DESIGN IDEALS

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FOSSEAL – A SEALER MECHANISM FOR FOOD WASTE MANAGEMENT

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ABSTRACT

This research aims to identify the behavior of household towards food waste management in the home kitchen and to propose a better way of food waste management method by developing a product. A total of 32 person (24 female and 8 male) were selected for a survey study. Two instruments were developed to collect data; first instrument was photography to show the real situation of waste management in one kitchen and second instrument was a survey questionnaire. The findings indicated that most of the respondents aware of Waste Separate Programme and has tried to separate their home waste.

This study also figured out behavior of household on their home food waste management. Most of respondents tie the plastic that contain rubbish before throw it into the Green Bin provided by their authority. The user prefers using small waste bin with a lid to help to prevent from bad smell comes from the waste bin and from insects and other animals. FOSSEAL is a new eco-friendly product that has a potential to improve the waste management at home as well as in formal institution i.e. hospital, school and offices.

RESEARCH INTRODUCTION

Our nation needs to have a new way to improve our waste management system. FOSSEAL is an alternative product to support waste separation campaign as promoted in Malaysia, and it is the best option for food waste management in various kitchens. The combination of sealing system and waste bin itself make it as a new innovation design that can improve hygiene and household behavior towards food waste management. FOSSEAL is a user friendly product, with a simple mechanical concept, which has an application of a sealer on the waste bin [figure 1]. The sealer can be installed easily and it is replaceable.

METHODOLOGY

The study on user awareness has been conducted recently, to enhance the validity of the product research. First, a questionnaire survey on user awareness towards waste separation programme has been done as well. The objective of the survey was to get the users perception towards the waste management and its demands. A total of 30 respondents from housing area near Gombak were selected for the survey. Also, the observation on user daily behavior towards food waste management has been conducted in 3 different house in Kuala Lumpur, Malaysia. At a later stage, an analysis on the product line-up has been done to identify the latest trend, material, dimension, colors and mechanism. FOSSEAL was inspired by the user behavior, who need to tie the plastic waste to ensure the hygiene, tidiness and convenience for the better food waste management.

