as one of the main contributors in worsening this issue. In fact, plastic toys constitute 6% of all plastic found in landfills and to make things worse, even the production of it releases all sorts of toxic emissions into the atmosphere. Thus, it has led us to create this project called EarthSmart Toys. The primary goal of the making of this product is to mitigate the amount of plastic consumption and to make toys that are chemically safer for both children and environment. EarthSmart Toys will be made fully from plant-based materials, including glycerine and food wastes. Additionally, our product will also be beneficial to the nature upon disposals as it can also act as a fertilizer to the soil and reduce the impact on nature. Furthermore, this product can be mainly commercialized to the parents, kindergartens, and other child-centric establishments. In conclusion, EarthSmart Toys can be used to tackle plastic pollution as it can help to reduce plastic wastes and the emission of toxic gases to the atmosphere.

Keywords: EarthSmart Toys; pollution; toxic; plant-based; kids.

1. INTRODUCTION

Bioplastics are plastic materials produced from renewable biomass sources, such as vegetable fats and oils, corn starch, straw, woodchips, sawdust, recycled food waste, etc. Bioplastic can be made from agricultural by-products and from used plastic bottles and other containers using microorganisms. Common plastics, such as fossil-fuel plastics (also called Petro based polymers) are derived from petroleum or natural gas. Not all bioplastics are biodegradable nor biodegrade more readily than commodity fossil-fuel derived plastics. The biodegradability of bioplastics depends on the specific materials and manufacturing processes used. Some bioplastics, such as those made from polylactic acid (PLA) or polyhydroxylalkanoates (PHA), are designed to be biodegradable. However, other bioplastics, like those made from bio-based polyethylene or polyethylene terephthalate (bio-PET), may not biodegrade as readily as their fossil-fuel. Bioplastics are usually derived from sugar derivatives, including starch, cellulose, and lactic acid. As of 2014, bioplastics represented approximately 0.2% of the global polymer market (300 million tons). The use of bioplastics can reduce carbon footprint and reduction in fossil fuel dependence. Additionally, the production of bioplastics must be ensured that the additives used are safe and do not leach harmful chemicals to avoid toxicity. Furthermore, some bioplastics are derived from plant materials that could potentially cause allergic reactions. For

instance, bioplastics made from soy or nuts should be labelled appropriately to prevent allergic reactions. The objective of this innovation is to improve the usage of bioplastics by enhancing its ability where the bioplastics can be used as a fertilizer by using food wastes such as eggshells and banana peel. Additionally, banana peel is filled with calcium which can improve root growth and helps add oxygen to soil which will assists in photosynthesis. Eggshells contain minerals such as potassium, phosphorus and magnesium which can help plants to grow. The process of making our bioplastics is conducted after the procedures are arranged. The procedure starts by measuring the amount of glycerin and vinegar needed to ensure the bioplastics have strong structure. Then, we studied that the amounts of banana peel and eggshell needed to be used in the right proportions. Next, all the previously stated ingredients will be mixed and heated on a pan until a sticky mixture is produced before pouring it into the desired toy mould shape. Some experiments are conducted to test the strength and the water dissolving ability of our bioplastics. The hardness test which involves a test on a fixed minor load to a major load and then returned to a minor load has been carried out with success and the max weight it can carry shall be stated later in our report. Other than that, the experiment on our bio-plastic's water dissolvability has also been conducted and the time needed for it to dissolve completely has been received and factors affecting it such as water properties, temperature of water but unfortunately, we were only able to test a few factors due to our limited supply of the materials used. Based on the experiment conducted, it is evident that our bioplastic can bear a significant load and maintains its integrity longer than expected. Additionally, the higher the temperature of the water sample, the faster the bioplastic dissolves completely.

2. METHODOLOGY

First, the eggshells and banana peel were cut into smaller pieces and then washed. The smaller pieces of eggshells and banana peel are dried under the hot sun for 30 minutes. The eggshells and banana peels are grinded in a blender separately. After that, the pan was heated, and 10 mL of glycerine was added. The mixture of eggshells and banana peel poured into the pan. The mixture was stirred until it forms into jelly-like looking fluid. Then, 2 mL of pure water, 2 teaspoon of tapioca starch and sodium bicarbonate are added. The mixture was stirred until the substances completely dissolved. Then, the heat was turned off and the mixture was left to cool down for 2 minutes. Next, the mould plate was prepared. The mixture was poured into the mould plate. The mixture was scattered until uniform thickness is achieved. The mould plate was placed under the sun and was left until it become dry for a few days. After that, the bioplastic would take its shape and it is taken out of the mould plate. Then, the bioplastic is placed on the table to be tested for its hardness. A block of 50g was used and placed on top of the bioplastic. The experiment was repeated with 100g, 150g, 200g, 250g and 300g. After that, the bioplastic is put into a 50ml beaker filled with water. The beaker was placed on top of the heating plate. The temperature of the heating plate is set 90°C. Record the time for the bioplastic to fully dissolve.

3. RESULTS AND DISCUSSION

3.1 Figures and Images

Based on Hardness Test, a test carried out to know the exact weight a bioplastic with different diameter can handle before it starts to crumble, we can conclude that the maximum weight our bioplastic can handle is around 200g for each 3 cm diameter bioplastic before it starts to break

and buckle.

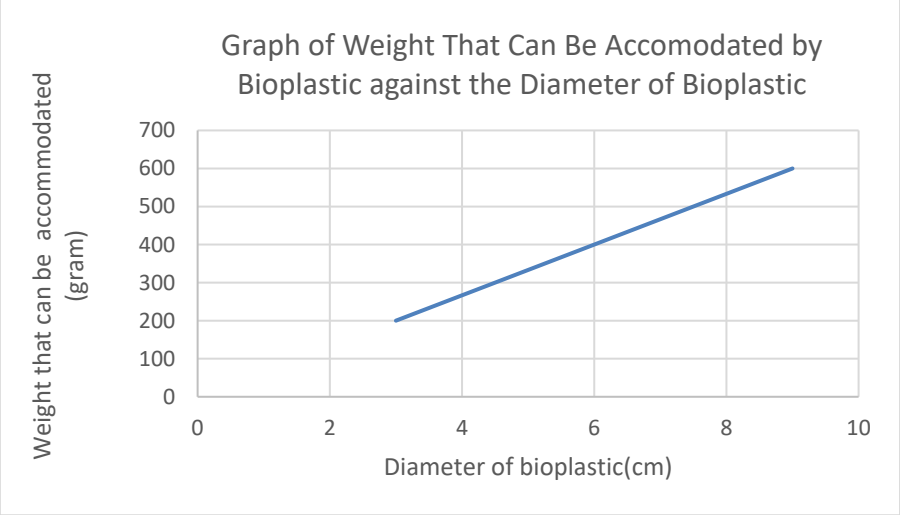

Figure 1. Graph of Weight That Can Be Accommodated by Bioplastic against the Diameter of Bioplastic

Based on water solubility test, which was a test for the shortest time needed for the bioplastic to fully dissolve in water is 10 minutes at 90°C. It can be said that the higher the temperature of the water sample, the shorter the time it takes for the bioplastic to dissolve completely.

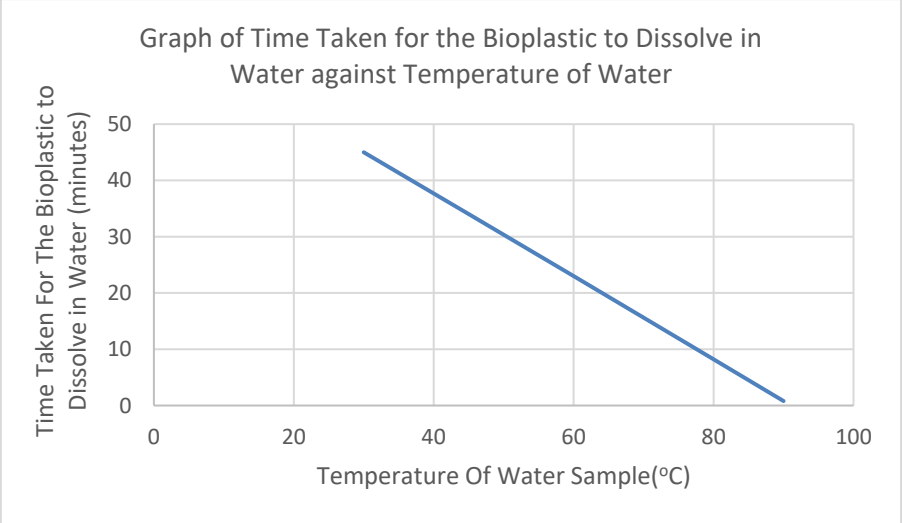

Figure 2. Graph of Time Taken for the Bioplastic to Dissolve in Water against Temperature of Water

3.2 Tables

Table 1. Hardness Test

Diameter of bioplastic (cm)	Weight that can be accommodated (g)
3	200
6	400
9	600

Based on the data obtained from Hardness Test, it is shown that the weight that can be accommodated by the bioplastic increases when the diameter of the bioplastic increases.

Table 2. Water Solubility Test

Water Samples	Temperature (°C)	Time taken to dissolve (minutes)
A	30	45.7
B	60	23.4
C	90	10.5

Based on the data obtained from water solubility test, it is shown that the water sample A took the most time for the bioplastic to dissolve compared to water sample B and C respectively. This is due to the low temperature of the water which causes the molecule bond inside the components of the bioplastic to break up and separate a lot slower than the other bioplastics inside higher temperature water baths.

4. CONCLUSION

All in all, the maximum weight the bioplastic with different diameter can withstand is about 1000g before breaking and the time needed for bioplastic to completely dissolve in water in the highest temperature of water sample that is 90oC is 10 minutes. Furthermore, it is important to further improve its strength, flexibility, and durability of bioplastics to make them suitable for a wider range of applications, including packaging and durable goods. Moreover, the commercial potential for bioplastics is significant and is growing rapidly due to environmental concerns, regulatory pressures and corporate sustainability initiatives.

ACKNOWLEDGEMENT

First and foremost, we would like to express our sincere gratitude to all those who have contributed to this project. Special thanks to our lecturer, Madam Nurul Huda for her guidance and support throughout the research process. We are also thankful to our colleagues and friends for their valuable insights and encouragement. Additionally, we would like to acknowledge the organizer for giving us the opportunity to conduct this innovation project. This project would not have been possible without the collective efforts and support of everyone involved. Thank you.

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Malay Language Grammar Mastery through Video Game 'Tatabahasa Adventures @ Cabaran Tatabahasa' among Students of Centre for Foundation Studies, IIUM

Muhammad Baihaki Iskandar, *Nur Syahmina Supian, Ahmad Kiezman Shamsul, Nurina Imanina Mohamad Razali, Siti Nur Amalin Che Mat and Aisya Fitrina Azmi

Languages and Management Department, Centre for Foundation Studies, International Islamic University Malaysia, Gambang Campus, 26300 Gambang, Pahang, Malaysia

*Corresponding author: syahmina.supian@gmail.com

ABSTRACT

Considering students nowadays are more exposed to casual language styles that do not adhere to standard grammar rules especially in Malay language, therefore their ability to practice the right grammar rules either in speaking or writing can be worsened. Moreover, some students may find grammar less interesting to study compared to other subjects. 'Tatabahasa Adventures' is a comprehensive approach to provide IIUM foundation students with a context-rich environment while learning the common mistakes in Malay language grammar. 'Tatabahasa Adventures' has been designed for students to personalize their own level while playing this game. 20 students of Centre for Foundation Studies, IIUM, have been asked to try out this video games. The effectiveness of this video game has been praised as it has become a platform for students to learn grammar repeatedly in a fun way. 'Tatabahasa Adventures' recognizes the value of video games as an effective method for grammar learning to help students across Malaysia to master in Malay language grammar.

Keywords: grammar; Malay language; context-rich environment; video games.

1. INTRODUCTION

Grammar is important to achieve proficiency in a language. This is said to be so because the use of the correct structure allows humans to communicate effectively in both oral and written forms to deliver a message that is intended accurately and appropriately. Nowadays, the mastery of Malay grammar in the community, especially among students in schools and universities, is at a concerning level. This point can be proven through the results of a study conducted by Siti Khodijah Chee Mee (2020) in her study entitled 'Malay Language Syntax Mastery among Malay Language and Linguistics Undergraduate Students at Universiti Putra Malaysia'. She found that the level of student mastery was in medium level. Most students master the use of language well, but do not master the types of words, phrases, clauses, and sentences. In addition, according to Zaliha Mohamad Nasir et al. (2013), in her study entitled 'Mastery of Malay Grammar Among Students at Universiti Teknologi Malaysia', she also stated that the issue of weak grammar mastery is not only experienced by foreign students who study Malay, but local students also experience the same problem. This issue is also experienced by students at the school level which can be proven through statistics that show students find it difficult to understand and master Malay grammar in any important exam stage in Malaysia because students are only tested on exam-oriented language skills. In relation to that, the teaching and

learning system (PdP) based solely on examination of the Malay language should be changed. This is so because the knowledge and skills of grammar among students are actually incomplete, without looking at the aspect of their language proficiency. Competency here refers to the student's ability to use the language based on specific situations (Nor Hashimah Jalaluddin & Julaina Nopiah, 2011).

Based on the analysis of previous studies, a survey on the mastery of grammar among students at the Centre for Foundation Studies, International Islamic University Malaysia (CFS, IIUM) was conducted. As a result of the survey, the researcher found that the mastery of the CFS, IIUM students in practicing the correct use of Malay grammar, whether in oral or written form, was at a moderate level. In relation to that, an initiative has been carried out to improve students' mastery and expand their knowledge about common mistakes in Malay grammar, namely a gamification approach in the form of video game in teaching and learning activities (PdP) has been generated. 'Tatabahasa Adventures' is a 2D game that covers Malay grammar topics for students to practice grammar and reflects the richness and diversity of Malay grammar. 'Tatabahasa Adventures' features contain questions about common Malay grammar mistakes in various difficulty levels. In order to evaluate the effectiveness of this video game in helping to strengthen the mastery of grammar among the students of the CFS, IIUM a questionnaire was conducted involving students from various fields at the CFS, IIUM. As a result, students who have practiced this video game have shown an understanding of Malay grammar after playing 'Tatabahasa Adventures' thus strengthening their understanding of grammar, which can be seen in Figure 2.

2. METHODOLOGY

2.1 The basic description of ‘Tatabahasa Adventures’

The production of 'Tatabahasa Adventures' is by using a software, which is the Unity software that has been developed by Unity Technologies. This video game is inspired by the video game ‘Super Mario’ by combining grammar elements as an innovation for Malay language education. In short, this video game requires players to pluck cherries (which represent grammar questions) and dash through a number of obstacles and challenges. There are three distinct stages in the game. Each player's level of difficulty increases as the level does. In addition, players must successfully answer all the grammatical questions in order to go on to the next level or to the finish all the level. They must reanswer the question if they don't pass until they succeed.

2.2 Analyzing the effectiveness of 'Tatabahasa Adventures' through the questionnaire

Questionnaire becomes the main instrument in evaluating the effectiveness of this video game. A total of 20 respondents consisting of CFS, IIUM students from various fields were selected to play the video game. Then, they have to answer the questionnaire given for the researcher to evaluate the level of effectiveness of 'Tatabahasa Adventures' in strengthening their grammar knowledge. There are two evaluation scales used in this study, which are the Guttman Scale and the Likert Scale, while there are four sections in the questionnaire used by the researcher. The first part of the questionnaire is respondent information. Next, the second part, which is the level of students' mastery and interest in grammar topics (before playing the 'Tatabahasa Adventures' video game) and the third part, which is the level of effectiveness of the 2D 'Tatabahasa Adventures' video game in strengthening students' mastery and interest in grammar

topics (after playing video game 'Tatabahasa Adventures'). Finally, the fourth part, which is the effectiveness of the components found in the video game 'Tatabahasa Adventures'. The Guttman Scale was used to evaluate the students' accurate perception of their grammar mastery before playing 'Tatabahasa Adventures', while the Likert Scale was used to evaluate their perceptions and opinions about the effectiveness of the video game 'Tatabahasa Adventures' in helping them master grammar after playing the game. The results and discussion of this questionnaire can be seen through the display and explanation of Figure 1 and Figure 2.

3. RESULTS AND DISCUSSION

3.1 Students' level of mastery and interest in the topic of Malay grammar (before playing the 'Tatabahasa Adventures' video game)

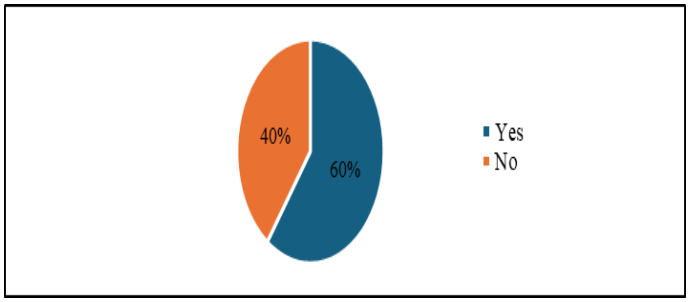

Figure 1. Question: Based on Your Experience Throughout Studying Malay Subject, Do You Have Problems Understanding the Correct Use of Malay Grammar?

