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“Optimizing Innovation in Knowledge, Education and Design”

EXTENDED ABSTRACT



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17.	GeraNeem: A Natural Antibacterial Hand and Body Soap from Neem and Geranium Oils <i>Nor Raihan Mohammad Shabani, Nurhidayah Ab. Rahim, Siti Nurshahida Nazli, Tengku Nilam Baizura Tengku Ibrahim, Nurhidayah Sabri & Syarifah Masyitah Habib Dzulkarnain</i>	352-357
18.	Evolution Measuring Tape (Ev_MeTa-Cx) <i>Dr. Wan Zukri Wan Abdullah, Dr. Mohd Fairuz Bachok, Ainamardia Nazarudin, Dr. Duratul Ain Tholibon & Farah Wahida Mohd Latib</i>	358-362
19.	PLC-Based Industrial Application Simulator: Four Ways Traffic Light Management System <i>Rozi Rifin, Kamaru Adzha Kadiran, Mohamad Zhafran Hussin, Muhammad Rajaei Bin Dzulkifli & Ezril Hisham Bin Mat Saat</i>	363-368
20.	The CC Guy: Enhancing Comprehension of Continuity Correction <i>Syah Runniza binti Ahmad Bakri, Noriham binti Bujang & Aidil Azli bin Alias</i>	369-373
21.	Coupling of Computation Simulation and Hands-On Experience in Process Control Laboratory Inline with IR 4.0 Oriented Education <i>Serene Lock Sow Mun, Irene Lock Sow Mei & Lim Lam Ghai</i>	374-379
22.	Vib-Phages as A Supportive Tool for Development of Antibacterial Treatment in Aquaculture <i>Ruhil Hayati Hamdan, Tan Li Peng, Ain Auzureen Mat Zin, Nora Faten Afifah Mohamad, Pang Sing Tung, Nur Hidayahanum Hamid & Lee Rui Ying</i>	380-383

CATEGORY: BSC YOUNG INVENTOR

1.	Eye Tech <i>Ahlam Abdul Aziz, Muhammad Amir Farhan Mohd Azhar, Muhammad Aiman Muhammad Azly, Muhammad Irfan Abdul Jabar & Khairun Liyana Mohd Kamal</i>	384-388
2.	Kompany Illustration by Using Equation of Curve <i>Masnira Ramli, Rosfatihah Che Mat, Zati Ascha Rejab, Nalle Nor Lyana Binti Saridon & Mohd Asmirul Fikri Bin Mukmin</i>	389-393
3.	SOAPOLOGY: Eco-Friendly Handmade Soap from Used Cooking Oil <i>Muhamad Aiman Mazlan, Muhammad Alif Haiqal Bin Asmizar, Ilhamd Bin Sazali & Nurul Hidayana Mohd Noor</i>	394-399
4.	E-SMART 2.0: A Sustainable Bin for E-Waste Disposal <i>Raja Nur Izny Kamaliyah Raja Zulkifli @ Wan Zulkifli, Tengku Nurshazwina Tengku Sahrum, Abdur Rahman Sudais Ahmad, Muhammad Mukhlis Ahmad Taufiq & Mohd Idham Mohd Yusof</i>	400-404

Assalamualaikum warahmatullahi wabarakatuh,



First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality. I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services. By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality. I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH



WELCOME MESSAGE (i-SPIKE 2023 CHAIR)



We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPIKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPIKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail

Chair

3rd International Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023)

SOAPOLOGY: ECO-FRIENDLY HANDMADE SOAP FROM USED COOKING OIL

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ABSTRACT

With billions of liters of waste oil produced worldwide each year from cooking, waste cooking oil is a major environmental issue. Palm oil is the most widely used cooking oil in Malaysia. Despite the usefulness of palm oil, one aspect that consumers have often neglected is its disposal. Pouring used cooking oil down the kitchen sink and into the drain harms the environment. Used cooking oil can be reused in many ways, such as making soaps, candles, and renewable energy. Soaps made out of used cooking oil may sometimes be referred to as eco soap or green soap. These soaps are considered trendy nowadays and posture as a break of income. SOAPOLOGY is a soap that is made with environmental-friendly ingredients. The three main ingredients needed to develop this product are distilled water, sodium hydroxide, and fragrance. In addition, we mix kaffir lime leaves, tea powder, and lime grass, which can be used to wash hands, clothes, and dishes. The primary purpose of soap is to promote sustainable practices in the personal care industry and address the issue of waste oil cooking. The soap is designed to effectively clean the skin, removing dirt, impurities, and excess oil, leaving the skin feeling fresh and rejuvenated. The distinctive feature of our innovative packaging is its packaging. We used biodegradable packaging, an excellent alternative to plastic that brings numerous environmental consequences. We hope the product can help save the earth, in addition to taking care of our health and earning a good income from the product sold.