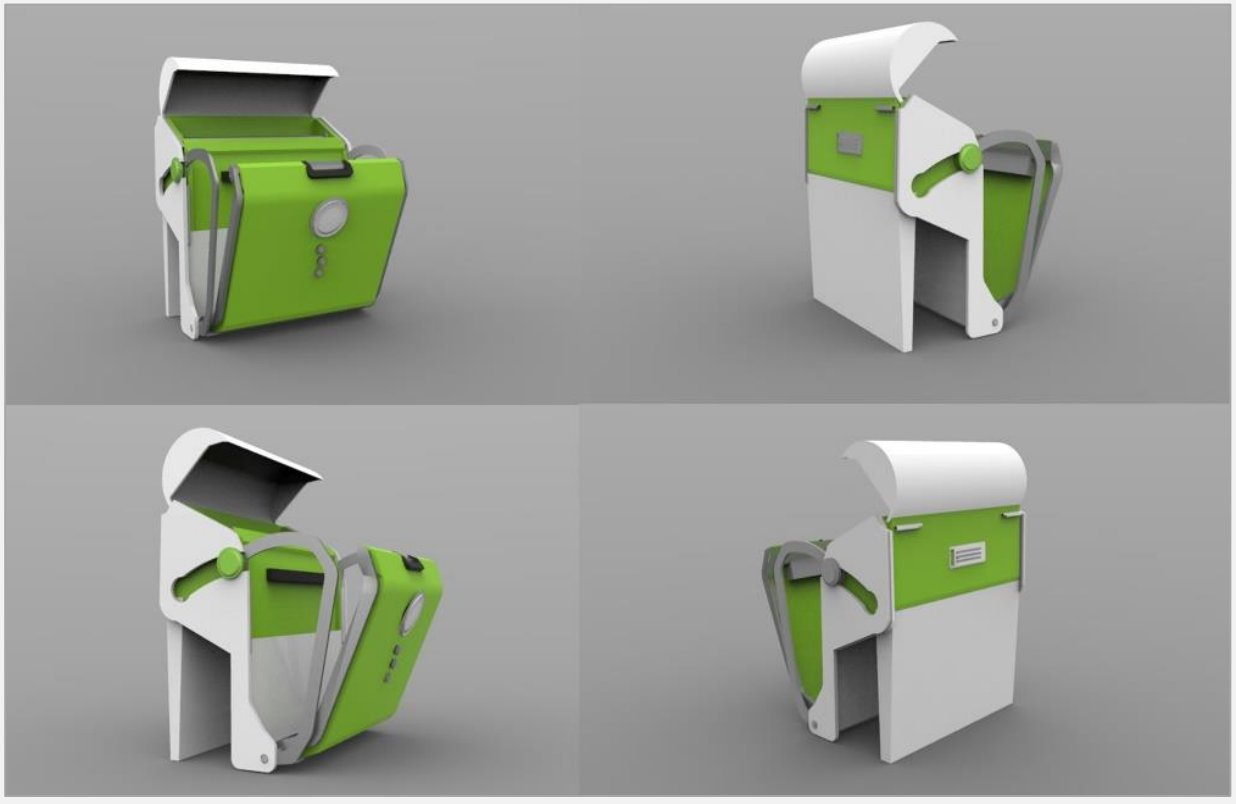


Figure 1: FOSSEAL – A sealer mechanism for food waste management

RESEARCH FINDINGS

LINE UP OF WASTE BIN FOR HOME USE

Many kinds of existing waste bins for home use were produced to provide a waste management system for municipal solid waste including food scrap, papers, bottles, clothing, appliances etc. Most of the design of waste bins are with or without lids, with or without pedal and with or without hook for hanging purposes. Most of the bins design are simple for hygienic purposes. According to Saeed et. al (2009), the municipal solid waste generated in Malaysia house hold is 0.8 – 0.9 kg per house hold in general, with food waste constitution approximately about 60% of the solid waste. Due to Malaysian weather is hot, home waste such as food scrap can be very smelly and watery. Therefore, it is good if innovation of design for waste bin can be developed to create more hygienic and user friendly.

Table 1: Line up analysis for existing waste bin

Design criteria									
DESIGN	Simple without lid and open, half pierced at the above.	Simple without lid and open, using wire for all over the body.	Full covered, comes with lid.	Full covered, come with lid that can be open with pedal. And plastic bucket inside Handy: lid remains open if opened manually, lid closes itself with pedal operation.	Full covered come with lid and pedal. And plastic bucket inside, Motion Control - light pedal operation and the lid closes silently. Handy: lid remains open if opened manually, lid closes itself with pedal operation.	Frame design, come with hook, light and simple, act as plastic holder , handy and frame	Full basket design, come with hook. Handy design, only hook when want to use it	pull-out under counter wastebin has been designed for door front fixing cabinets, and is designed with soft close runners	Door-Mounted, without lid.

FOOD WASTE SEPARATING AWARENESS

A questionnaire survey was done in Klang Valley area on 32 respondents, which 75% of them were females and 25% were male. There were three (3) sections in the survey; Section A : (Demographic), Section B (Awareness on Waste Separation Programme) and Section C (User Behavior Towards Food Waste Management). The result are as in Table 2 – 6.

Table 2: Respondents of Survey – Demographic

The result shows that 81.8% of the respondents alert on the Malaysian Waste Separation Programme. Only 57. 6% respondents having the green waste bin and recycle bin in their housing areas. 84% of them have a knowledge on garbage variation or groups. More than 50% of them had tried to separate their waste.

Table 3: Result of Awareness on Waste Separation Programme

	QUESTIONS	YES	NO
Q1	Malaysia Separation Program alert	81.8%	18.2%
Q2	Housing area provided by green wastebin and recycle bin	57.6%	42.4%
Q3	Garbage group knowledge	84%	15%
Q4	Tried separate garbage	61%	39%

There are 46% respondents who used small plastic bags before threw it to the green waste bin. 28% of them use only a dustbin to throw all rubbish without separating it. 25% of them used several bins and plastics before throwing it into the green bin. This result showed that the users are most of the users are alerts on the waste separation and tried to separate their waste for a better waste management at their home. [Table 4]