Based on Figure 1, there are a total of 8 students, which are 40% who answered 'No' because they do not have problems to understand the correct use of Malay grammar, while a total of 12 students, which are 60% who answered 'Yes' because they still have problems to use correct grammar despite having studied this topic since school. This point illustrates that Malay is easy to learn, but difficult to master, especially the grammar aspect (Jeniri Amir, 2005 as cited in Elmy Maswandi et al., 2022). Furthermore, this questionnaire gives a preliminary impression that most students only learn grammar topics to pass the exam, but when it comes to written assignments in Malay language at the university level, the grammar proficiency among them is very unsatisfactory and is still in a moderate state. This is said to be so because there are still mistakes made by them due to the problem of lack of understanding and lack of reinforcement of grammar knowledge that lasts in their lives. However, the results of the questionnaire changed after they played the video game 'Tatabahasa Adventures' as shown in Figure 2.

3.2 Students' level of mastery & interest the topic of Malay Grammar (after playing the 'Tatabahasa Adventures' video game)

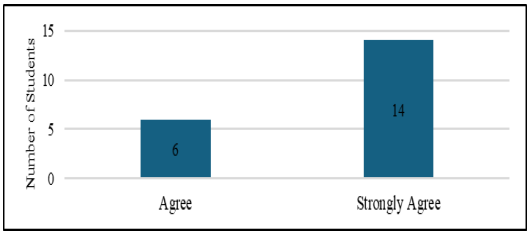

Figure 2. Question: After Playing the Video Game 'Tatabahasa Adventures', I Was Able to Further Strengthen My Mastery of Correct Grammar Usage.

Based on Figure 2, the results of the questionnaire after the students played 'Tatabahasa Adventures' showed positive feedback when 6 students, which are 30% agreed, while 14 students, which are 70% strongly agreed that the video game 'Tatabahasa Adventures' can help them strengthen the mastery of correct Malay grammar. Furthermore, they can identify and correct grammar mistakes that are often made through exposure to the questions found in the video game. The fact is, this video game is a very effective initiative in teaching and learning activities (PdP) because students understand and reinforce grammar topics through a more interesting approach than attending lectures and answering exams alone. This initiative is also in line with the opinion of Ahmad Afandi et al. (2024), which is that game-based learning coincides with the learning characteristics of the 21st century because it is more student-centered thus helping instructors to apply these 21st century skills.

4. CONCLUSION

In conclusion, from 60% of CFS, IIUM students who have problems to understand and master Malay grammar correctly, have shown positive feedback that is 100% of students reached a consensus agreeing that the video game 'Tatabahasa Adventures' successfully helped them understand and strengthen their mastery Malay grammar correctly. It is clear that, this video game is an interesting platform for learning, in addition to assessing the competence and strengthening the players' grammar while creating an effective learning experience that leverages the concept of gamification in education for students. Furthermore, through this 'Tatabahasa Adventures', students are also able to develop problem-solving skills and help address their focus for future challenges and opportunities in an ever-changing world. Finally, 'Tatabahasa Adventures' is an innovation in the world of education, especially in an effort to strengthen and dignify the Malay language in line with current technological progress. This video game is seen to have a high potential to be commercialized by registering a patent and expanding its use to students at other universities and students at the school level in an effort to further strengthen their knowledge of Malay grammar.

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Self-Heating Canned Food

Marsya Haziqah, Muhammad Farhanuddin, Muhmmad Haziq Hadwan, Muhmmad Syahmi Luqman, Muhammad Zareef Irfany and *Aimi Suhaily Saaidin

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: aimisuhaily@uitm.edu.my

ABSTRACT

Self-heating canned food is an easy solution for consumers to enjoy hot meals anywhere without needing heating sources. This paper presents the development of a self-heating canned food system designed to provide safe reheat of packaged food items. The system is included with a portable can equipped with a chamber for storing the food and a heating chamber where it contains chemicals that can produce heat. The performance of the self-heating canned food system was assessed. Results indicate that self-heating can achieve fast and thorough heating of food contents, reaching the desired serving temperatures within minutes. Additionally, consumer feedback shows high levels of satisfaction with the convenience and the efficiency of the self-heating mechanism. Overall, this study highlights the potential of self-heating canned food systems as a practical solution for providing hot meals in many situations, including outdoor activities, emergency situations, and busy lifestyles.

Keywords: self-heating can; hot meals; canned food.

1. INTRODUCTION

We all love easy and quick meals, especially when we are on the move. Regular canned foods are handy, but self- heating canned food offers a whole new level of convenience. Introducing self-heating canned food marks a significant advancement in the realm of convenience and practicality for consumers worldwide. This innovative technology revolutionizes the way individuals approach meal preparation, offering a hassle-free solution for enjoying hot meals on the go, in emergencies, or during outdoor activities without the need for external heat sources or electricity (Beery, Calvén and Wendin, 2023). By simply activating a self-contained heating element within the can, users can enjoy piping hot meals within minutes, regardless of their location or circumstances. This product approach not only enhances convenience but also ensures food safety and quality, making it an ideal option for a variety of situations where traditional cooking methods are impractical or unavailable. With self-heating canned food, individuals can now enjoy hot, nourishing meals with ease, providing a convenient and reliable solution to meet the demands of modern lifestyles.

2. METHODOLOGY

Self-heating canned food provides a convenient way to heat meals without external heat sources.

2.1. Research and development

2.1.1 Market research

This product is created to be able to cater towards most of the public. However, one of the most prominent audiences that we plan to cater towards include outdoor adventurers which include hikers, campers and backpackers. However, consumers of today, including most travelers, have higher demands of the food; the food should also be attractive, tasty, and convenient (Palacios et al., 2021). These people tend to be out and about, therefore have no access to conventional heating facilities such as stoves, microwaves and kettles. Thus, they often face the problem of acquiring heated food. Therefore, with our product readily available on the market, those problems are no more. Secondly, we see potential in our products being a hit among shelters like emergency shelters and homeless shelters. Our product will be an advantage as preparing hot meals on demand no longer takes time while also eliminating the risk of food wastage (Palacios et al., 2021). For instance, during emergencies such as floods and power outages, surrounding infrastructure is compromised thus conventional cooking facilities cannot be used (Oliver-Hoyo et al., 2009). In such times, our product can be used as a substitute, providing a hot meal that is quick to be prepared and easy to store. Our meal only takes 3 minutes to prepare, thus this product can be a huge advantage to them as they have to do little work, and wait little time to have a meal.

2.2. Design and formulation

2.2.1 Self-heating mechanism design

In our innovation, we have collected some information to create new products. This Self-Heating Canned Food uses the chemical concept of thermochemistry. First, the chemical substances used to generate energy are quicklime, also known as Calcium Oxide (CaO) and Water (H_2O). Calcium Oxide are chosen because it is readily available, inexpensive and are certified safe to use by the FDA (Poonia & Singh, 2015). Uniquely, when Calcium Oxide reacts with water, in an exothermic reaction, energy is released in the form of heat around a value of -63.7kJ/mol.

2.2.2 Prototype development

Next, to ensure less heat escapes by convection and conduction to the surrounding, the body of the can is made of steel jacket and is shut (Kolb, 2006). Thus, ensuring little or no heat escapes to the surrounding area. Other than that, canned food consists of two parts: heating mechanism and the space for food. Meanwhile, the heating mechanisms are separated by two compartment water and quicklime that are separated by thin breakable membrane. In our product, we use foil separators. To use, users just have to push the plastic button at the bottom of the can to break the foil separator allowing the reaction to take place and heat up the food inside. Once steam is seen, the user can open the can and the food is ready to eat.

3. RESULTS AND DISCUSSION

Market research indicated high demand for convenient, ready-to-eat meal among outdoors enthusiasts, professionals and emergency preparedness consumers, revealing significant market

potential. Competitive analysis showed existing products limitations in heating efficiency and safety, presenting opportunities for differentiation. The chemistry reaction between Calcium Oxide and water acts as an efficient heating mechanism, balancing efficiency and cost despite the need for stringent safety measures.

Design of the canned food that is enclosed with a jacket and shut to ensure less or no heat escape. Hence, the objective can be achieved to heat the food in less than 5 minutes with a safe external temperature, confirming reliability and user safety. Food formulation remained stable and retained quality during heating, ensuring consumer satisfaction. Material testing validated the safety and durability of selected materials, and the final packaging design enhanced the user experience with easy activation and clear instruction.

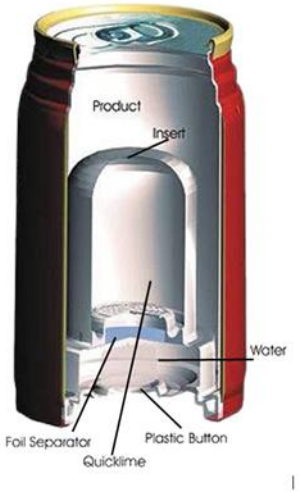

Figure 1. Product Figure

Nowadays, canned tuna is one of the most popular instant foods taken for breakfast among Malaysians due to its delicious taste and ease of preparation. Furthermore, there is no self-heating mechanism for warming the instant tuna that is currently on the market. As a result, we calculate the temperature at which the instant tuna must be reheated as a pilot test. 90oC to 92oCis the baseline temperature needed to cook instant tuna (Mya Tin, 2017). Equations 1 to 3 were used to calculate the temperature required to reheat the instant tuna based on the characteristics in Table 1 with the assumption that there was no heat loss in the surrounding region (Nur Syukriah et al., 2023).

Table 1. Parameters of Surroundings

Parameters	Value
Weight of water	50 g and 100 g
Weight of tuna	250 g
Specific heat capacity for tuna	3180 J/KgC
Specific heat capacity of water	4182 J/KgC
Room temperature	29^{o}C
Boiling water temperature for tune	92^{o}C

The required heat for reheating the tuna was calculated in the following equations and calculations below.

Heat loss by water = Heat gain by tuna Equation (1)
Heat loss by hot water = mCΔT Equation (2)
Heat gain by tuna = mCΔT Equation (3)

Heat loss by water (using 50 ml water) = Heat gain by tuna
(0.05) (4182) (92^oC-T_2) = (0.25) (3180) (T_2-29^oC)
$T_2 = 42.1^oC$

Heat loss by water (using 100 ml water) = Heat gain by tuna
(0.1) (4182) (92^oC-T_2) = (0.25) (3180) (T_2-29^oC)
$T_2 = 50.7^oC$

Hence, it is concluded that the temperature needed to be raised up to 42.1 ^oC and 50.7 ^oC for the use of 50 ml and 100 ml of water, respectively.

4. CONCLUSION

In conclusion, the production of self-heating canned food represents a remarkable advancement in convenience and practicality for consumers worldwide. By offering a hassle-free solution for enjoying hot meals on the go, during emergencies, or while engaging in outdoor activities, this innovative technology revolutionizes the way individuals approach meal preparation. With its ability to provide piping hot meals within minutes, regardless of location or circumstances, self-heating canned food enhances convenience, ensures food safety and quality, and meets the demands of modern lifestyles. This versatile solution caters to a wide range of needs, from busy professionals to outdoor adventurers, making it a reliable and invaluable addition to the culinary landscape.

ACKNOWLEDGEMENT

First and foremost, we would like to express our gratitude towards The Almighty, Allah SWT for allowing us to successfully finish this project without encountering any major obstacles. This assignment would not have been accomplished without the involvement and support of many people. Their participation is gratefully valued and appreciated. Therefore, all of us would like to convey our gratitude to our mentor, Dr. Aimi Suhaily for the continuous support and guidance she has provided us in making this assignment happen. Her advice carried us to being more encouraging to finish this work.Not to forget our group members consist of Marsya Haziqah, Muhammad Farhanuddin, Muhammad Haziq Hadwan, Muhammad Syahmi Luqman, and Muhammad Zareef Irfany deserve many thanks as we have pooled in energy into completing this project. Although it was challenging, we managed to finish this during the time given. To conclude, without the assistance of each person who has been described above, we could not have completed this project of Self-Heating Canned Food successfully.

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GazaHope

Nurul Alieyana Jamil, Saidatun Nadjwa Sabki, Syamimi Batrisyia Zulkifli, Imtiyaz Wajieha Ismail and *Nurkhaizan Zulkepli

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: khaizan2821@uitm.edu.my

ABSTRACT

In the era of conscious consumerism, individuals are increasingly seeking ways to align their purchasing decisions with their values and beliefs. This abstract introduces a novel mobile application designed to empower users in making informed choices regarding the origin of products in relation to Israel. The Pro-Israel Product Scanner utilizes barcode scanning technology to provide users with real-time information about a product's association with Israel, allowing them to make ethical and informed purchasing decisions. The app not only assists users in avoiding products associated with Israel but also provides additional features such as news updates on Palestine and a rewards program to further incentivize user engagement. With its potential to cater to the growing demand for ethical consumption and support global movements like the Boycott, Divestment, and Sanctions (BDS) campaign, the Pro-Israel Product Scanner represents a valuable tool at the intersection of technology and social activism. Its availability on both iOS and Android platforms ensures accessibility for users worldwide. By empowering consumers to make conscious choices, this app contributes to a more socially responsible marketplace and fosters awareness about the impact of consumer decisions on global issues.

Keywords: barcode scanning; Pro-Israel; news update; application.

1. INTRODUCTION

The app scanner GazaHope is a versatile tool designed to provide users with valuable information about the origin of products they encounter while shopping. Specifically tailored to help users identify whether a product originates from Israel or not, this app leverages the convenience of barcode scanning technology integrated with a comprehensive database.

When users encounter a product, they wish to inquire about, they simply launch the app and utilize their smartphone camera to scan the barcode. Behind the scenes, the app's algorithms swiftly process the scanned barcode information, referencing it against a vast database that includes details about products from around the world, including those originating from Israel.Once the barcode is scanned, the app retrieves information associated with the product, including its name, brand, manufacturer, and crucially, its country of origin. This information is then meticulously cross-referenced to determine whether the product hails from Israel.

Upon completing the analysis, the app promptly notifies the user with a clear indication of whether the product is of Israeli origin or not. This empowers consumers to make informed decisions aligned with their preferences, values, or any considerations they may have regarding

products sourced from specific regions. Moreover, beyond its primary functionality, the app may offer additional features to enhance the user experience. These could include detailed product information, user reviews, alternative product suggestions, or even educational content related to the country of origin and its impact on consumer choices. In summary, the app scanner serves as a reliable companion for conscientious consumers, enabling them to navigate the marketplace with confidence and make choices that resonate with their individual preferences and values.

2. METHODOLOGY

Based on our observation and researches about the worrying issues in Palestine, our app GazaHope is developed. However, due to our limited knowledge and abilities in developing an app, we opted to interface by using the website “Figma”. Figma design is for people to create, share, and test designs for websites, mobile apps, and other digital products and experiences. It is a popular tool for designers, product managers, writers and developers and helps anyone involved in the design process contribute, give feedback, and make better decisions, faster.

To create the interface for GazaHope, our product scanner app includes features like scanner, mass media platform, points collected display, sign-in page, and recommendations page, start by gathering requirements through researches and user surveys. Develop user personas and journey maps to understand user interactions. The app’s structure is organised with a sitemap and navigation flow. Then, wireframes and interactive prototypes are created to visualize the design.Next, we also prepared detailed design specifications and use agile methodologies for development and testing.

2.1. A barcode scanner

The app is developed to scan barcodes on products, so users can recognize whether the products that they are purchasing are Pro-Israel or Pro-Palestine. This can help them in boycotting products that support Israel, to weaken their incomes given by the company of the products.

2.2. A mass media platform

The app is developed to include a mass media platform where users can keep up to date about the current situations that are happening in Palestine. This can help users to stay informed and motivate them to keep boycotting products that are Pro-Israel.

2.3. A rewards program

The app is developed to include a rewards program where users can benefit if they scan products until a certain goal is reached, they can donate in their name automatically for Palestine. This can help to motivate users to continue boycotting Pro-Israel products to help the people of Palestine.

3. RESULTS AND DISCUSSION

The primary function of this interface is the barcode scanner. Users can scan a product's barcode through the app. If the product or brand is identified as Pro-Israel, a warning notification

appears on the screen, advising users against purchasing the item and recommending alternative products that support Palestine.

Additionally, users earn 10 points for each product scanned, regardless of whether the product is Pro-Israel or Pro-Palestine. These accumulated points are displayed in the user's profile section. Users have the option to convert their points into real currency or donate them directly to an NGO's bank account listed in the app. To convert points, users must consistently accumulate up to 10,000 points to receive RM1.00.

This app also provides users with the latest information about Palestine. Users can click on any information they are interested in displayed on the news page of the app. This can help users to keep up to date about the current situations that are happening in Palestine. This can help users to stay informed and motivate them to keep boycotting products that are Pro-Israel. As a result, the users who intend to help the Palestinians will be able to implement their help by using this app.

4. CONCLUSION

In conclusion, from this innovation, we can say that it is effective for society to practice boycotting any Israel origin product consistently in daily life. We also managed to achieve our objectives which are to provide users with valuable information about the origin of products and increasing awareness to society about the situation of Palestine from the features in the application. Some of our future recommendations that can be made is the improvement of our partnerships and collaborations, such as including trusted donation features that link to NGO that are dedicated to helping Palestinians, making it easier for consumers to donate in a trusted account. Lastly, we hope that by using this application, it will help people to feel at ease when shopping for any products with trusted information from the application and always be aware of current issues.