Keywords: waste cooking oil, eco soap, environmental-friendly ingredients, biodegradable packaging

INTRODUCTION

Domestic waste is materials thrown away from residential areas, such as food waste, plastic, paper, and used metal. Toxic waste such as cooking or engine oil, excess herbicides or insects, and organic waste. Domestic waste consists of solid waste and liquid waste. Domestic waste can be classified into organic and inorganic materials. Most of the domestic waste is caused by daily human activities and natural disasters, and the rest is from the natural response of the environment (Chirani et al., 2021). In Malaysia, the problem of domestic waste disposal is critical, especially in areas with high population density and inhabited by people with a low standard of living, such as flat areas, slums, villages inhabited by immigrants from neighboring states, and others. Among the causes of domestic waste disposal identified is a need for more education about the impact on the environment and the effects of dumping everywhere on the environment (De Feo et al., 2020).

Dumping domestic waste affects pollution, the breeding of flies, mosquitoes, and rats, flash floods, increased maintenance costs, and others (Azme et al., 2023). According to Indah Water, this waste, known as FOG, will harden and must be removed to avoid clogging drains or sewers. Fat, oil, and grease (FOG) are waste from food preparation activities, cooking oil, friedfood, and others. If this FOG is not disposed of properly, it can cause blockage problems in sewer pipes and eventually cause pollution (Chirani et al., 2021). Referring to Table 1, Malaysia is one of the contributors to the most pollution waste of cooking oil Asia countries, with 0.54 million tons per year.

Table 1. Amount of Waste Cooking Oil Generated in Asia Countries

Country	Quantity (million tonnes/ year)
China	5
Malaysia	0.54
Taiwan	0.05–0.03
Indonesia	0.9

(Source: Suzihaque et al., 2022).

Malaysia, a nation renowned for its culinary diversity and gastronomic delights, faces a pressing environmental challenge in the form of cooking oil waste. As Malaysians indulge in their love for flavorful dishes, the improper disposal and mismanagement of used cooking oil have become a significant concern. Thus, an innovative solution has emerged amidst this concern, by transforming cooking oil waste into soap. This approach not only addresses the issue of waste management but also contributes to sustainable practices and economic opportunities (Zulwazi et al., 2023). Our group noticed that the oil could be disposed into soap, a more sustainable practice in Malaysia. Our group's idea of converting cooking oil waste into soap presents a dual benefit. Firstly, it tackles the issue of waste management by providing a practical solution for the disposal of used cooking oil. Instead of being discarded haphazardly, the oil can be collected and processed to create a valuable and marketable product (Daveray & Dutta, 2021). This significantly reduces the environmental harm caused by the improper disposal of cooking oil waste.

Secondly, the innovation of soap production from cooking oil waste contributes to sustainability (De Feo et al., 2020). Traditional soap manufacturing processes often rely on virgin oils, such as palm oil, which can have adverse environmental consequences, including deforestation and habitat destruction. Using used cooking oil as a raw material can reduce the demand for virgin oils, promoting sustainable practices and preserving natural ecosystems (Daverey & Dutta, 2021). The soap produced from cooking oil waste can be of high quality and possess various beneficial properties. The soap can moisturise and cleanse properties with appropriate processing techniques and by adding natural ingredients, such as essential oils and herbs. Furthermore, utilising locally sourced ingredients and incorporating traditional Malaysian elements can produce unique and culturally significant soap products (Azme et al., 2023). The innovation of our group, producing soap from cooking oil waste, has the potential to create widespread awareness and promote sustainability globally.