Table 4: Result of User Waste Management at Home

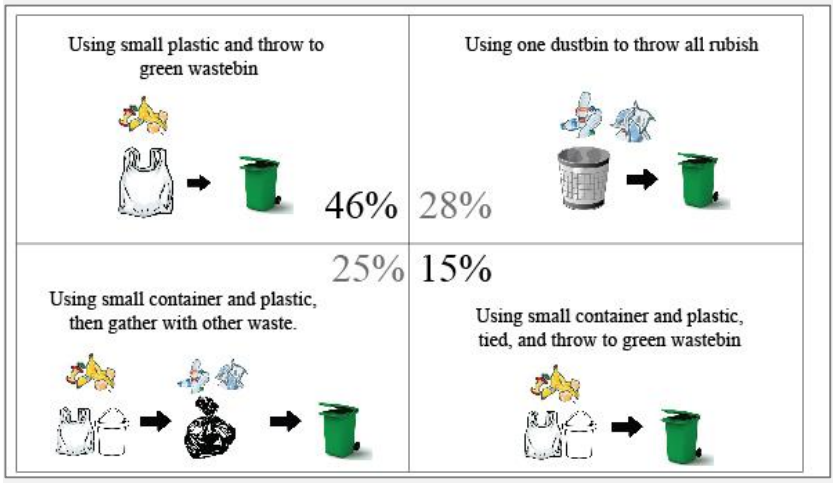


Table 5 shows frequency of throwing waste on weekly basis at home area. 45% of the respondents have a routine of throwing their home waste everyday, while another 45% of the respondents only throw it when their rubbish bin is full. Other respondents throw their rubbish twice and once a week. Table 6 shows several reasons from respondents on why they should tie their plastic bags that contains home wastes. Most of the respondents wanted to keep their home hygiene. 56% of them also wanted to avoid from flies and bad smells of the waste. 21% of them also wanted to avoid the home waste from the cats and dogs. From this result, most of the respondents alert on the clean and hygiene of their home, which they need to throw the waste everyday even though the rubbish bin is not full yet. They need a waste bin that more practical and user friendly.

Table 5: Frequency of Throwing Waste Weekly at Home

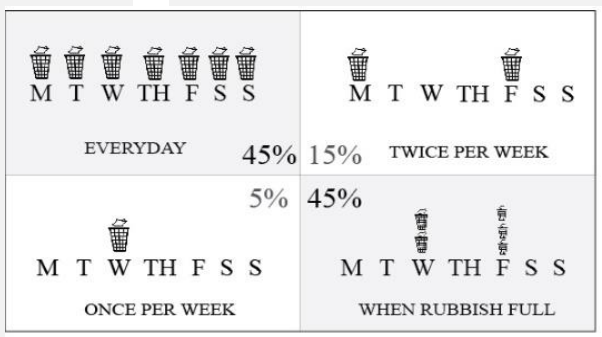


Table 6: Reasons users need to tie home waste plastic bags

Table 7 shows design preference by the respondents. Six (6) kinds of design (A – F) were the selected as the samples. Design A and F obtained the highest preference, which is 24.2% respectively. Design A have a lid to avoid the smell from the rubbish, which is consider as hygiene purposes. Design F is without lid but has a very user-friendly purposes. The least preference are Design B and C, which are less in their practicality.