ACKNOWLEDGEMENT

We would like to express our gratitude to every individual and organization that gives invaluable support and contribution in the achievement of developing of the GazaHope app. A huge appreciation to the Centre of Foundation Studies at UiTM Selangor Kampus Dengkil for hosting this Creations de UiTM 2024 that leads our innovation, GazaHope to a wider audience. Additionally, for our supportive mentor, Nurkhaizan Zulkepli who is guided us in completing this innovation by providing valuable guidance and support. We would not have been able to achieve this milestone without the help of these individuals including our group members. Finally, we hope that this app will make a positive impact to the world about Palestine and eventually will contributes benefit to Palestine.

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Ecosorter

*Nurul Huda Mohd Noor, Nawal Abdul Razak, Amirul Hakimi Azham, Intan Nur Qistina Md Diah, Wardyna Maisarah Mohd Anuar, Hanis Aina Natasha Hasbullah and Iffah Irdina Kamarudin Elias

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: huda3632@.uitm.edu.my

ABSTRACT

One of the pressing issues faced by communities worldwide is waste management and disposal. In Malaysia, improper garbage disposal has depended heavily on landfills and poses a significant threat to both the environment and public health, leading to a range of interconnected issues. The project aims to assist in tackling the problem of improper garbage disposal by segregating the waste. As well as to emphasise the importance of waste reduction, recycling, and the adoption of sustainable waste management approaches at the local, national, and global scales. Consequently, the Ecosorter, which is equipped with the Arduino Uno platform, has been developed to identify various categories of recyclable materials. It then opens the lid of the appropriate bin to facilitate the user's segregation of their waste into the appropriate bins. According to the Malaysia Investment Development Authority, in 2021, a total of 13.95 million metric tons of municipal solid waste were generated per year in Malaysia, equivalent to 38,207 metric tons generated per day by households and institutions. This showed an increase from previous years, as municipal solid waste amounted to 13.91 million metric tons and 13.88 million metric tons in 2020 and 2019, respectively. In summary, Ecosorter represents an innovative solution capable of addressing the global challenge of improper garbage disposal, offering sustainable alternatives that hold considerable market potential for various stakeholders, including households, environmental departments, and garbage collectors.

Keywords: Arduino Uno; garbage; waste management; environment; disposal.

1. INTRODUCTION

In Malaysia, the improper disposal of waste has become a pressing environmental concern and there is still no best solution to this problem. The global population is expected to produce 3.40 tonnes of solid trash by 2050 (colife.com, 2023). Waste management refers to the collection, removal, processing, and disposal of materials that can be considered waste. Waste materials can be solid, gaseous, liquid, or even dangerous, and they are typically generated by human activities (D. A. Vallero and V. Shulman, 2019).

Waste management is a significant problem in Malaysia as waste output outpaces the country’s recycling rate (H. L. Chen et al., 2021). Malaysia generates more than 30,000 tonnes of municipal solid waste (MSW) per day, equivalent to 1.17kg of waste per person. Food waste made up the largest portion of MSW, followed by plastic, paper, mixed organic, wood, and others (H. L. Chen et al., 2021). On the oter hand, as one of the world’s major importers of plastic waste, together with the increasing urbanisation and population growth rates, Malaysia

too faces problems with the management of waste, in particularly plastic wastes. Additionally, as a biodiversity hotspot with some of the world's most biodiverse coral reefs, plastic waste is also a major concern in Malaysia, threatening both the terrestrial and marine ecosystems (S. Sarkar, 2015). Meanwhile, sources of solid and metal wastes for steel industries may thus be identified as coke oven by product plant, sinter plant, refractory materials plant, blast furnace, basic oxygen furnace, steel melting shop and rolling mill. Dumping solid waste in open space and excavated land not only creates environmental pollution in the form of dusts and leachate but also create huge financial liability due to scarcity of land. Out of total solid wastes generated in the steel plant in our country around 63% are dumped which needs to be recycled or reused to target a zero solid waste as being done in many developed countries (Metal Recycling 101, n.d.).

Based on our findings, the normal trash bin that is normally used only provides a container but cannot segregate the waste material. This issue will hinder the implementation of the recycling program. Our product, Ecosorter, focuses on continuous improvement and additional compartments to provide the best trash bin solution. Firstly, Ecosorter can identify the type of material waste so that the segregation can occur. Secondly, a wheel component is selected to be integrated into the product to improve its portability for use both indoors and outdoors. Thirdly, the Ecosorter is designed in a square shape to make it easy to fit into any place.

The objective of the project is to manage the improper waste disposal by segregating them into four distinct categories which are metal material, non-metal material, dry waste and wet waste. By segregating waste in this manner, the project will be able to facilitate more efficient handling and disposal processes. Furthermore, we also emphasise the significance of waste reduction, recycling, and the implementation of sustainable waste management practice not only at the local level, but also at the national and global scales. In many developing countries, the mismanagement of wastes poses a threat to both the ecosystem and human health. Overall, waste management is an inescapable challenge of our times, whenever waste is produced, it needs to be managed well and with the potential environmental impacts in mind.

2. METHODOLOGY

To address this issue, we must first identify the fundamental cause of the inefficiencies in existing waste management systems. The difficulty is that they do not segregate their trash into the appropriate waste categories. As a result, we propose a product that will improve the waste management system. Thus, we suggest the development of the Ecosorter. It uses the Arduino Uno platform to identify different materials and sort them into their respective bins. The Arduino Uno-based technique has been divided into two parts: garbage detection and trap door opening. As a result, the garbage may be easier to recycle once it arrived at the recycling facility.

2.1. Detection of Different Type of Waste

The use of the Arduino Uno platform to identify and help sort waste thrown by the user into the appropriate bins. By using the Arduino Uno, we can connect a few sensors to help to detect the different materials presented by the user. We use a capacitive sensor to detect non-metallic items, an inductive sensor to detect metallic items, and a humidity sensor to differentiate between wet and dry items. After the waste type is detected, a trap door will as correspondence for the correct waste types.

2.2. Trap Door Opening

There will be four trap doors for each type of waste which are metal, non-metal, wet and dry items. Each trap door will automatically open after a sensor has detected its waste type. When the sensor identifies a particular type, it sends a signal to the Arduino Uno to open the appropriate trap door. The trap door can be opened or closed using a servo motor.

3. RESULTS AND DISCUSSION

First and foremost, Ecosorter are designed as shown in Figure 1. It was designed to be environmentally friendly to minimise resource consumption and promote efficient use of materials. This environmentally friendly product is found to be more durable and long-lasting, consequently reducing the need for frequent replacements. This can lead to less waste being generated over time, as fewer unused products end up in landfills or incinerators. Besides, Ecosorter offers an exceptional quality at an affordable price. They are available for a wider range of consumers, including those with limited budgets, as most of the materials used are readily accessible and obtained from various sources. In addition, Ecosorter can manage waste efficiently with the help of sensors, which powered by Arduino Uno. This innovative product utilizes sensors to detect and categorize different types of waste, hence enabling precise sorting. The Ecosorter functions by gathering data from its sensors, which are strategically positioned to detect various characteristics of incoming waste materials. This data is then transmitted to the Arduino Uno microcontroller, where it undergoes processing to determine the appropriate course of action. Through sophisticated algorithms and predefined parameters, the Arduino Uno accurately analyzes the sensor input and generates precise output commands. Lastly, by using this product, the waste will be well managed according to its type which eventually will help the disposal process much easier. This product will be easy to operate, will require very minimal maintenance, and will be cheap to operate. The product will be powered by a 12-volt battery to ensure that the circuit has enough power to operate all the sensors and the servo motor.

3.1 Schematic Diagram of Ecosorter

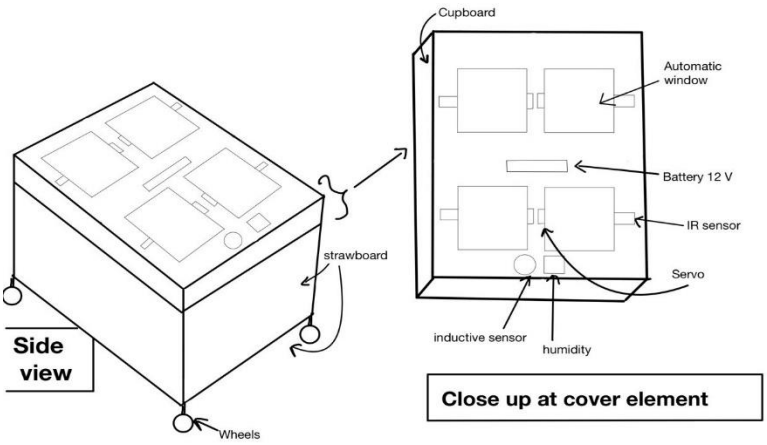

Figure 1. Schematic diagram of Ecosorter

3.2 Ecosorter Expenses

Table 1. Ecosorter expenses

Item	Quantity	Price (RM)
Arduino Uno Kit	1	59.80
Inductive Sensor	1	14.61
IR Sensor	1	7.00
Humidity Sensor	1	2.75
Battery 12V	1	10.00
Strawboard	6	9.60
Total		103.76

Table 1 shows the amount of expenses needed to produce this product which cost approximately RM 103.80.

3.3 Future Improvements

Although, our product has been proven to solve the issues with stated before, we have a few ideas on how we could improve our product to help make it even more effective at waste management. Firstly, we would like the add a conveyer system that would automatically deposit the waste into the correct bin without human intervention. This would greatly improve our product and make it easier for users to recycle. Secondly, we would like to add a method to detect glass and plastic object. This will further improve the waste management system by weeding out the waste into more specific categories. Thirdly, in the future we will add a solar panel to our product. This is to ensure the product could last for months without needed a change of battery.

4. CONCLUSION

All in all, we have observed a significant rise in waste management problems in Malaysia due to the accumulation of waste, especially involving non-biodegradable materials that have been excessively consumed by the citizens without proper segregation. To overcome this issue, we have developed Ecosorter to simplify waste sorting for people and increase opportunities for recycling. Ecosorter aims to enhance efficient waste management to manage the growing volume of mixed waste in Malaysia while also properly segregating them into several categories. In addition, we are also aiming to increase the recycling rate in the country, surpassing even that of first-world countries, as more Malaysians become involved and informed about recycling by using Ecosorter. Additionally, with the assistance of Ecosorter, we set out to educate and raise awareness among younger generations and even older generations, making responsible waste management a societal norm. Our sole aim for Ecosorter is for it to set the benchmark for more remarkable initiatives in waste reduction and making the earth a better place.

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First and foremost, we express our deepest gratitude to Allah S.W.T for His abundant grace, which has eased our journey to successfully developed our project in this CREATIONS de

UiTM: INTERNATIONAL MEGA INNOVATION CARNIVAL 2024 as we believe that our product will be beneficial towards others. We also would like to thank our dedicated mentor, Puan Nurul Huda binti Mohd Noor, for her great aid and direction for us to finish this project. Finally, we would like to applaud ourselves for the fantastic hard work, effort, and contribution in completing this project.

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SMART Food Warmer

*Siti Nursyafiqah Mohammad Sabri, Nur Naqiyah Badrina Mohd Yusri, Elya Khairul Anuar, Nik Nur Nadhirah Mohammad Nawawi and Mohd Helmy Yusof

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023829362@student.uitm.edu.my

ABSTRACT

In the modern era of technology, food delivery services have committed a lot to today's society as it offers convenience and time-saving. However, one of the major problems faced by most food delivery service companies is getting a low-star rating due to the food delivered being cold as the delivery duration may take longer than expected. The current packaging procedure using thermal insulated bag may fail to insulate food effectively and is unable reheat the food if the restaurant failed to provide a freshly made meals. Thus, SMART Food Warmer is invented to counter this issue. The objective of this product is to increase the efficiency of food delivery services by providing a simple and efficient method for heating food and beverages without the need of external heat sources. The normal thermal insulated bag is improvised with a container installed inside. Peltier module is used as the heating element, in which will activate when switch is on. The Peltier module is standardized to reach certain temperature and remain to prevent overheating. Food that has turned cold was used to demonstrate and it was found that it reached the standard of freshly made meals after 10 minutes in an operating SMART Food Warmer. The main target audiences are food delivery services companies, food delivery runners and food business owners. In conclusion, improvising food delivery services is essential in order to meet consumer needs and adapting to changes in the market and regulatory environment. Hence, companies can improve their growth, enhance customers' satisfaction and build a strong, sustainable business.

Keywords: food delivery; cold food; peltier module; smart food warmer; customer satisfaction.

1. INTRODUCTION

The increasing demand of food delivery services today has also increased the demand for innovative solution that allows consumers to receive the best service. Big companies are competing to give the best in order to be the first choice for everyone using their service. Previous study shown dissatisfaction of customer for the food received from delivery company (Holmes, 2019). Conventional thermal insulated bags have been used all this time to maintain the temperature of the food during transportation. But the issue faced by most of industry player is they are not able to re-heat meals to ensure freshness upon consumption, particularly if the restaurant fail to provide a freshly made food. Our main question is "How does the design and components of a portable food warmer make use of a Peltier affect its efficiency and usability for maintaining food temperature during transportation?" This question is our attempt to dive into the problem such as the effectiveness of thermal insulation, users experience with the device's controls, and overall performance in keeping food at desired temperatures. This helps

investigating the optimization of the design and components function factors to enhance the efficiency of the SMART food warmer. Hence, an approached has been made by innovating a food warmer that integrate the thermal insulation with advanced heating capabilities using Plaiter module (Corpuz et al., 2022). The Peltier module is widely used to generate both heating and cooling effects when an electric current passes through it, particularly to generate heat for food warmer (Yan-Wei et al., 2017).

SMART Food Warmer is beyond merely keeping the food warm as it is able to actively reheat meals while maintaining their freshness at an optimal temperature. This innovation idea seeks to explore the design, functionality, and potential application of this improvised food warmer that is believed to significantly represent the advancement in food delivery services industry. This product is aimed to increase good consumer experience in using delivery services at the most convenient state, receive the food with high quality and freshness, besides but it can also become a potential impact on outdoor dining experiences and emergency food provisions.

2. METHODOLOGY

The components needed to build this SMART food warmer are Peltier, battery compartment, dry cells, switch, container, and insulated bag. Moving on to the build-up of the product, Connect the switch to a connector. The other end of the connector should be connected to the battery compartment. The purpose of the connector to connect the controller easily to the battery compartment. Place the Peltier into an insulated bag. Then, this device should be connected to the switch where the users can turn the device on or off. The insulated bag is used to evenly distribute the heat produced by the Peltier throughout the container. Also, it provides thermal insulation to prevent heat loss from the food warming device, which is the Peltier, helping to maintain the desired temperature inside the container. The container function is to store the food that needed to be warm. Position the switch and battery compartment at the side of the insulated bag. This arrangement allows easy access to the switch and facilitates connection to the battery compartment.

3. RESULTS AND DISCUSSION

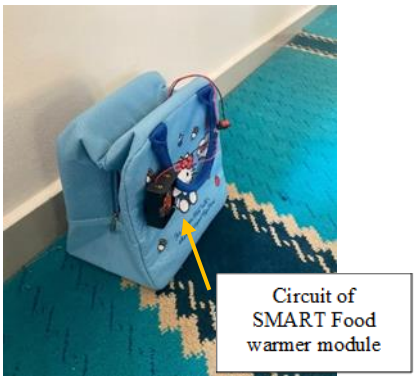

Figure 1(a)

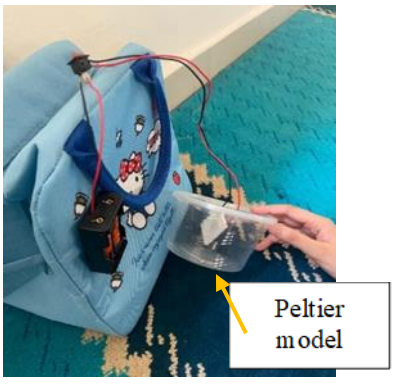

Figure 1(b)

Figure 1. (a) SMART Food Warmer with Peltier is kept inside a container. **(b)** SMART Food Warmer with Peltier outside a container.

From Figure 1 (a), we can see that the Peltier is kept inside a container to keep the food hygienic and the Peltier from any damage such as moisture, oil and food residues. This is a convenient way to keep our food warm without needing an open flame or hot water. Unlike traditional methods that rely on passive insulation or external heat source, Peltier devices actively regulate temperatures, ensuring the optimal conditions for the food. This feature is particularly valuable in scenarios where maintaining a specific temperature range is critical. Furthermore, SMART Food Warmer offers an eco-friendlier alternative to single-use packaging. By reducing reliance on plastic containers or aluminum foil, this bag helps minimize waste generation and environmental footprint.

There are some future recommendations on how we are planning to improve our SMART food warmer, one of them is by integrating smart technology into food warming devices to enable remote monitoring and control via smartphone apps. This would allow users to monitor temperature levels, adjust settings, and receive notifications remotely, enhancing convenience and control. Other than that, we plan on developing food warming containers with multiple compartments and adjustable temperature zones to accommodate various types of food simultaneously. This would provide flexibility for users to warm different dishes at optimal temperatures without compromising flavour or texture. By improving food freshness during delivery, this may help food delivery companies in several ways. It makes customers happier because they get better-tasting food, which means they're more likely to order again and recommend the service to others. Good reviews and word-of-mouth promotion bring in new customers and build the company's reputation.

