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ECOOIL: Waste Cooking Oil Collector Machine

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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.

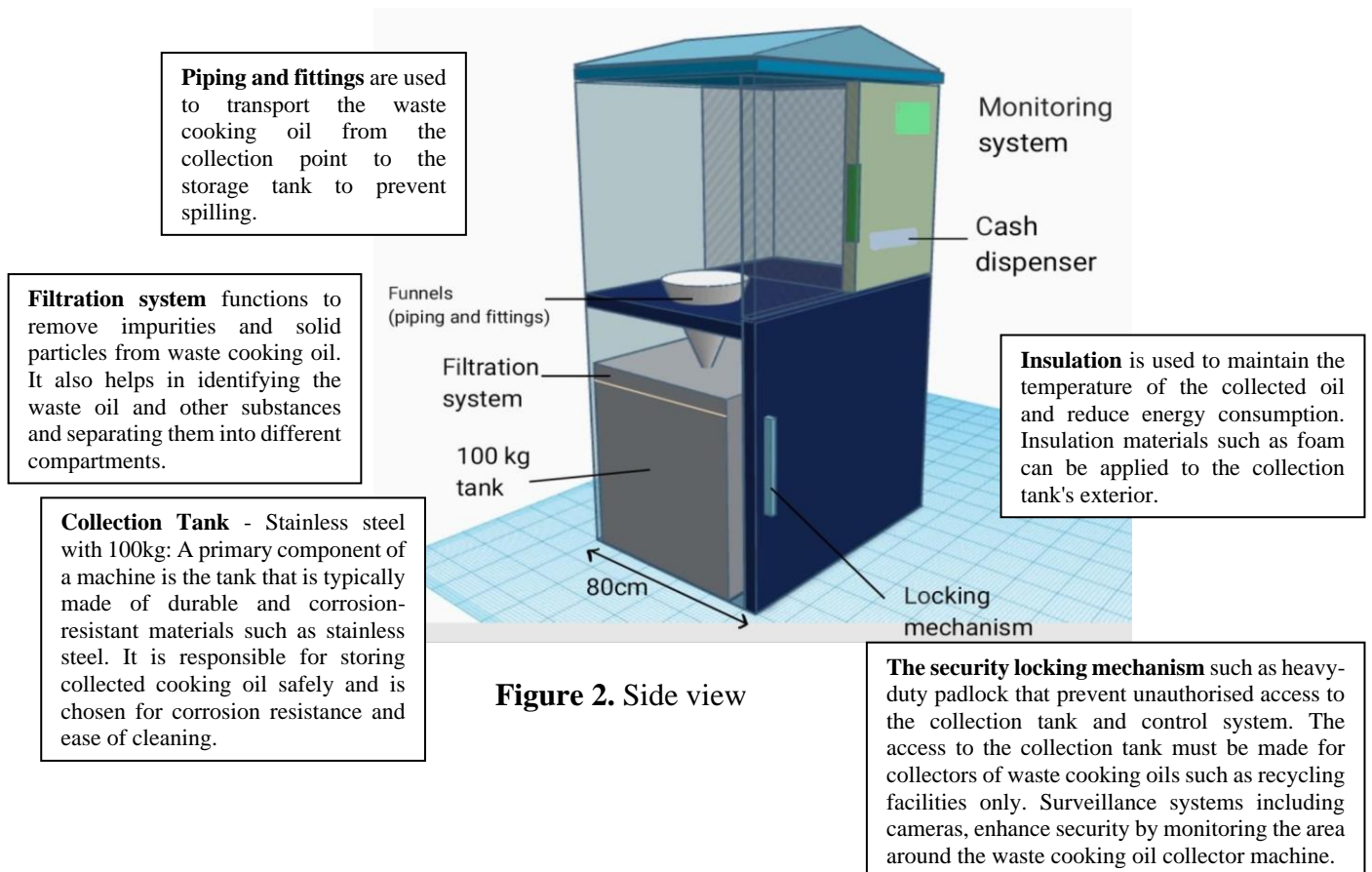
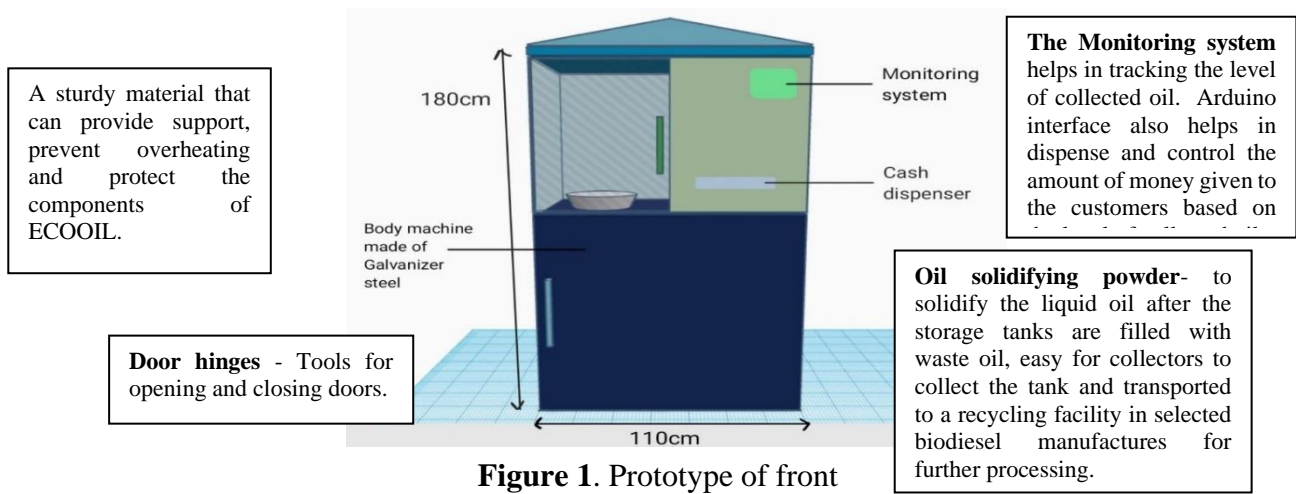
2. METHODOLOGY

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



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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