Table 7: Result of User Preference on Waste Bin Design

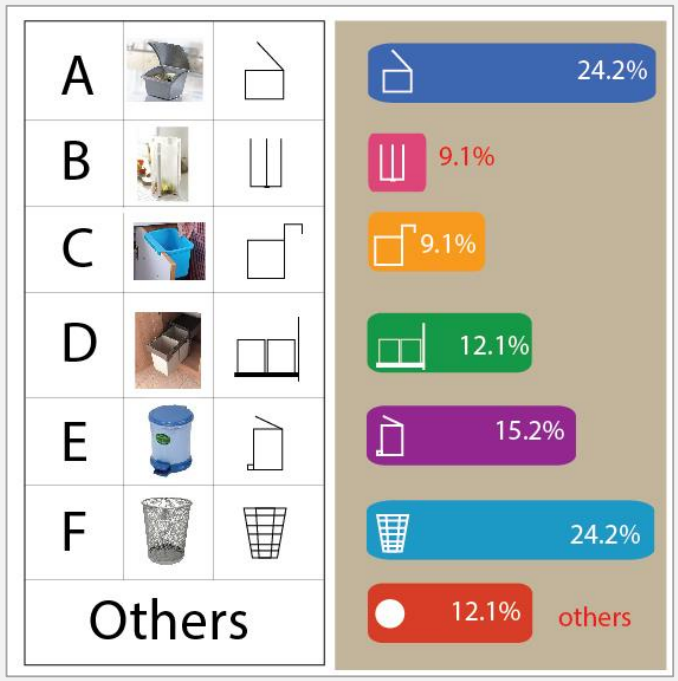
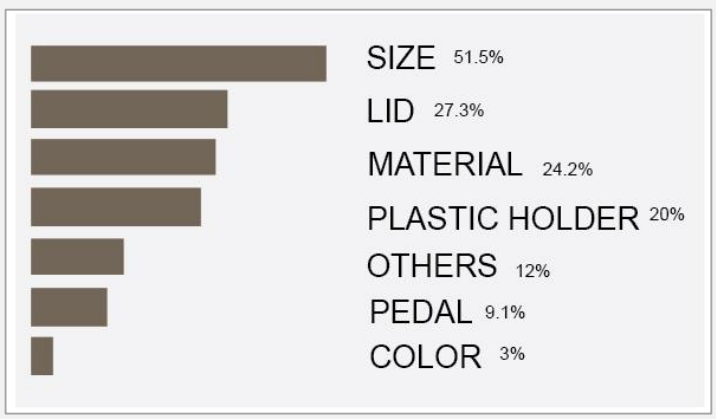


Table 7 shows several reasons of preference on waste bin design. Seven (7) different reasons were asked to the respondents. Respondents selected their design preference mainly based on size (51.5%), lid (27.3%), material (24.2%). It can be said that users consider more on size than the material and color for waste bin design. Waste bin with lid is also one of the consideration while purchasing the waste bin. Lid can help to cover the smells and keep the waste from home flies and other insects.

Table 8: Result of User Waste Management at Home



SKETCHES AND DRAWINGS

In the FOSSEAL design development, there are many stages were conducted which are thumbnail, idea development, proposal and final design. With undergo on all stages, appropriate final design can be gained under the supervision of the designer or expert. The idea development are as in Fig. 2. Design concept of FOSSEAL as in Fig. 3.