We used light material for the thermal bag which is convenience for the users to carry even with a heavy load. In addition, the outer layer of the bag last longer and less likely to peel. The starting price of our smart food warmer is rm 35. We believe that the price is reasonable since we provide the thermal bag in a big size. Hence our target audiences are food deliveries service company, food delivery runners, food businesses owners, and those who frequently went for outdoor activities. Furthermore, we believed that our products are on the same league as any other products, yet even better since it can keep food fresh and hot.

4. CONCLUSION

In conclusion, addressing the challenge of maintaining food freshness during delivery is crucial for ensuring customer satisfaction and food quality. By prioritizing innovative solutions in improving temperature control mechanisms and packaging that integrated with Peltier module, we innovated the idea of SMART Food Warmer so that it can enhance the overall experience of food delivery and ensure that consumers receive meals that are delicious, nutritious and well freshness, henceforward achieve the aim for the customer fully satisfaction.

ACKNOWLEDGEMENT

We take this precious moment to extend our sincere acknowledgement to all who contributed to our successfully completing this research. Foremost, we wish to extend our sincerest gratitude and praise to Allah SWT, the Almighty, for the blessings that accompanied our research, from its commencement to its conclusion. We are grateful to our lecturer, Sir Helmy,

for his hard work, encouragement, and unwavering support for this project. His expert advice and thoughtful suggestions had a considerable influence on improving the quality of this research. May I take this opportunity to express our sincere gratitude to Sir Helmy, whose financial funding made the fieldwork and the development of this paper possible.

Moreover, we are also grateful to UiTM for conducting this innovation competition as it motivated us to express our creativity in innovating great products. Thanks to colleagues and collaborators who supported and involved in our work and discussion and, in that sense, enriched and enhanced the overall quality of this task. A special thank, however, is to the participants of this study, who agreed to participate in this project, shared their experiences, and were very cooperative in all ways during the research. Finally, and most importantly, we would like to acknowledge the continuous support and willingness of our family and friends, whose moral and financial support was enormous. However, they never gave up on us and gave us the support we need. Therefore, thank you to everyone involved in this research endeavor.

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BEAKUR, A HALAL, HEALTHY CANDY FOR CHILDREN

Adlin Suhaila Idlani Azman, Nurhazira Mohd Yusop, Alya Zulfikar, Nurul Aqilah Farahiah Abdul Hadi and *Siti Nor Haliza Abd Zamani

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil 43800 Dengkil, Selangor, Malaysia

*Corresponding author: norhaliza6768@uitm.edu.my

ABSTRACT

Referring to the interpretation of the Child Act (2001), a child is defined as a person under the age of eighteen. Children are a national asset and the lifeline for the country's future development, hence it is crucial for children to grow up healthy both physically and mentally. It is with considerable concern that we acknowledge the data acquired through the Malaysia Child Statistics 2023 published by the Department of Statistics Malaysia (DOSM) shows an increase in the number of children under five years old in this country suffering from severe nutritional deficiencies by 0.3 percent in 2022 compared to 2021. Among the factors contributing to this increase is the practice of unhealthy eating among children. Children prefer to eat sweets such as candies. Most candies on the market contain preservatives and high sugar content. Therefore, a food product innovation named Bearkur was created as an initiative to replace the candies found in the market. This product is made from halal and high-quality ingredients such as dates, honey, and bovine gelatin. Bearkur comes in an attractive form that can capture children's interest in choosing healthy gummy candies and expose them to sunnah foods.

Keywords: sunnah foods; health; children; dates; honey; gummy.

1. INTRODUCTION

Children that are facing health issues such as obesity, cardiovascular diseases, and malnutrition need to consume healthy food that is packed with nutrients and yet, most of them prefer to eat processed and junk foods rather than a diet rich in nutrients. This is because the primary reason to avoid eating healthy food such as vegetables is due to their bitter taste. Moreover, there is less incorporation of the sunnah of Prophet Muhammad SAW into the daily lives of children. This will lead to the possibility that as they grow older, they may become less aware of or forget about the sunnah of Prophet Muhammad SAW. Other than that, the appearance of healthy food is not appealing to children. For instance, most vegetables and fruits have shapes that are not interesting which results in children not wanting to consume foods that are good for their health. Lastly, there are gummy candies in the market that contain non-halal ingredients such as pig bone. Almost 95% of the gelatine that is available in the market is made from animals that are prohibited for Muslims to consume (Mohd Zin, et al., 2021).

The first objective of Bearkur is to help children become healthier as the consumption of unhealthy food is reduced and avoided by children. Next, Bearkur also wants to expose children to the Sunnah practice of Prophet Muhammad SAW as well as incorporate them into their daily lives so that it will not be forgotten in the future. Furthermore, the production of this product

aims to produce a nutritious product that has an attractive appearance and can capture the hearts of anyone who eats it, especially children. Lastly, Bearkur was created to add to Muslim-made products that are believed to be halal.

2. METHODOLOGY

This study used a library research methodology to obtain relevant information and data. We use relevant published materials, such as articles, books, and websites, to gather accurate information about the benefits of the ingredients used in this innovative product. In addition, this study also used simple surveys to gather feedback on this innovative product. We randomly selected respondents to taste these gummies and asked them to fill out a Google Form feedback form. A total of 21 respondents were involved, consisting of students from the Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor,Kampus Dengkil. The implementation took place on March 27, 2024.

3. RESULTS AND DISCUSSION

Children generally have a greater interest in sweet foods compared to other types. Therefore, they prefer eating sweet fruits over bitter-tasting vegetables. Hence, the Bearkur product, which is a bear-shaped gummy candy, is made from dates to attract children's interest in eating dates. Dates contain various nutrients such as fibre, vitamins, and minerals (A. Ayad, et al., 2020). Among the minerals found in dates are iron, potassium, and calcium (Naureen, et al., 2022). Dates also contain antioxidants that can prevent chronic diseases such as cardiovascular diseases (Al Farsi & Yong Lee, 2008). Dates are also among the good sunnah foods to practice regardless of age. Therefore, it is appropriate to introduce dates to children from a young age so that they can be practiced into adulthood. In addition, Bearkur also contains honey which acts as a natural sweetener. Honey has many benefits, including helping in cognitive development (Tumiran, et al., 2020). Moreover, Bearkur is made from bovine gelatin. Bovine gelatin is collagen derived from cows that contain protein and amino acids that are good for health (Mohd Zin, et al., 2021). Therefore, the Bearkur product is believed to be halal because it uses bovine gelatin compared to the doubtful gelatin available in the market.

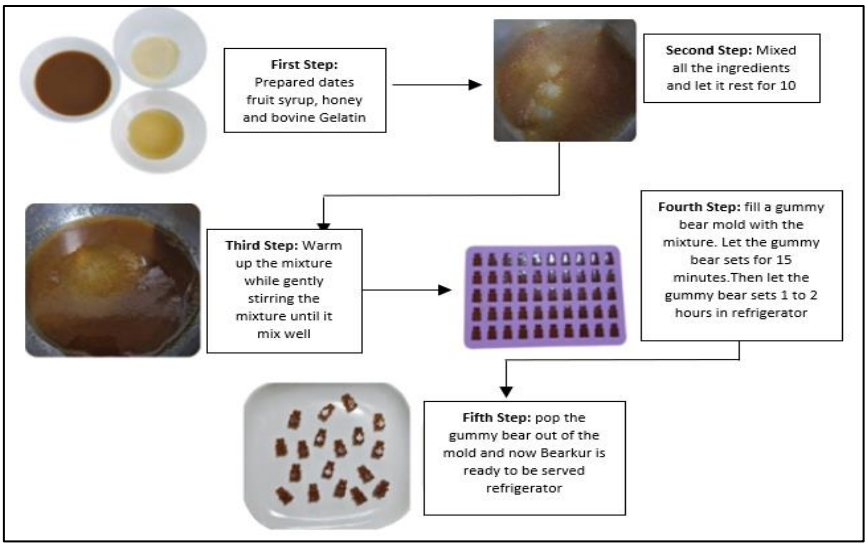

Figure 1. The production steps of Bearkur

Figure 1 shows the production steps for Bearkur. The first step is to steam the date fruits to soften them. Then, mix the date syrup (60 ml), honey (42 g), and bovine gelatine (14 g), and let it bloom for 10 minutes. Next, warm up the mixture by gently stirring it until it is well combined. After that, fill a gummy bear mold with the mixture and let the gummy bear set for 15 minutes. Then, set the gummy bear in the refrigerator for 1 to 2 hours. Lastly, pop the gummy bear out of the mold and now Bearkur is ready to be served.

A simple Google Form survey with 21 respondents revealed that 95.2% thought the product was delicious and agreed that it was suitable for children to eat.

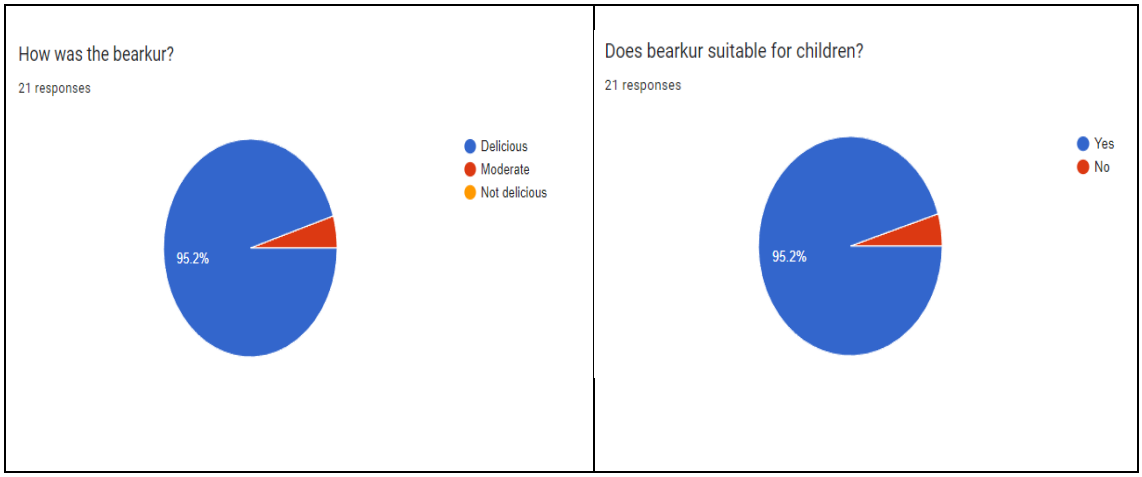

Figure 2. Respondent's feedback on Bearkur.

4. CONCLUSION

BEARKUR has a good potential to be marketed as it is categorized as part of the essential food needed for human survival. This product is made from combinations of dates and honey which are nutritious and rich with nutrients and good for children's mental and physical health development. The community prefers to consume this product because of their awareness of practicing a healthy lifestyle, making them choose healthy food products as a part of their dietary routines. Muslim consumers prefer to consume this product to obtain good rewards from Allah s.w.t due to their practicing prophetic dietary ethics. In addition, Muslims are also required to choose good and nutritious food to maintain body health. This product is unique compared to normal gummy products in the market where this product is a combination of dates and honey. Moreover, this product has a soft and chewy texture, appealing taste, and is shaped as cute patterns that appeal to children's appetites. BEARKUR is innovated as a healthy food product, especially for children. This product comprises sunnah foods such as dates and honey which are good for children's physical and mental development. Besides, parents don't have to worry about whether the product is halal because we use bovine gelatin made from cows, buffalo, and oxen's skin, bones, and connective tissue. In addition, children also are exposed to prophetic dietary practices through this product. Hence, all parties should ensure the children are thriving as they will be responsible for community development in the future. For improvement in the future, this product will be produced in a variety of shapes, flavours, and colours to attract the interest of children in eating it.

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Tapipoon: Innovating Tapioca as an Edible Cutlery

*Roosevelt Chemundai Marshal Rogers, Shawn Selie Standlie, Randi Victor Rooney, Alexysious Rengga Unggit and Siti Norida Abdul Kadir

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: 2023831122@student.uitm.edu.my

ABSTRACT

Ever since the realization of the fact that plastic products can pollute our environment, many parties have stepped in to help reduce the usage of it. This innovation comes to light when our group is tasked by our lecturer to propose a product of our choice to be innovated. A compilation of research papers done by various constitutions worldwide about tapioca is used to assist our research better. We also prepared a survey for the public to survey their opinions regarding the compatibility of tapioca as cutlery. We then proceeded to survey some villages around Sarawak which provide high quality tapioca, theoretically formulate the ratio of ingredients used to make the cutlery and collecting data on potential market impact and other related information. To assist our project development as well, we also conducted interviews with the public, and discovered that our product has potential to be alongside its eco-friendly counterparts such as paper and rice straws. We strongly believe that our product has a potential to be commercialized domestically in the future, with improvements on our product's quality to be done frequently.

Keywords: tapioca; mother nature; cutlery; green-based.

1. INTRODUCTION

Tapipoon is a cutlery set made of tapioca (manihot esculenta). Eco-friendly based products can be seen nationwide such as paper and rice straws, but we detected that it too has flaws. With that problem in mind, we decided to prepare some hypotheses to help guide us in our product's development. The hypotheses can be seen below:

1. Does our product impact human health?
2. What impact can our product give towards plastic pollution?
3. Is our product durable for beverage and food usage?
4. Will our product be useful as a way to practice and nurture environmental conservation?

Some interesting findings can be found when conducting our research, such as it has the ability to melt slowly into warm foods and acts as a flavoring, can withstand warm and cold foods and beverages, and can decay easily if unused. When comparing our product with existing plastic cutleries and eco-friendly cutleries, we observed that our product has some benefits and also flaws. We also believe our product can also help environmental conservation as it has similar effects with existing eco-friendly products. Our main role is to promote that tapioca is easily found anywhere nationwide, and that it is sustainable for conservation efforts in the long run.

This research is first used as an assignment for a university subject. Seeing the potential of this research to be a future product, we then decided to delve deeper to see how far our product can go. We conducted some readings from reputable sources about the plantation of tapioca, specifically in Sarawak. It is found that tapioca is sometimes planted together with paddy fields or in small scale (Yakup Pendak et al., n.d). While no research papers so far had mentioned about the usability of tapioca as a cutlery, but we found potential in the future development of our product. A research paper shows that when cassava peels are discarded as waste, it will lead to environmental concerns due to decomposing of the peels (Edma et al., 2014). Considering that situation and other factors such as pests and infections, this greatly increases our reasoning to help reduce this problem.

We also refer to existing research papers regarding plastic pollution and compare it with the environmental impact our product can make. 92.4% of the respondents in a research done in Malaysia recognizes the negative impacts of plastic towards human health (S.M. Parveena, 2024). Plus, marine debris too will severely impact our coast lines in Malaysia which is rich with marine biodiversity (S. H. Fauziah et al., 2021). With reference to this information, we have come to a small conclusion that our product will certainly give a huge impact environmentally. The source of tapioca is planned to be in Sarawak, because of multiple factors. Most villages in Sarawak plant tapioca in small scale, and has high quality produce compared to its Peninsular counterparts. Its suitable humid environment too produces more contents in each tapioca, hence making sure the availability is secured.

2. METHODOLOGY

2.1 Planning of prototype & interview and survey sample questions

Initially, we only planned to propose our product's prototype using a spoon. However, after discussing with our lecturer, we then changed our product to be a full set of cutleries (spoons, forks, butter knives, etc.) The cutlery is made from tapioca with wheat flour. The measurement for the cutlery is as shown below:

Figure 1. Final design of prototype

Figure 2. Plannings of prototype

Average size of all cutleries = 9 cm
Average length of all cutleries = 2.3 cm

The ingredients to make this product only consists of tapioca and some wheat flour. No final measurements for the prototype has been decided yet, however we decided that our measurement

for our initial prototype is measured as: 100g of wheat flour to 500g of tapioca for a full set of cutlery. The steps to make the cutlery are as shown below:

1. Harvest the tapioca from chosen villages in Sarawak.
2. These tapiocas are then separated and washed to remove existing dirt.
3. Using a peeler, remove the skin from the tapioca.
4. The tapioca is then cooked until soft, then is mashed into a dough. Mix it together with wheat flour to prevent stickiness of the dough.
5. Carve the dough into desired cutlery shape, then separate it according to their desired uses.
6. Place the dough in the oven which is set to 180°C and heat the dough for 10-15 minutes.

Leave the cutlery to cool down for 1 hour and test for durability and sturdiness.

To test the finished prototype, we conducted a durability test to ensure our product is ready to release. The durability test consists of water resistance, fragility and sturdiness of each prototype. Details for each test are as below:

3. RESULTS AND DISCUSSION

3.1 Water resistance test

Each prototype will be submerged in a water for 2 hours to see how much water each prototype can absorb. Results are as shown in Table 1.

Table 1. Results for water resistance test

Test Prototype	Water Absorped (cm^3)
1	30
2	29
3	29
4	30
5	30

3.2 Fragility & Sturdiness Test

A weight of 10 kg will be placed on top of each prototype to see how long each prototype can last before they break. A stopwatch and a programmed table in Microsoft Excel are used to record the data. Results are as shown in Table 2.