OBJECTIVE

This innovation project aims to demonstrate the practicality and efficacy of converting used cooking oil into organic soap using an efficient and environmentally friendly manufacturing technique. This project aims to establish an argument for the widespread adoption of used cooking oil as a valuable resource for creating eco-friendly personal care products by conducting comprehensive studies, employing cutting-edge techniques, and evaluating the environmental and economic viability. SOAPOLOGY, the product's name, creates a sustainable and profitable method for turning used cooking oil into high-quality organic soap. Furthermore, the project aims to use recycled cooking oil to reduce environmental effects, advance the circular economy, and provide customers with a natural, healthy alternative to personal care goods. Spreading knowledge to the community that wastes cooking oil can be recycled as valuable materials such as biodiesel, which is more environmentally friendly and becomes an alternative energy source. This product helps promote the 'Waste to Wealth,' where the community can generate income from this recycling and utilize it for community activities.

NOVELTY & ORIGINALITY

Novelty is simply an incremental change to an existing product designed to help marketers differentiate their products from the competition. In the case of our innovative packaging product, we have previously researched the packaging's unique uses and functions to ensure that it can fulfill our primary goal, which is to decrease and solve difficulties that arise throughout the purchasing process. The distinctive feature of our innovative packaging is its packaging. We used biodegradable packaging, an excellent alternative to plastic that brings numerous environmental consequences. Plastic has a slower decomposing rate, and this affects the natural ecosystem. Biodegradable packages may be made from the following materials: cornstarch, seaweed, and mushrooms. This new packaging is different from the previous packaging. Moreover, we design our soap don not to look like packaging designs. For example, it may look like a flower or chocolate. This renewal would assist users in purchasing based on this new packaging innovation.

USEFUL & APPLICATION

Average Malaysians throw waste oil into the home sink. Oil does not dissolve in water, and disposing of used pitches in the sink often makes wastewater treatment more expensive. Used cooking oil not disposed of properly can also cause problems in kitchen faucets and cause

unpleasant odors. Who would have thought that used cooking oil, usually thrown away, could be processed into soap after mixing with several other ingredients? Our project realized the green innovation. The three main ingredients needed to develop this product are distilled water, sodium hydroxide, and fragrance. In addition, we mix kaffir lime leaves, tea powder, and lime grass, which can be used to wash hands, clothes, and dishes. It can be used to wash items such as soap to wash dishes, sinks, and others.

Material Needed:

- ï 500g of used cooking oil
- ï 70g caustic soda (sodium hydroxide)
- ï 165g of water
- ï Vinegar 10g (to remove the smell)
- ï Essential oil, kaffir lime leaves, tea powder, and lime grass (acts as a fragrance)

Process:

- ï Put 165g of water into a stainless-steel cup (container A)
- ï Mix 70g of caustic soda with water in container A until completely dissolved.
- ï Meanwhile, you can add the oil and mix it in a large bowl (container B)
- ï When the caustic soda solution has cooled and filtered, combine everything at once.
- ï Add vinegar or perfume if desired.
- ï Pour into a mold (any recycled mold, such as a yogurt cup or milk container, can also be used).
- ï Carefully remove the soap from the mold using gloves after two days and let it dry for two weeks before use.



Figure 1. Project Innovation Product

COMMERCIALIZATION VALUE

This innovative product can be commercialized and sold in the market through online platforms or physical stores. Soap is becoming an increasingly popular souvenir. Most soaps are given as souvenirs either in an attractive form or with a premium design that looks luxurious. It might be something you would not usually buy for yourself. You can give scented soap to wedding or event guests. Soap as a wedding favor is a great way to add color and beauty to your wedding ceremony and make it a valuable gift for your guests. These floral soaps will surely make your guests smile and remember your special day for a long time.

CONCLUSION

The planet Earth we live in is getting more and more polluted. Pollution can occur through various irresponsible activities. For example, when you throw the used cooking oil in the wrong place, such as in the kitchen sink, drain, or river. In addition to polluting the environment, this act also causes trouble when the pipe or drain is blocked due to frozen cooking oil trapped in it (Azme et al., 2023). Used cooking oil can be recycled into valuable materials such as dish soap, wax, and biodiesel (Zulwazi et al., 2023). With oil, we can make body soap, clothes-washing soap, dishwashing soap, and olive oil soap for sensitive skin. Every action we take today can have a significant impact on our future. Take wise and responsible steps because we will pass this earth on to our children later. Let us save the earth where we live from pollution, in addition to taking care of our health and earning a good income.

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