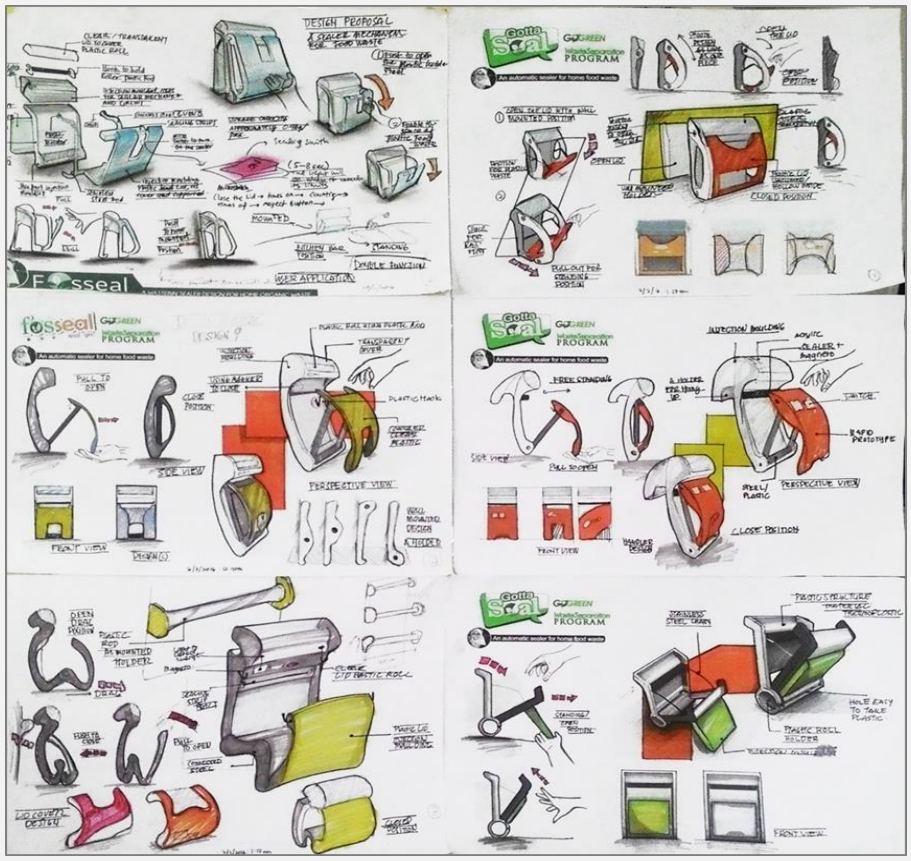


Figure 2: Sketches for FOSSEAL

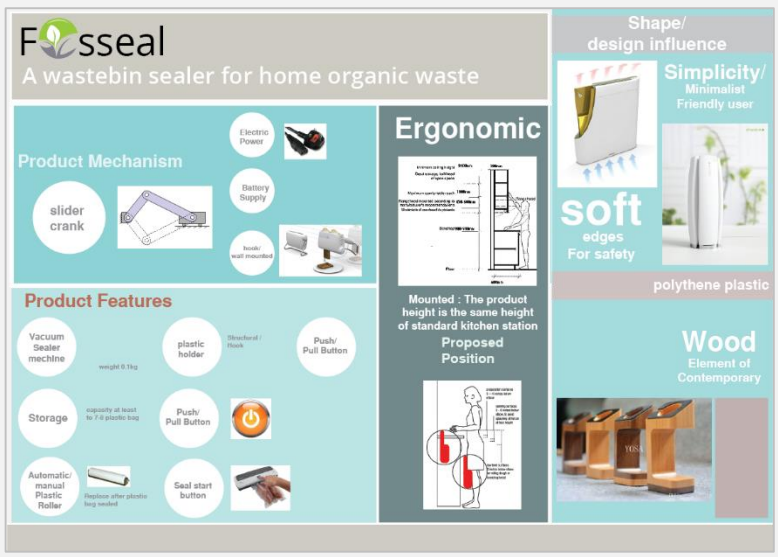


Figure 3: Design Concept for FOSSEAL

MODEL DEVELOPMENT

Table 9: FOSSEAL Model Development

1.Using Laser cut on acrylic 3mm to get the body of product	2. After laser cut body part, then using model board to cover the whole body. Then using poly putty to cover the fault and to make plastic effect.	3. Blow the LID using blower and together with the mold, using ABS board.
		
4. After finished the surface of body, spray with primer coating.	5. Also spray primer on the structure part and white spray for the last resort.	6. Spray white for basic color for coating and layer.
		 
7. In the meantime waiting for spray to dry, blow this acrylic sheet using blower and use the pipe pvc 4' diameter as mold.	8. After the white spray dry, spray LIME GREEN,	9. Put all the detailing like button, holder, rubber sheet, sealer and iron rod, as detailing.
		 
10. Put the laser cut mechanism at the side.	11. Testing the mechanism after glue everything together.	11. Put the plastic cover. And attach it with hinge.
	 	

Mock-up model was developed as initial model development to assess product practicality and its design composition, material application and mechanism. Table 8 shows the mock-up development in stages, while Figure 4 shows the outcome of model development (no 1- 6). Rendering Illustration also has been created by 3DS MAX 3D Software and KEYSHOT 5 to make a realistic look for the product, to show a clear mechanism and material usage, as well as the color of the product.