Table 2. Results for fragility & sturdiness test

Test Prototype	Durability (S)
1	60
2	61
3	59
4	60
5	60

To further complement our research, we also conducted surveys with the public regarding our product in general to see consumer compatibility with our product. These survey questions are distributed to 40 people and the table below shows the survey questions together with the percentage of answers given:

Table 3. Survey questions and results of survey

Survey Questions	**Yes (%)**	**No (%)**
Do you think that our product, Tapipoon has a potential to be among the eco-friendly cutleries to be used in the future?	90	10
Do you see yourself using our product in your household in the long run?	87.5	12.5
Is our product up to your initial expectations when first promoted?	75	25

3.3 Expected Collaboration & Commercial Potential

Based on our observation on the potential marketing and usability of this product among the general public, we believe that this product can attract attention and be able to generate some profit, depending on how large our scale of products can be. We initially plan to start promoting these in our local shops inside our campus, Anjung Dengkil. These shops mostly sell food and drinks to our students and would have a high potential to use our product. Our local 'Mamak' stalls and restaurant in the area around our campus as well could also be another potential since they receive customers almost every day.

Comparing the cost of existing plastic cutleries and our product, it is very obvious that our product is more costly compared to plastic cutleries because most consumers still rely on it for events and gatherings. The price for an average plastic cutlery in Malaysia is RM 2.00 per piece whereas our product is about RM 3.00 per piece. As for collaborations, we will start by looking for local companies who can help us in mass produce our products and ship them nationwide. Commercially, we believe that we can attract more consumers to use our products because it has potential to be a part of the household with future changes. The initial cost that we set for this product is RM 20.00, since most of the cutlery in the early stages can be made in small amounts with limited machinery and workers.

4. CONCLUSION

Overall, this product shows positive feedback from everyone involved in the survey, and is able to achieve all the objectives we initially planned for it. Not only can this product reduce the usage of plastic cutleries, but at the same time we are able to educate the general public about the existence of edible cutleries and use it. We plan to eventually improvise some initial plans for our product. First, we would like to insert some unique flavors for the users to enjoy eating the cutlery after a meal, such as vanilla and chocolate. Secondly, we plan to change the measurements of the cutlery to fit everyone's usage. Thirdly, since the initial cost of the product is expensive, we plan to find a collaborators or factory to mass produce it and provide customers with a lower price.

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Our appreciation also goes to our beloved lecturer, Madam Siti Norida Abdul Kadir for her never ending support of our group and gave us all the advice and support to make this project a success. Special thanks to the group members as well, Roosevelt Chemundai, the group leader for ensuring our project is going smoothly and making sure everything is prepared on time. Shawn, for proposing this idea in the first place and bringing us to where we are now. Randi, for helping us whenever we needed him, especially in crucial times before the day of the presentation. Alexysious, who helps a lot in explaining perfectly the details of this product and preparing everything necessary.

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ECOOIL: Waste Cooking Oil Collector Machine

*Nur Dhamira Zainee, Nur Atiqa Safiya Osman, Nur Amiira Izzati Mohamad Rafizal and Nik Nurul Akmal Ab Alim

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: dhamirazainee@gmail.com

ABSTRACT

Millions of used cooking oil are thrown into the sink, poured down the drain or thrown on the ground causing damage to ecosystems, river pollution, clogging and dirty pipes and drains. Our intention of introducing the "ECOOIL" is to reduce environmental effects, greenhouse gas emissions and other types of pollution that could be resulting from oil consumption. Additionally, this invention might prevent clogging and reduce the flow capacity of the pipes. ECOOIL also can help cut diesel usage in Malaysian transportation by replacing fossil diesel with biodiesel made from palm oil recycled from collected used cooking oil. We believe that the concept of ECOOIL, which would collect and solidify used cooking oil and offer cash in exchange, has found a way to begin correcting this situation. This ECOOIL comes with a design that is user-friendly controls, making it accessible to a wide range of users. This machine is suitable and conveniently helps households, industrial kitchens or restaurants dispose of their used cooking oil without harmful practices. Through the automation of the collection process and the promotion of appropriate disposal methods, our ECOOIL aims to lessen the negative environmental effects of used cooking oil while fostering effective recycling of this vital resource. The machine creates an environmental awareness by encouraging individuals to participate in sustainable waste cooking oil management practices. The resources for this study were gathered through library research. The methods of data collection, description, and analysis are used in this study, and then a conclusion is drawn.

Keywords: waste cooking oil; machine; environmental effect; ecosystem.

1. INTRODUCTION

An estimated 50 000 tons of leftover cooking oils, including vegetable oils and animal fats are disposed of yearly in Malaysia without treatment as wastes (Sohkheang, 2006). Cooking oil waste accumulates because it is used frequently to prepare meals in homes, restaurants, commercial kitchens, and catering services. Therefore, communities and ecosystems may be seriously harmed by the inappropriate disposal of cooking oil waste in landfills or sewage systems (Balaria, 2021). When waste cooking oil is disposed of incorrectly, it can cause clogging pipes, sewage backups, contamination of water resources, increases the expenses of cleaning up the drainage system, river pollution and lead to damage aquatic life due to an increase of chemical oxygen demand (COD) (Kulkarni, 2006). The objective of ECOOIL is to help in reducing cooking oil disposal by providing practical and efficient waste management. By automating the collecting process and encouraging responsible disposal practices, our "ECOOIL" strives to reduce the environmental impact of spent cooking oil while promoting efficient recycling of this important resource. This machine is equipped with state-of-the-art

technology, including a durable container for keeping waste oil, filtration systems that are able to identify the waste oil and other substances and separate them into different compartments and a mechanism for recycling by solidifying waste oil. With a proper disposal and recycling of waste cooking oil, it contributes to preserving the ecosystem and reducing environmental deterioration. Through this innovation, we believe this product greatly helps in recognizing the impact of waste cooking oil on the environment and providing urgent solutions for our country in efficiently managing cooking oil waste.

2. METHODOLOGY

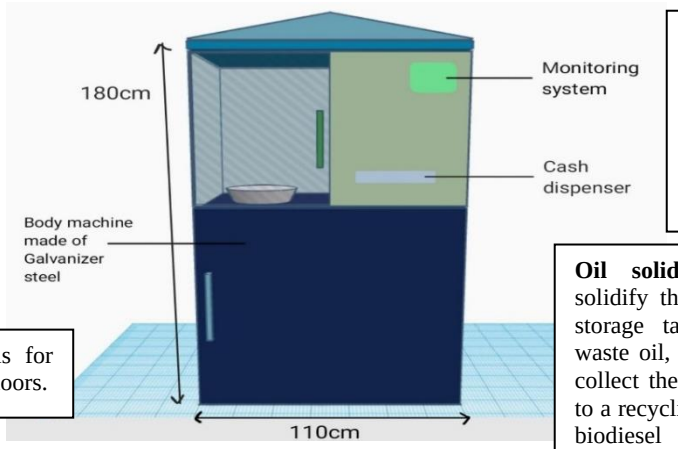
Library research is the research methodology that was employed in this study. In order to gather secondary data for the study, relevant published materials like articles, books, and websites were also reviewed. Thus, to perform this research, this study uses the methodology of data collection, description, and analysis, followed by conclusion drawing. Throughout all the data collected, we compare the current system and the processes of waste cooking oil collector with our idea of ECOOIL. Our observations led us to conclude that there is room for improvement in terms of ease of use and effectiveness with our current waste cooking oil collector system.

2.1 Innovation Development

Waste cooking oil collector machines are equipped with a collection system that includes storage tanks or containers to hold the used oil. When a user has used cooking oil to dispose of, they deposit it into the waste cooking oil collector machine. This is often done by pouring the used oil directly into a designated opening or receptacle on the machine. Once the used cooking oil is deposited into the machine, it passes through a filtration system to remove any solid particles, food debris, or impurities. The filtered oil then flows into storage tanks within the machine and will be solidified using an oil solidifier powder. ECOOIL will be equipped with monitoring systems to track the level of collected oil and alert operators when the tanks need to be emptied. The monitoring device not only keeps track of the weight of the used cooking oil that consumers deposit, but it also distributes a specific amount of money. The machine would dispense used cooking oil for RM2.50 per kilogram. Regular maintenance, including cleaning filters and inspecting components, also helps ensure the machine operates efficiently. When the storage tanks are full, the collected waste cooking oil is transported to a recycling facility in selected biodiesel manufactures, where it undergoes further processing. This involves converting the waste oil into biodiesel fuel through processes like transesterification. Depending on the recycling process and regulations in place, the recycled biodiesel will be reused as a renewable fuel or disposed of in an environmentally responsible manner.

2.2 Main Materials, Functions and Figures

A sturdy material that can provide support, prevent overheating and protect the components of ECOOIL.



The Monitoring system helps in tracking the level of collected oil. Arduino interface also helps in dispense and control the amount of money given to the customers based on

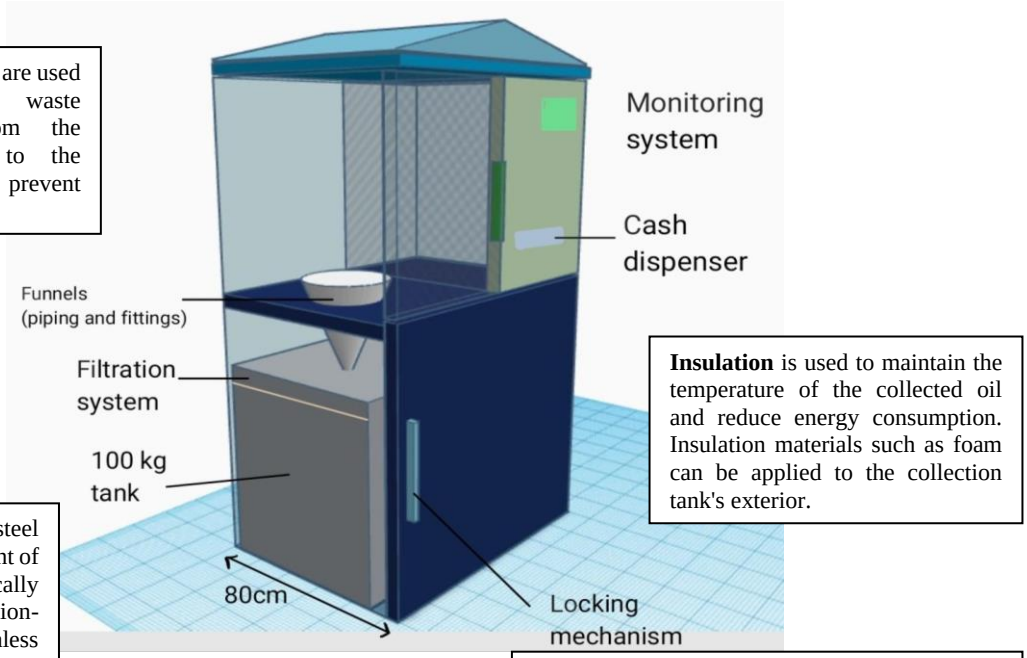
Door hinges - Tools for opening and closing doors.

Oil solidifying powder- to solidify the liquid oil after the storage tanks are filled with waste oil, easy for collectors to collect the tank and transported to a recycling facility in selected biodiesel manufactures for further processing.

Figure 1. Prototype of front

Piping and fittings are used to transport the waste cooking oil from the collection point to the storage tank to prevent spilling.

Filtration system functions to remove impurities and solid particles from waste cooking oil. It also helps in identifying the waste oil and other substances and separating them into different compartments.



Insulation is used to maintain the temperature of the collected oil and reduce energy consumption. Insulation materials such as foam can be applied to the collection tank's exterior.

Collection Tank - Stainless steel with 100kg: A primary component of a machine is the tank that is typically made of durable and corrosion-resistant materials such as stainless steel. It is responsible for storing collected cooking oil safely and is chosen for corrosion resistance and ease of cleaning.

Figure 2. Side view

The security locking mechanism such as heavy-duty padlock that prevent unauthorised access to the collection tank and control system. The access to the collection tank must be made for collectors of waste cooking oils such as recycling facilities only. Surveillance systems including cameras, enhance security by monitoring the area around the waste cooking oil collector machine.

3. RESULTS AND DISCUSSION

ECOOIL aims to reduce the amount of cooking oil disposed of by offering useful and effective waste management. Modern features of this machine include a robust waste oil container, filtration systems that can distinguish between waste oil and other materials and divide them into several sections, and a solidification mechanism for recycling waste oil. Our machine is also designed to protect the environment by preventing pollution. It also helps businesses

minimize the financial burden on waste disposal fees, while households can avoid plumbing repairs due to oil buildup in pipes. The proper disposal and recycling of waste cooking oil helps to preserve the ecosystem and reduce environmental deterioration. This innovation will contribute significantly to recognizing the environmental impact of waste cooking oil and giving urgent solutions for our country in efficiently managing cooking oil waste. The current oil collecting system is inefficient in terms of use for the public due to a lack of clarity in operational processes and the absence of a systematic and effective management framework. In contrast, ECOOIL improves user-friendliness by using a mechanism similar to existing water vending machines, but with a reversal in functioning. Users are compensated for their contributed waste cooking oil, with an integrated oil solidifier facilitating the collection process for subsequent processing by manufacturers. This design reduces the chance of oil spills during transportation because the oil is already solid. Moreover, the pre-existing method for collecting cooking oil involves the use of a container. Filling bottles with oil and placing them in the container for collection is the procedure. However, collectors have difficulties with this method because multiple bottles require manual handling, which makes the makers' eventual oil extraction process more difficult. On the contrary, our ECOOIL streamlines the collection procedure for collectors while also increasing user satisfaction with its simple operational design. Simultaneously, it simplifies the oil handling process for manufacturers. Furthermore, ECOOIL incorporates a reward system, providing users with monetary compensation based on the weight of the contributed oil (RM2.50 per kilogram), aligning with prevailing market prices. On the other hand, the current oil collecting system permits users to dispose of spent cooking oil without receiving any compensation, which can discourage community involvement. A comparison of the similarities and differences between the existing oil collection system and our waste cooking oil collector machine is given below.

Table 1. Comparison between the existing oil collecting system and ECOOIL Machine

Similarities	
Have a filtering system to get rid of any contaminants, food scraps, or solid particles.	
Differences	
Existing Oil Collecting System	**ECOOIL Machine**
Placed only in certain petrol stations and companies	Place in convenient locations such as outside of the restaurants and residential areas.
Not effectively commercial to the public	Effectively commercial to the public
No regular maintenance	Regular maintenance
Old-fashioned features	Modern features
No filtration system in the container	Filtration system to remove any solid particles, food debris, or impurities in the machine directly

4. CONCLUSION

In conclusion, the ECOOIL stands as a viable and innovative solution to the challenges associated with cooking oil disposal. By incorporating advanced technology, such as a durable container, effective filtration systems, and a recycling mechanism, the machine not only addresses the immediate problem of waste cooking oil but also contributes to environmental preservation. The machine offers a practical and efficient way to manage cooking oil waste, providing urgent and sustainable solutions to the environmental impact of waste cooking oil. Overall, this innovation aligns with its proposed objectives and serves as a valuable tool in promoting responsible waste management practices. To enhance the effectiveness of the ECOOIL and meet evolving waste management needs, future developmental initiatives should prioritize continuous technological advancements and explore strategies to maximize the utilization of this machine. Several recommendations for further enhancement include fostering increased collaboration with additional factories to amplify the effectiveness of used cooking oil collection and processing, incorporating data analytics to analyse usage patterns and derive insights for optimizing the machine's performance—potentially reducing operational costs and enhancing overall efficiency.

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CASIC – Children Assistant System in Car

*Najwa Rawaida Ahmad @ Ahmad Fauzi, Muhammad Zul Irfan Abu Thalib, Khabir Khusairi Zainal, Azad Azraei Zulkhairi, Ariq Aidiel Kamarudin and Mohamad Syabil Mohamad Sha

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia.

*Corresponding author: najwarawaida@uitm.edu.my

ABSTRACT

A hectic daily existence in which both parents work, requiring the children to be transported to a nanny's residence or nursery for care. Parents' condition, such as excessive exhaustion, forgetfulness, and out from their daily routine, are among the variables that contribute to incidents of children being left in cars for an extended amount of time, resulting in death. To combat this 'forgetfulness' element, a mechanism has been devised to warn parents when children are brought together in a car, which serves the primary objective of this innovation. This device is aimed to detect the high temperature, body movement and crying sound from sensors to activate the fan and motor for side windscreen hence alarm the user about the unattended children in the car. The system is divided into three sections: input sensors, the system brain, and the outputs. There are 3 sensors used named as heat sensor, sound sensor and movement sensor. The second section is the system's brain, which uses the Arduino UNO to regulate the system's operation based on the several conditions. The last section shows the outcome of the brain system's instruction to turn on the fan, forcefully to slightly open the side windscreen, and then transmit a warning to the parents via mobile phone using the Bluetooth platform. This situation provides an opportunity to lower the temperature in the car while the parents get into the scene. This device is expected to have a significant influence on parents, particularly in terms of kid protection, enhancing its economic potential. This invention can provide parents with peace of mind and assist them in overcoming the problem of 'forgetfulness', particularly when it occurs outside of their usual routine.

Keywords: child heatstroke prevention; car safety mechanism; parental alert system.