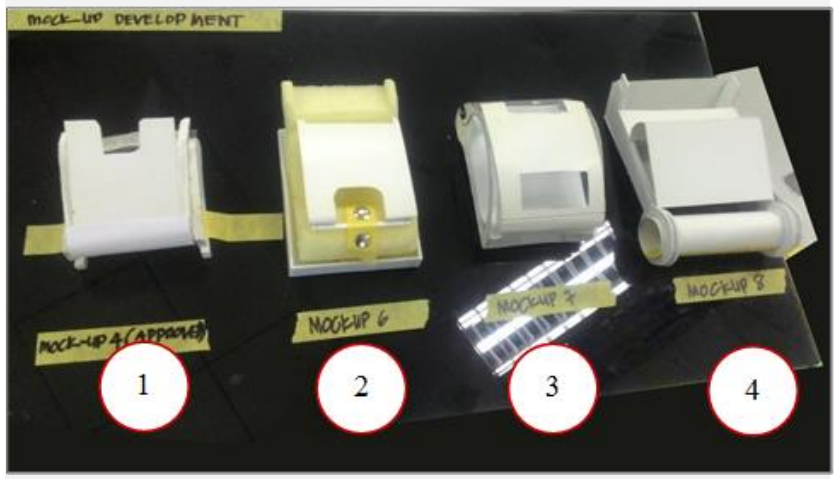


Figure 4: Mock – up Development for FOSSEAL

Figure 5: Rendering Illustration for FOSSEAL

APPLICABILITY

FOSSEAL give the idea of easy-to-seal plastic, which are biodegradable, after they throw the food waste. After sealing the plastic, the food waste can be thrown aster 2-3 days without the bad smells from the rotten waste being exposed. It also can help to prevent the rubbish from insects and other animals. In addition, it will help Alam Flora in their rubbish collection services in terms of managing the separation of waste especially when dealing with the food waste. FOSSEAL also is ideal to be used in the medical institution for example in clinic and hospitals, as well as in general offices. FOSSEAL can be applied in multi-location i.e. at the kitchen cabinet or table top. Several parts of this product can be dismantle for cleaning purposes. [Figure 6]

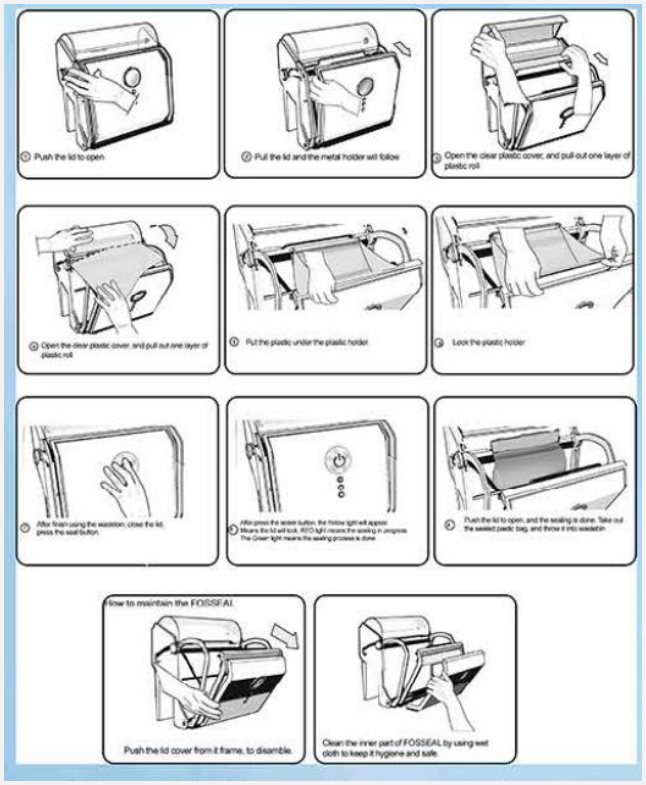


Figure 6: Manual for Product Usage

COMMERCIAL POTENTIALS

FOSSEAL is a handy and stylish product that is needed in the hectic lifestyle for personal or office solid waste management. The cost of this product is reasonable and it comes with several colors line-up such as the lime green, maroon and red. The sealer is maintenance-free, which can be replaced easily. The usage of biodegradable plastic will enhance the commercialization for bio-economic product. The sealer and the biodegradable plastic are proposed to be sold separately at affordable price. The manufacturing processes will use the common techniques including laser cut and injection molding with appropriate material selection. In future, FOSSEAL can be developed more in many potential design variation [Fig.7].

Figure 7: Design Variations

CONCLUSION

FOSSEAL is a potential solution that can encourage people to participate in the waste separation campaign and practice a healthy and green lifestyle. The study found that typical users separates the food waste in the plastic and tie it. Then, the user will dump the plastic with other rubbish together. The study also found that users prefer small size of rubbish bin with lid, which is more practical in their daily life. FOSSEAL is a new eco-friendly product that is potential to solve the household waste management.

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