1. INTRODUCTION

More than 1000 children have perished because of the heatstroke from being left in the car for an extended period. Negligence of an individual leaving a child in a car unattended is an offense under Section 31(1)(a) of the Children Act 2001. If convicted, they will face a fine of no more than RM50,000, imprisonment for no more than 20 years, or both (Mokhtar N.A., 2021). Since 1990, around 1,000 children have perished due to heat stroke (Ghafar N., 2023). This indicates that one child was murdered in a heated car every ten days. Children aged one to five years suffer more heat transfer from their surroundings than adults. The sweating system in the body is not developed enough to protect them from extreme heat. Babies and small children are more likely to die when left in a hot car, with 87% of children dying under the age of three (Ghafar N., 2023). If the temperature outside is 32 degrees Celsius, it may increase to 55 degrees Celsius in 10 to 15 minutes inside the car. Such a high heat can cause the internal temperature of the

body to increase to 41 degrees Celsius, resulting in heatstroke. The heat in the car can quickly grow to an alarming degree, leaving the body unable to cope. Heat stroke can occur in a hot environment, causing a significant rise in body temperature and collapse of the central nervous system (Mahdin H. et. al., 2017). According to (Ambroce A. M., 2024), various methods have been developed to lessen the probability of this sad incident. Besides, parents can start the practice of checking the rear seat, putting the child's items in the front seat, and downloading the Waze app to aid remind you of the child's presence in the car.

1.1 Problem Statements

Children's deaths in parked cars with the engine and windows closed and locked are common, whether due to parents who want to leave the child in the car for a moment while running errands or forget to bring the child out. Parents believe that leaving their kids in the car is safe. The scenario worsens when parents forget and leave the children in closed car, since the temperature inside can rise from 16 to 40 degrees Celsius in minutes (Ghafar N., 2023) especially leave the child in the car for an extended amount of time. Besides, this type of occurrence might occur when a child enters an unlocked car alone, without the knowledge of their parents. Several variables lead to this type of occurrence, including old parents, many children, suffering from 'forgetfulness syndrome', acute exhaustion, the task of sending children outside of regular responsibilities or routines, and educational level (Dusuki F.N., 2023).To combat this sad incident, a mechanism has been devised to warn parents when children are brought together in a car, which serves the primary objective of this innovation. The system is split down into three sections: input sensors, the system brain, and outputs.

1.2 Objectives

The objectives of this innovation are: -

i. to develop the circuit with sensors that can detect the high temperature, body movement and crying sound.
ii. to operate the fan and motor for side windscreen when receiving signals from system’s brain in various conditions.
iii. to alarm the user about the unattended children in the car.

2. METHODOLOGY

As mentioned in earlier part, this innovation consists of 3 sections: input sensors, the system brain, and outputs. The input of the system will receive signals from the sensors; the heat sensor to determine the temperature inside the car, the movement sensor to detect any movement or gesture from the unattended children in the car while the sound sensor to detect sound or crying frequency from the children. These three inputs will send the positive signal to the brain of the system, which uses the Arduino UNO to control the system's functioning depending on a variety of parameters. The final piece depicts the brain system's directive to turn on the fan, quickly open the side windshield, and then send a warning to the parents via cell phone utilizing the Bluetooth platform. This condition allows you to reduce the temperature in the car while the parents attend the scene. This idea can provide parents with peace of mind and help them overcome the problem of 'forgetfulness', especially when it occurs outside of their normal routine. The block diagram of the system and the prototype of the innovation are shown in figure 1 and figure 2 respectively.

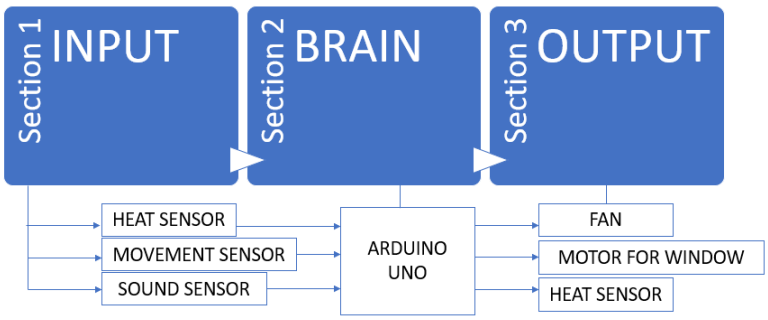

Figure 1. Block diagram of the system.

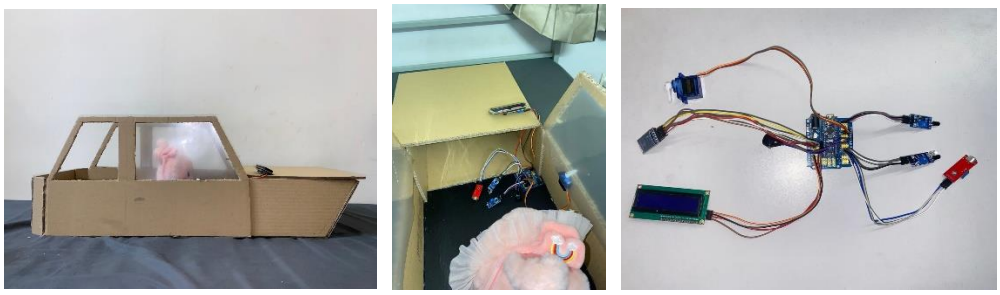

Figure 2. Prototype of the developed system.

3. RESULTS AND DISCUSSION

The Arduino UNO is used to control the system's functioning depending on a variety of situations. The situation is tabulated in table 1.

Table 1. Various situations for system to response.

Heat Sensor	Movement Sensor	Sound Sensor	Fan	Motor for side windscreen	Alarm via Bluetooth
0	0	0	x	x	x
0	0	1	√	√	√
0	1	0	√	√	√
0	1	1	√	√	√
1	1	1	√	√	√
1	0	0	√	x	√
1	0	1	√	√	√
1	1	0	√	√	√
1	1	1	√	√	√
1	1	1	√	√	√

When all the sensors have negative input, the system will not operate as expected. The system is programmed to respond if even one sensor detects positive input, activating the fan, motor, and alarm system via Bluetooth. This is owing to the fact that the ages of children who may be left unattended range from newborn to infant to toddler, each of which exhibits a unique response to the scenario. If just the heat sensor has a positive input, it is possible that the car has been left in the sun, raising the temperature inside, causing it to only activate the fan and

send an alarm to the user in case there is still have a children left unattended and the children are asleep at the time.

4. CONCLUSION

The CASIC - Children Assistant System in Car was designed to combat this sad incident, unattended children died in car due to heatstroke. Many factors that lead to this incident such as negligence, old parents, many children, suffering from 'forgetfulness syndrome', acute exhaustion, the task of sending children outside of regular responsibilities or routines, and educational level. As a result, the development of CASIC can provide parents with peace of mind and assist them in overcoming the problem of 'forgetfulness', particularly when it occurs outside of their usual routine. Due to this, it is believed that CASIC has high potential to be marketable and compete with other method of resolving this problem.

However, there is still have a wide room of improvement for this product before it is ready to commercialize. One of the improvements that can be done is to embed the system with the IoT platform which give more convenience to the user. GPS also can be included for easy tracking for the position of the car.

ACKNOWLEDGEMENT

The authors would like to appreciate the involved parties that contributed into successful of this project especially to Pusat Asasi UiTM for providing opportunity and space to promote innovative ideas through the CDU2024 innovation competition platform.

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Apaisant Comb: A Multipurpose Brush to Help Maintain Healthy Hair and Scalp

*Najwa Rawaida Ahmad @ Ahmad Fauzi, Ifa Alieya Maisara Mohd Zuhkuri, Nur 'Alia Qistina Bakri, Nasywa Yasmeen Fadhlul Rahman, Anis Batrisyia Norzamri and Nur Zakirah Hanum Zaabah

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia.

*Corresponding author: najwarawaida@uitm.edu.my

ABSTRACT

Personal grooming and hair care continue to see tremendous breakthroughs thanks to innovation. Because of their hurried lifestyles, most individuals have little to no time for personal self-care. People are worried about the health of their hair and scalp, yet many of them are too lazy or busy to go through the various processes required to care for their hair and scalp. Furthermore, traditional hair care treatments sometimes overlook the importance of scalp care, focusing just on hair strands rather than the scalp environment, which is where healthy hair development begins. The goal of this innovation is to create a customized brush that acts as a scalp messenger and secretes nourishing hair fluid to help individuals reach healthy hair and scalp wellbeing. The novel device combines a regular hairbrush, a discreet, portable vibrator, and an integrated oil pouring system. This unique combination offers users with a practical device that enhances their self-care routines. The brush's design incorporates a reservoir for holding essential oils or hair serums, which may be dispersed via the brush's teeth for simple application while massaging the scalp. The Apaisant Comb, which holds the serum, can assist customers apply the serum more efficiently by brushing their hair while a tiny amount of serum is placed equally at their scalp. Furthermore, the brush's form, which incorporates an ergonomic handle, makes it easier for the user to hold. This new device is intended to revolutionize hair care by providing a simple and pleasurable approach to maintain healthy hair and scalp. It might be argued that this invention would modify people's habits of keeping healthy hair and scalp, increasing the commercialization potential in the beauty business.

Keywords: Apaisant Comb; scalp; hair; hair care; serum.

1. INTRODUCTION

All humans seek healthy hair and scalp. This desire is tied to both the care regimen and the products utilized. Many instruments have also been developed to meet this demand, such as the many kinds of combs available on the market with different aims. Scalp massage is the process of applying calming pressure to your scalp using your hands or massaging tools. Many people massage their scalps at home, but a qualified massage therapist may also do a scalp massage. According to research, regular scalp massage may boost hair development, minimize hair loss, and improve hair thickness in certain people. Additional benefits of scalp massage include less stress, increased blood flow, decreased blood pressure, and a slower heart rate. Some studies show that scalp massage might promote hair growth. The studies were recorded in 2016 and 2019 where it discovered that males who underwent a regular scalp massage had considerably

thicker hair after six months. Over 70% of participants suffer androgenic alopecia, generally known as male pattern baldness or female pattern hair loss who massaged their scalp for up to 20 minutes each day had hair loss stabilization or hair regeneration after six to eight months (Dorwart, 2024). Depending on the product and its contents, hair serum can provide a variety of advantages to your hair. Some of the most popular advantages of utilizing hair serum are moisturizing, anti-frizz, heat protection, nourishment, shine enhancement and detangling (R., 2024). Everyone who has hair brushes it, even never given any consideration to what sort of brush to use. Using the proper hairbrush for your hair and style demands may improve its health and beauty *("Royale Multi-Purpose Ceramic Hairbrush Plus Shampoo and Conditioner and Serum,"* 2024) (Gallagher, 2020). With so many various types of hairbrushes and combs available, it can be difficult to decide which specific brush is the best for certain hair type and problems. The goal of this innovation is to make it easier for people to obtain healthy hair and scalp wellness by utilizing a particular brush that acts as a scalp messenger and secretes nourishing hair fluid. The unique tool combines a regular hairbrush with a discrete, portable vibrator and an integrated oil pouring system. This unique combination provides consumers with a multipurpose gadget that improves self-care routines.

1.1 Problem Statement

Given that people live in such a fast-paced, contemporary society, most individuals have little to no time for personal self-care. People all over the world are worried about the health of their hair and scalp, yet many of them are too lazy and busy to follow the numerous steps required to care for their hair and scalp. Furthermore, traditional hair care treatments occasionally overlook the importance of scalp care, focusing on only hair strands rather than the scalp environment, where healthy hair development begins.

1.2 Objectives

The objectives of this innovation are: -

i. to develop a special brush that functions as a scalp messenger.
ii. to design a special brush that can secretes nourishing hair serum via brush's teeth.
iii. to provide user with comfort in handling hair and scalp treatment with ergonomic handle.

2. METHODOLOGY

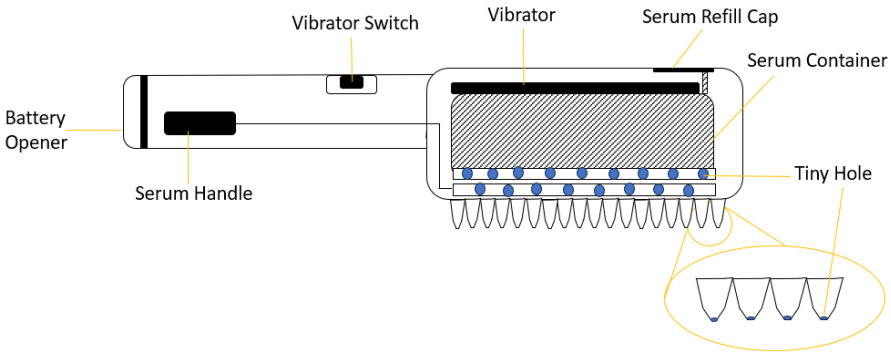

Figure 1. Mechanism inside the Apaisant Comb.

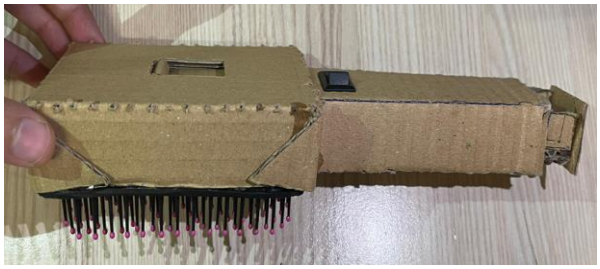

Figure 2. Prototype of Apaisant Comb.

The Apaisant Comb is design to serve the consumers with vibrating element for massaging the scalp and nourishing the scalp with the serum stored in the hairbrush. The hairbrush is come with ON/OFF switch to activate the vibrator and the tiny tank of serum will be activated by mechanical part placed at the handle of the hairbrush. The hairbrush is powered by 2 units of AA batteries with 3V supply while the serum is applied straight to the scalp using the little tips of hairbrush's teeth. Figure 1 shows the mechanism inside the Apaisant Comb while the prototype of Apaisant Comb is shown in Figure 2.

3. RESULTS AND DISCUSSION

The innovative tool combines a standard hairbrush with a discreet, portable vibrator and an oil delivery system. This distinctive combination provides consumers with a multipurpose gadget that improves self-care routines. Apaisant Comb has an array of vibrators that are supposed to assist consumers decrease headaches by gently massaging their heads. This is because the action of the vibrators in the brush can assist to smooth out blood flow and lower the activity of the trigger point at the user's head, which is the source of the headache. Besides, having smooth blood circulation may help people relax while also improving hair growth and preventing hair damage. The brush's design incorporates a reservoir for holding essential oils or hair serums, which may be dispersed via the brush's teeth for simple application while massaging the scalp. In general, serum is required to smooth, encourage hair growth, and maintain the health of an individual's hair. However, the incorrect application method used by individuals today, which is to apply the serum to their hair rather than straight to the scalp, renders their efforts at preserving the healthiness of their hair ineffective. The Apaisant Comb, which retains the serum, can assist people by applying the serum more efficiently by brushing their hair with a tiny amount of serum is uniformly distributed around their scalp while at the same time can massage the scalp by activate the vibrator function. Furthermore, the form of this brush, which has an ergonomic handle, allows the user to hold the brush easier. Based on the positive comments received during Apaisant Comb's initial appearance in the invention competition, about 95 percent of visitors agreed that the vibrator was quite pleasant and did not cause scalp pain. The inclusion of an integrated oil pouring mechanism in the comb is quite enticing and may sell rapidly if it becomes available, since visitors sincerely hope the comb will be available at a reasonable price. Visitors also anticipate the Apaisant Comb to be produced in a range of color options, as well as smaller for portability.

4. CONCLUSION

Apaisant Comb, a multipurpose brush to help maintain healthy hair and scalp is designed to help busy people to maintain their hair and scalp health. It has an array of vibrators that are supposed to assist consumers decrease headache and promoting hair growth by smooth out blood flow and lower the activity of the trigger point at the user's head. At the same time, it can assist people by applying the serum more efficiently by brushing their hair with a tiny amount of serum and uniformly distributed around their scalp. However, there is still have a wide room of improvement for this product before it is ready to commercialize. One of the improvements that can be done is by adding the infrared light to treating a scalp by penetrate the infrared directly into it which can effectively improve the blood circulation and hair growth. Besides, the vibrator side can be improved by designing a hairbrush with various intensity of vibration. For easy carry, the power source can be replaced by rechargeable battery via USB port charger.

ACKNOWLEDGEMENT

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Effortless Ablution Turbine

Mikael Haqimi Nahar Junaidi, Muhammad Faris Muhammad Anas, Naqib Danish Abdul Aziz, Arsyad Ashraf and *Norakmal Abdul Hamid

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: norakmal@uitm.edu.my

ABSTRACT

Effortless Ablution Turbine is a smart innovation that aims to obtain electricity through the utilization of waste ablution water or rainwater. Created with aftermarket components, these devices consist of dynamo-like electronic devices that convert kinetic energy into electrical energy through rotation. This device is installed in the water channel or drainage system, the turbine moves according to the water flow. With the main focus in the mosque area, this product is designed to maximize the utilization of community ablution water waste. This discovery is not only efficient in reducing water wastage but also makes a positive contribution to the sustainability of nature by saving water resources that were previously neglected. With a progressive concept, Effortless Ablution Turbine is an innovative step in reversing energy needs and generating awareness of environmental sustainability.

Keywords: ablution; rainwater; dynamo; electricity; environmental sustainability.

1. INTRODUCTION

The high average water consumption in Malaysia reflects less prudent practices in the use of natural resources. Most Malaysians seem not to practically save water, especially when taking ablution, where the water consumption exceeds the actual need (Muhammad, 2018). This situation contributes significantly to the amount of water consumption per capita that exceeds the guidelines set by the UN, especially in residential areas (FOMCA, 2021). In addition, Malaysia, despite having a high rainfall rate, still faces the problem of water wastage. This is because an inefficient drainage system causes a large amount of water to flow through channels without good management. Although nature provides a sufficient supply of water, unwise use practices can damage the continuity of water resources and cause waste that needs to be avoided. In order to overcome this issue, community awareness regarding the importance of wise water use needs to be increased. The drainage system also needs to be renewed and improved to ensure a more efficient and effective use of water (Ahmad et al., 2018). The existence of this Effortless Ablution Turbine can certainly provide benefits to the community and economy. By taking these steps, Malaysia will definitely be able to reduce water wastage and move forward towards sustainable use of natural resources.

Effortless Ablution Turbine was produced with the main focus to fulfil two main objectives which are to provide an environmentally friendly drainage system and generate electricity through the use of ablution water or rain. The first objective of this turbine is to reduce the waste of water that often occurs during ablution activities (Hashim et al., 2016). By exploiting available water resources, this turbine provides a proactive step in reducing pressure on the

water supply and provides a positive impact on the environment.

The second objective is to provide long-term economic benefits. This turbine is not only aimed at students, the general public, and mosques, but is also designed to save electricity bills in the production of electricity. With this focus, turbines can contribute to the sustainability of the country's economy in a continuous period of time. By combining environmental and economic objectives, the Effortless Ablution Turbine is expected to be an innovative model that includes environmental sustainability and economic growth. This objective shows a commitment to provide a holistic and viable solution that can meet the needs of the present without sacrificing the interests of the future.

2. METHODOLOGY

2.1 Innovation Development

Effortless Ablution Turbine was created as an innovative solution to overcome this problem by utilizing the mosque's ablution water waste and turning it into electricity. The turbine is integrated into the main drainage system in the mosque, allowing waste ablution water to flow through it. The uniqueness of this turbine lies in its ability to turn wasted water into a source of energy. When the wastewater drives a turbine connected to a dynamo, the kinetic energy is converted into electrical energy (Riaz et al., 2021). This effect provides a double benefit. First of all, to obtain electricity without using additional natural resources, and secondly, to provide an alternative to reduce the cost of electricity bills found in mosques.

2.2 Product Inventive Features

2.2.1 Dynamo

Dynamo acts as an electricity generator by converting kinetic energy through the rotation of the rotor, the result is electricity. The rotation speed of the rotor affects the amount of electricity produced, where the faster the rotor rotates, the more electricity is produced (Riaz et al., 2021). The electricity is stored in a high-capacity battery for future use. This storage system ensures that electricity can be supplied to the mosque at any time, showing an effective approach in the use of electricity resources for the mosque's needs.

2.2.2 Turbine

The uniqueness lies in the larger turbine blades, which produce a stronger and faster rotation when there is a strong water flow (Riaz et al., 2021). This system harnesses the power of water to generate kinetic power in the rotor, creating an effective power source through an efficient and innovative mechanism.

2.2.3 LED Light

The LED light plays an important role as a status indicator in the Effortless Ablution Turbine system. In situations where the rotor on the dynamo is spinning, a green LED light will light up, providing a benchmark that electricity has been generated. The function of LED lights as a visual indicator provides clarity and immediate understanding of turbine activity. By lighting

up and emitting a green light, it provides direct information about system performance and electricity production, facilitating the monitoring and management of the Effortless Ablution Turbine's operational effectiveness.

3. RESULTS AND DISCUSSION

3.1 Analysis of Needs and Market Potential

Effortless Ablution Turbine has great market potential, especially among mosques in Malaysia. With its ability to optimize the use of ablution water waste and reduce the cost of electricity bills, this tool is also effective for mosques to preserve the environment. This product is not only limited to the mosque sector, but can be sold to residential and industrial areas, large or small. The ability of this tool to reduce the cost of electricity bills gives great power to various levels of society. Finally, the reduction of greenhouse gases makes this product a positive choice to support environmental protection efforts.

3.2 Product Prototype

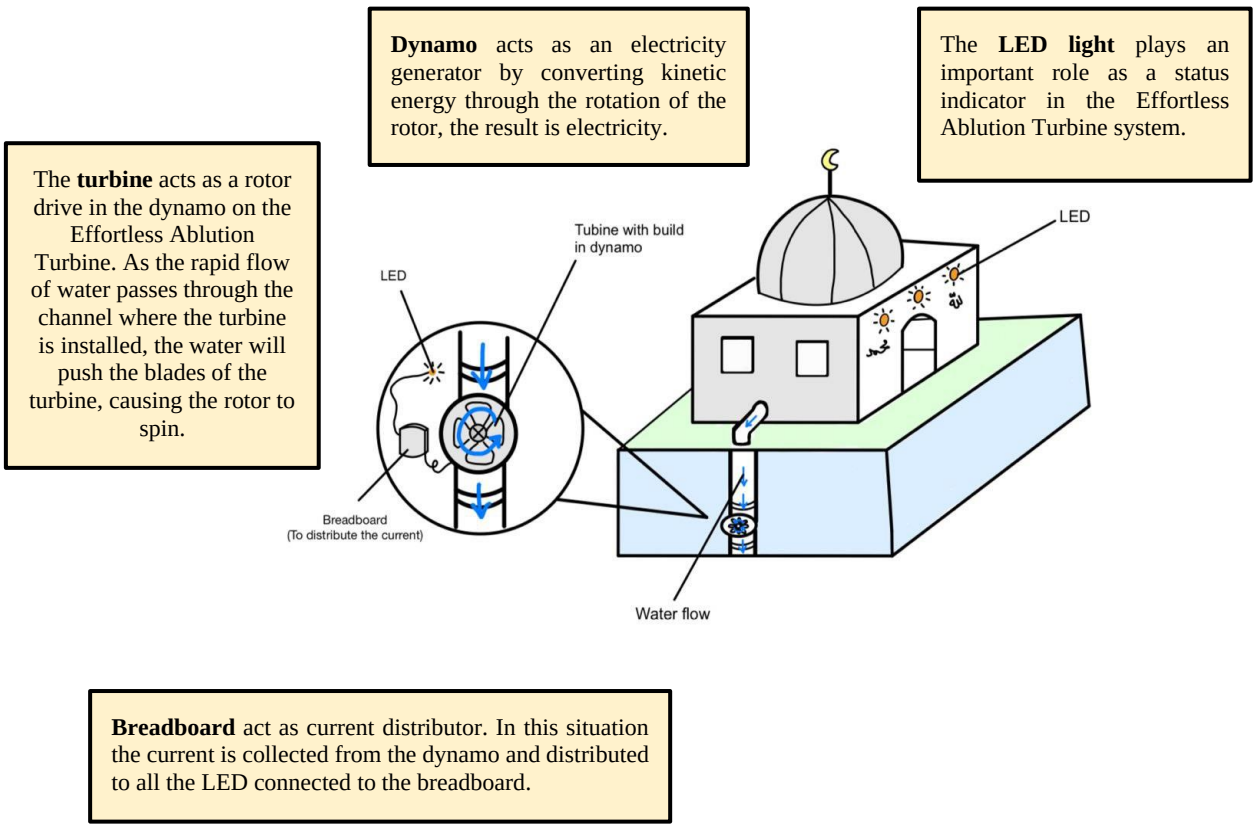

Figure 1. Sketch of prototype

Figure 2. Prototype result

4. CONCLUSION

The Effortless Ablution Turbine is capable of providing many benefits to the environment, the national economy and even daily life. By using this built turbine, this product can be used to generate hydroelectric power by using excess ablution water. Not only that, this turbine is built based on the scientific concept in Islam that forbids us to waste. Waste of water can be avoided using this turbine device by using excess water to generate hydroelectricity. Hydroelectricity that is generated for mosques can reduce electricity bills as well as increase the country's economy. Therefore, the construction of this turbine can be seen as an effort to create the pure values taught in Islam.As a conclusion, the construction of the Effortless Ablution Turbine can teach us that the development of technology based on scientific concepts in Islam can provide many benefits to the environment and society. Therefore, this product is not only able to generate electricity but can also bring us closer to Islamic values in the development of technology and ideas that can benefit the country.

ACKNOWLEDGEMENT

First of all, we take this opportunity to express our deepest gratitude to Ustazah Norakmal Binti Abdul Hamid who is the CTU087 lecturer for our group. She has helped us a lot in completing this task within the stipulated time. She has provided insight, guidance and advice to our group in making this task a success. At the same time, we would also like to say a million thanks to our classmates who gave us support and encouraged us in completing this assignment. Finally, we greatly appreciate all forms of help and encouragement from all parties who have directly or indirectly contributed energy to us to make this innovation project report a success.

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SecureSolah Mat

Nur Afiqah Yasmin Nor Azman, Nur Izzati Amni Iskandar Sani, Alya Maisarah Yusri, Nik Nur Farah Najwa Adnan and *Norakmal Abdul Hamid

Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

*Corresponding author: norakmal@uitm.edu.my

ABSTRACT

Prayer mat is one of the most significant equipment that is used by Muslims to perform *solah* (prayer). A prayer mat is placed on the ground in order to maintain cleanliness throughout the worship especially in position of *sujud* (prostration). Despite the fact that there are many various kinds of mats available on the market, most of them still require few adjustments and improvement to ensure the safety and convenience of a worshipper. One of the major problems that most worshippers faced, particularly women is that their handbags that contain valuable items such as mobile phones and wallets are often stolen while performing their obligatory prayer and ablution. Therefore, the main objective of innovating this product is to lower the risk or the possibility of theft and to guarantee worshippers to remain solemn and calm while performing prayers. This innovation calls for the addition of a new compartment; a dome-shaped part at the front of the mat that will serve as the storage area for purses and handbags, as to ensure the safety of the stored goods. The prayer mat also could form into a bag that enable to store prayer garments. In addition, a bag strap is also added at the back of the mat to transform it into a backpack. Thus, make it easier for users to carry while performing their ablution and carrying the bag anywhere. This product can be commercialized in famous prayer clothing boutiques. In conclusion, these improvements are able to provide a safety and convenience experience.

Keywords: solah mat; theft; safety; compartment; backpack.

1. INTRODUCTION

Sejadah, or prayer mat is one of the tools used when fulfilling the 2nd Pillar of Islam which is prayer for Muslims. The function of the prayer mat is to serve as a mat for prayer and can also be used as a marker for the Qibla direction (Educalingo, n.d.) Among the functions of the prayer mat in prayer is as a mat for ‘sujud’. By using a praying mat for ‘sujud’, worshippers will be more comfortable and confident in cleanliness while praying. In addition, prayer mats can also make prayer more solemn and calm (Hanna Mirae, 2022).

The prayer mat plays an important role in getting a solemn prayer because our eyes are focused on the place of ‘sujud’. Although there are various types of prayer mats on the market such as fluffy and thick mats, large prayer mats, as well as mats with cool fabric, there are various improvements that can be made to produce the best prayer mats considering that there are number of types of problems that occur when performing the obligatory worship. Among the main problems that often happen especially to women is the theft of handbags containing valuable goods such as mobile phones, wallets and more. This often happens during prayer especially during prostration or ‘sujud’ because they are unable to see the whereabouts of their

handbags. Furthermore, worshippers need to bring their handbags together while performing ablution because they get anxious and fear their belongings might get stolen, which is why it may be troublesome for the majority of worshippers. Moreover, it will cause worshippers to face difficulties in taking ablution because they need to always hold their handbags since most of the bag storage areas provided in ablution places are often wet and dirty. Therefore, the objective of innovating this product is to reduce the risk of theft and ensure that users can remain solemn and calm while performing prayers. With various improvements made to the regular mat, worshippers no longer have to worry about where to put their handbags and keep their minds off the safety of their belongings. Therefore, a more perfect prayer can be established without any problems.

2. METHODOLOGY

2.1 Innovation Development

The SecureSolah Mat is innovated from a regular prayer mat with various improvements to overcome safety problems that are often faced by worshippers, especially women. Most of the existing prayer mat designs emphasised on the comfort and esthetical aspects and overlooking the safety aspect. Among the improvements applied is an additional space to store handbags and can be transformed into a backpack that can store prayer garments. In addition, a bag strap is also added to the back of the prayer mat which makes it convenient to carry anywhere. Not only that, the prayer mat is made out of organic cotton and linen which are environmentally friendly and sustainable materials. On the other hand, the zipper sewn around the mat and in the additional compartment is made of plastic to prevent rusting that could potentially ruin the prayer mat.

2.1.1 Extra compartment to store handbag

SecureSolah Mat has a special compartment or section for worshippers to store their bags while performing prayers in public places. This compartment or part has a hidden zipper sewn into the front of the prayer mat. Thus, the users are worry- free to find alternative places or extra bags to keep their belongings safe. SecureSolah Mat offers two different sizes; 60cm x 34 cm and 60 x 100 cm that allow users to choose the mat size according to their preferences and to suit the size of their handbags

2.1.2 Can be folded into a backpack

Another feature that has never been seen in any existing mat is that the SecureSolah Mat can be folded up to be used as a backpack. This feature allows users to perform ablution without having to worry about leaving their handbag unattended. The SecureSolah Mat has a zipper sewn around the mat that is easy to fold and transform it into a backpack. Users can place their handbags in the additional compartment provided and carry the mat like a backpack with ease while performing ablution. In comparison with the existing products that also have the feature of turning the prayer mat into a bag, they came out with a tote bag design instead of backpack. It will be quite difficult for the users to perform ablution as they need to hold onto the bag or have to leave it on the rack bag at the ablution area which is often wet or dirty. Furthermore, carrying a tote bag will make the users to bear the entire weight on one shoulder compared to a bag pack where the weight is evenly distributed between both shoulders (Mahdiya Bhiwandiwala, 2024).

2.1.3 Nature friendly

In innovating the best prayer mat, SecureSolah Mat did not miss to take this opportunity to apply environmentally friendly features. SecureSolah Mat is specially designed using environmentally friendly materials such as organic cotton and linen (Zhangjiagang Ruili Textile Co., Ltd., 2018). Compared to regular cotton fabric, organic cotton is a more sustainable fabric because it has a smaller carbon footprint as it is grown and manufactured without harmful chemicals that can reduce water pollution by 5 times (Is Organic Cotton Sustainable, 2022). The application of this sustainable material not only reduces the negative impact on the environment but also gives a good image to this product

2.2 Prototype Images

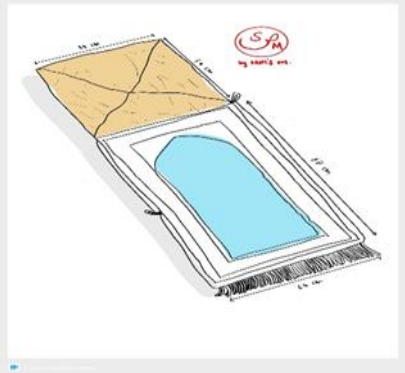

Figure 1. Compartment

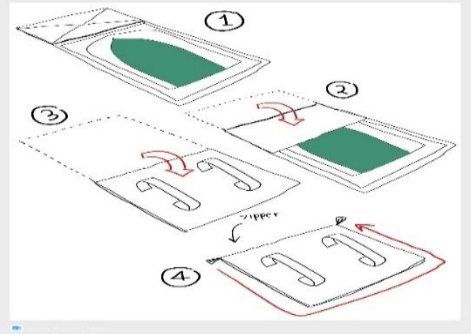

Figure 2. Folding to form a bag

3. RESULTS AND DISCUSSION

3.1 Findings

Observation and feedback are made when the product is demonstrated to a random group of females to try on. Each of the participants is required to fill in a questionnaire for feedback, therefore improvements can be made.

Table 1. Respondents' feedback on the Effectiveness of Product

Point		1		2		3		4		5	
Likert Scale		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
No.	Effectiveness of Product	No.	%	No.	%	No.	%	No.	%	No	%
1	Achieve the objectives							6	19.4	25	80.6
2	Usefulness							6	19.4	25	80.6
3	Meet expectations (functionality & design)					1	3.2	3	9.7	27	87.1
4	User- friendly					1	3.2	3	9.7	27	87.1
5	Recommendation to others					1	3.2%	2	6.5	28	90.3

From the results, it showed that 25 out of 31 (80.6%) respondents strongly agreed that SecureSolah Mat achieves its objectives and find it very useful. 87.1% of the respondents also satisfied that SecureSolah Mat meets their expectations in terms of functionality and design.

Other than that, the majority of the respondents (90.3%) also support that SecureSolah Mat is indeed user friendly and they are very likely to recommend this product to their friends and family.

3.2 Innovation Relevance

SecureSolah Mat is specially designed for users who often travel alone, especially women, to facilitate their affairs in performing prayers without having to worry about the whereabouts and safety of their handbags. This product is designed with special features such as hidden compartments that ensure cases of theft of valuables such as wallets, mobile phones and money do not happen again. Therefore, worshippers can remain praying with full devotion and guarantee a perfect prayer. In addition, users can also perform ablution more easily. With the special feature of being able to be folded into a backpack and also the existence of a bag strap, users only need to carry their bag when performing ablution and do not need to place the bag on a surface that is often wet and dirty at the place of performing ablution. Furthermore, the material used to produce SecureSolah Mat is organic cotton and linen which are environmentally friendly materials. In highlighting the aesthetic concept, this product is also concerned with the environmentally friendly concept to guarantee the well-being of the environment from being affected. Not only that, the zipper made of plastic was also chosen to prevent it from rusting, thus guaranteeing the cleanliness of the prayer mat.

4. CONCLUSION

In conclusion, due to its multipurpose use which includes an additional compartment for securing belongings and the ability to fold into a backpack for easy portability, this product has been shown to ease social problems. From this innovation study, some future recommendations that could be added is to provide the mat with an adjustable shoulder strap. This is important so the user can adjust the shoulder strap to the length that they're comfortable with when using the SecureSolah Mat as the backpack. To sum up, this invention has the potential to benefit a large number of people, so it should be released onto the market as soon as possible to help tackle theft incidents in the mosque and guarantee worshippers' pleasure in their prayer.

ACKNOWLEDGEMENT

Firstly, we would like to thank Allah the Greatest for his blessing and help in completing this project with ease. Besides that, we sincerely would like to thank our lecturer for CTU087: Islamic and Science course, Ustazah Norakmal binti Abdul Hamid. We appreciate every help, encouragement and advice that has been given in completing this innovation project. We believe that this project could be completed under her unwavering guidance and support throughout the process. In addition, this project could not be completed without the efforts of the group members. Without the cooperation of all group members, this task may not be completed within the specified time.

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Teachers's Helper in Teaching: Mechanical Whiteboard Cleaner (MWC)

[1]Abdul Mu'izz Ab Malik, [1]Ahmad Izzat Aiman Mohd Fauzi, [1]Akmal Syaheed Hukil, [1]Muhammad Ammar Shafi Mohd Ifkar and *[2]Karmila Rafiqah M. Rafiq

[1]Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia

[2]Faculty of Education, Universiti Teknologi MARA, Cawangan Selangor, Kampus Puncak Alam, 43800 Puncak Alam, Selangor, Malaysia

*Corresponding author: karmilarafiqah@uitm.edu.my

ABSTRACT

Learning solely in theory lacks practical application, hindering comprehensive mastery of knowledge. The prevalence of theoretical education neglects practical skills, resulting in unengaging learning environments. To address these issues, the Student's Helper in Teaching: Mechanical Whiteboard Cleaner (MWC) offers a solution. MWC expedites the erasing process, overcoming challenges like insufficient height and fatigue associated with traditional methods. Additionally, it incorporates a projector screen, bridging the technology gap in rural schools. Operating without electrical sources, MWC eliminates cost barriers, aligning with the M.E.C. principle of Mechanical, Easy, and Cheap design. By enhancing classroom efficiency and technological accessibility, MWC not only resolves mundane educational challenges but also inspires students to pursue practical applications of their knowledge, enriching their educational experiences and career prospects**.**

Keywords: whiteboard; projector; mechanical; teaching and learning; innovation.

1. INTRODUCTION

In the contemporary educational landscape, the integration of technology is imperative for optimizing learning environments and keeping pace with evolving pedagogical practices (Johnson, 2021). However, despite the advancements in educational technology, many institutions still grapple with outdated methodologies and limited resources. This inertia towards technological integration underscores the need for innovative solutions that bridge the gap between theory and practice. Inspired by this necessity, the Mechanical Whiteboard Cleaner (MWC) emerges as a transformative tool designed to enhance the efficiency and effectiveness of teaching and learning processes. By leveraging mechanical components and user-friendly features, MWC addresses prevalent challenges such as time-consuming erasing processes and limited access to technology in educational settings (Lee & Kim, 2019). Moreover, its affordability and ease of installation make it accessible to institutions across diverse socio-economic backgrounds (Choi et al., 2020). Drawing insights from existing literature and market analyses, this paper elucidates the rationale behind the development of MWC and its potential implications for educational practices. By examining the design, functionality, and market potential of MWC, this study aims to underscore its significance in revolutionizing traditional teaching methodologies and promoting student engagement.

The evolution of educational technology has witnessed a paradigm shift towards interactive and immersive learning experiences (Clark & Mayer, 2016). While digital platforms and virtual tools have proliferated in educational settings, the ubiquitous whiteboard remains a staple for conveying information and facilitating discussions. However, the conventional process of erasing whiteboards often proves cumbersome and time-consuming, detracting from valuable instructional time (Kim & Ramachandran, 2019). In response to this challenge, innovations such as the Mechanical Whiteboard Cleaner (MWC) have garnered attention for their potential to streamline erasing processes and enhance classroom efficiency. By integrating mechanical mechanisms and ergonomic design principles, MWC offers a practical solution to the persistent issue of whiteboard maintenance (Garcia, 2018). Moreover, its compatibility with projector screens addresses the need for incorporating digital content into traditional teaching practices, particularly in resource-constrained environments (Lin et al., 2020). In educational settings, the whiteboard serves as an essential tool for both educators and learners, enabling engaging interactions and visual learning opportunities.

Research carried out by Smith (2018) demonstrates that teachers, on average, spend 15 minutes per class session erasing whiteboards, resulting in a significant loss of instructional time over the school year. Furthermore, interviews with educators conducted by Johnson et al. (2020) reveal frustration caused by the manual erasing process, leading to a disruption in the teaching flow and a decrease in student engagement and understanding. From the students' perspectives, attributes such as improved content visibility and the ability to digitally interact with whiteboard materials are considered essential for effective learning (Chen & Jones, 2017). Additionally, a study by Thompson (2019) highlights that students appreciate whiteboards that facilitate collaborative activities and encourage active participation, emphasizing the need for smooth erasing processes to maintain engagement. Nevertheless, the time-consuming process of erasing the whiteboard presents challenges for teachers, taking away valuable instructional time and for students, disrupting the continuity of their learning experiences.

2. METHODOLOGY

The development of MWC draws inspiration from ergonomic design principles and user-centered approaches. By emulating the assembly process of IKEA products, MWC ensures ease of installation and user-friendliness. The adoption of durable materials and mechanical components aligns with the M.E.C framework, emphasizing Mechanical, Easy, and Cheap attributes. Through iterative prototyping and user feedback sessions, MWC undergoes refinement to optimize functionality and usability.

Figure 1. Product Sketch

The Mechanical Whiteboard Cleaner (MWC) targets educational institutions, including K-12 schools, colleges, and universities, as well as corporate training facilities and conference centres. Potential customers within these segments include teachers, educators, trainers, administrative staff, principals, department heads, and procurement officers. The Mechanical Whiteboard Cleaner (MWC) can be positioned as a premium product in the educational technology market, for educational institutions. For corporate customers in the training and conference sector, a slightly higher price can be justified. A tiered pricing strategy based on the target market segments and the perceived value proposition of the MWC can help maximize revenue potential.

3. RESULTS AND DISCUSSION

The market potential of MWC extends across various educational institutions, ranging from primary schools to universities (Liu & Chen, 2020). By addressing common pain points associated with whiteboard maintenance and technology integration, MWC offers a compelling value proposition to educators and administrators (Zhang et al., 2019). Furthermore, strategic partnerships with educational stakeholders and investors can facilitate the widespread adoption and scalability of MWC, thereby maximizing its commercial value and societal impact (Huang et al., 2021).

4. CONCLUSION

The Mechanical Whiteboard Cleaner (MWC) represents a paradigm shift in traditional teaching methodologies, offering a practical and cost-effective solution to enhance classroom efficiency and promote student engagement. By leveraging mechanical innovation and user-centered design principles, MWC embodies the ethos of accessibility and inclusivity in educational technology. Moving forward, continued research and collaboration are essential to unlocking the full potential of MWC and revolutionizing educational practices on a global scale. In conclusion, it is hoped that the Student's Helper in Teaching: Mechanical Whiteboard Cleaner can penetrate the markets of neighboring countries before gradually gaining influence worldwide so that the quality of the educational environment can be improved to a more interesting and less boring space. This is to ensure that students are more interested and motivated to learn, thus making school learning sessions more attention-grabbing and engaging for all students.

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Digitalization Of Student Activity Approval: A Microsoft 365 - Powered Solution for Cost-Effective & Sustainable Campus Operation

*Mohd Sharif Hashim, Mohd Zahid Ridzuan Mohd Zulkifly, Mohd Sufie Abdul Razak, Hasanul Basri Abdullah, Jefri Khairil Zabri and Nazira Zubir

Centre for Foundation Studies, International Islamic University Malaysia, 26300 Gambang, Pahang, Malaysia

*Corresponding author: hmsharif@iium.edu.my

ABSTRACT

The "Digitalization of Student Activity Approval" represents a groundbreaking advancement in academic administrative processes, developed using Microsoft Form and Microsoft Flow within the Microsoft 365 suite. The main objective of the project is to implement a cost-effective, sustainable, and efficient solution, aligning with the ministry's vision for a technologically advanced, environmentally conscious, and financially responsible educational ecosystem. In terms of practicality and sustainability, the system aligns with environmental sustainability goals by significantly reducing the reliance on paper. The system utilizes Microsoft Automate, a feature integrated within Microsoft 365, to facilitate the submission of student proposals. Using Artificial Intelligence, the system enhances data extraction from submitted proposals for efficient processing. This innovative system, provided for free by the Ministry of Education to all universities, is designed to significantly reduce the costs associated with system development while simultaneously contributing to the institution's commitment to sustainability through the reduction of paper usage. The results show that the system is convenient, time efficient and integrated seamlessly with existing workflows.

Keywords: Digitilization; Microsoft 365 Integration; Cost-Effective Development; Green Campus Initiative; Streamlined Proposal Workflow; Enhanced Collaboration.

1. INTRODUCTION

In today's modern era, digitalization has become an essential aspect of various sectors, including education. With the increasing integration of technology in education, it is crucial to streamline administrative processes such as student program approval. By digitizing the student program approval system, educational institutions can effectively manage the complex task of approving and monitoring student programs. Through digital submission and storage of program proposals, the Online Students Program Proposal System contributes to the university's Green Campus Initiative, minimizing the environmental impact of traditional paper-based processes.
Research Questions

1. How can a digital approval system be designed and implemented to effectively manage the approval process for student activities?

2.What are the perceptions and feedback of key stakeholders, including students, administrators, and other relevant parties regarding the digitalization of approval system for

student activities?

3. Does the digitalization of the approval system for student activities offer a cost-effective, sustainable, and efficient solution as compared to traditional manual processes?

The research follows the following framework:

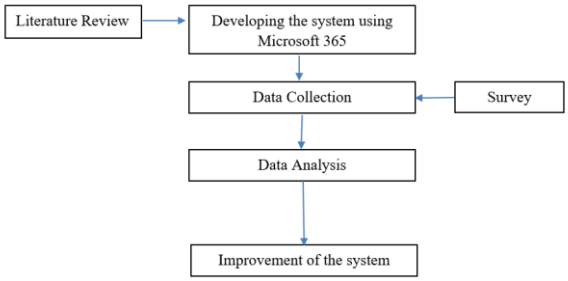

Figure 1. Research Framework

1.1 Literature Review

The interplay between digital investments and reforms in education is crucial for the successful approval of student programs (Shenglin, 2017). By leveraging digital technologies, such as online platforms and digital tools, the approval process can be streamlined and made more efficient (Zhao et al., 2020). This not only saves time and resources, but also ensures that the approval process is more transparent and accessible to all stakeholders involved. Digitalization in approving student programs also allows for the integration of data analytics and artificial intelligence, which can provide valuable insights and recommendations to improve the program approval process (Bican & Brem, 2020). This can lead to more informed decision-making and continuous improvement in student programs. Digitalization plays a vital role in bridging the digital divide, promoting sustainable development, and enhancing student learning experiences in approving student programs (Yun, 2023). By equipping students and teachers with digital competencies, digitalization enables active participation in the digital society and contributes to sustainable development. Furthermore, digitalization in approving student programs can enhance the management process by applying digital technology in teaching and learning (Le & Bui, 2020). This includes using digital libraries and digital knowledge to ensure easy access to information, data resources, and connectivity among learners, teachers, researchers, and other related people (Bednarčíková & Repiská, 2021)

The development and use of digital technologies have greatly impacted schools and society, providing new opportunities for teaching and learning. Digitalization has revolutionized the way educational institutions approve student programs (Pettersson, 2020). Digital innovation and transformation have brought about significant changes in both education and workplace environments. In an increasingly digitalized world, it is crucial for students to possess digital competencies in order to succeed (Zhao et al., 2020). One of the key benefits of digitalization in approving student programs is the ability to streamline the approval process. Digitalization allows for quick and efficient communication between students, faculty members, and administrators involved in the program approval process.

2. METHODOLOGY

The system utilizes Microsoft Automate, a feature integrated within Microsoft 365, to facilitate the submission of student proposals. Using Artificial Intelligence, the system enhances data extraction from submitted proposals for efficient processing. Upon submission of the proposals, the system automatically identifies and notifies the next approvers in the workflow. Meanwhile, students receive real-time updates on the status of their proposals, whether they are approved, rejected, or in progress, ensuring transparency and accountability throughout the approval process. To ensure that the system meets the needs and expectations of all stakeholders, a comprehensive feedback mechanism was implemented. This mechanism involved the creation and dissemination of survey questions tailored to 50 respondents: including students, advisors, administrators, and support staff. The survey questions were carefully crafted to assess various aspects of the system's performance, including satisfactory, usability, functionality, and reliability.

3. RESULTS AND DISCUSSION

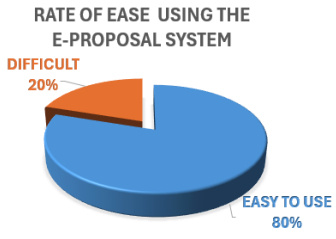

Figure 2. Rate of ease

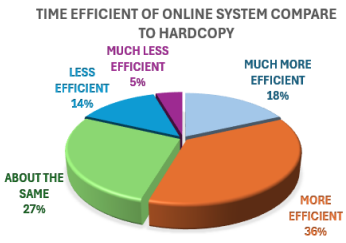

Figure 3. Time efficient

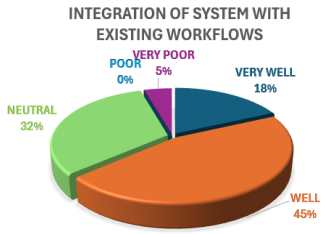

Figure 4. Integration with existing workflows

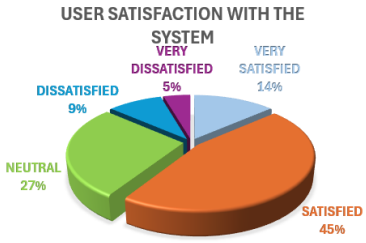

Figure 5. User satisfaction

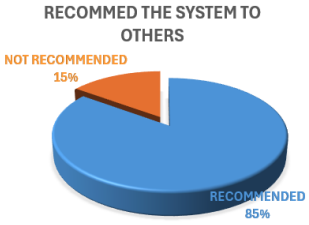

Figure 6. Recommend to others

From Figure 2, the result shows that 80% found the e-proposal system is easy to use while 20% found it difficult while referring to Figure 3, the result shows that 81% found the system is time-efficient. Figure 4 shows 95% found the system integrated seamlessly with existing workflows.

Figure 5 shows 86% expressed general satisfaction with the system. Finally, Figure 56 demonstrates that 85% would recommend the system to others. By utilizing the Microsoft 365 suite, universities benefit from a cost-effective development approach, as the tools are provided for free by the Ministry of Education. This strategic use of available resources enables institutions to implement a sophisticated program proposal system without incurring additional financial burdens. The system contributes to the institution's commitment to sustainability through the reduction of paper usage. Leveraging the robust capabilities of Microsoft 365, the Online Students Program Proposal System seamlessly integrates Microsoft Form and Microsoft Flow. This integration not only ensures a user-friendly experience but also facilitates efficient data flow and process automation, streamlining the program proposal submission and review. The automated processes facilitated by Microsoft Flow ensure a streamlined proposal workflow. From submission to review and decision-making, the system accelerates the entire proposal lifecycle, reducing administrative overhead and enhancing the efficiency of academic program management. Apart from this, it enables students to store and access their proposal drafts securely on cloud-based platforms, facilitating easy sharing and version control. In addition, it implements data analytics tools to track and analyze trends in proposal submissions. This can assist administrators in identifying patterns, strengths, and areas for improvement in the proposals received. Implement automated feedback systems to provide instant feedback on proposal submissions, guiding students in improving their proposals promptly.

4. CONCLUSION

Automated systems can easily scale to handle an increasing number of proposal submissions and evaluations, supporting program expansion without a proportional increase in administrative burden. The systems create audit trails, allowing administrators to track changes, reviews, and approvals, promoting accountability and transparency. It also ensures compliance with institutional policies and standards through automated checks and monitoring features. This ultimately minimizes the risk of human errors in data entry, evaluation, and record-keeping. Concerning potential and commercialization, universities, colleges, and research institutions are potential clients seeking efficient and streamlined processes for student proposal submissions, evaluations, and approvals. Besides, specific interest from research-focused departments looking to enhance their proposal management processes could be good potential. The systems can be tailored to meet the unique needs and workflows of different institutions or departments. The ability to integrate with existing academic systems, learning management systems, and other relevant platforms would be a great advantage for commercialization.

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