

WASTE MANAGEMENT OF INNOVATION PRODUCTION THROUGH THE PRINTING BLOCK PRINTING PLATE WORKSHOP USING *THE DESIGN THINKING APPROACH*

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Abstract

The waste problem in Indonesia is a problem that has not been resolved to date; this hurts the surrounding environment, one of which is 23.3 million tonnes annually produced from 202 districts or cities, of which only 15 are appropriately managed. 6 million tons annually. Therefore, it is necessary to process plastic waste to minimize the accumulation of plastic waste and its impact on the. Olah Plastic is one of the MSMEs located in Bandung that processes plastic waste into products. However, Olah Plastic has a problem in the form of remaining unprocessed production waste, so product innovation is needed that can minimize production waste and activities that can increase public knowledge about processing. plastic waste. The results of this research are block printing plates made from the remaining waste from Olah Plastic production, where the printing plates will be used as media in workshops to increase public awareness regarding the negative impact of plastic waste on the environment, which still has selling value.

Keywords: Sustainability, Block Printing, workshop

Introduction

The waste problem in Indonesia is one of the problems that has not been solved until now, this hurts the surrounding environment, one of which is the length of time it takes to decompose plastic waste, which can result in a decrease in soil fertility and requires hundreds of years to decompose plastic naturally (Purwaningrum, 2016). Based on data obtained from the (Wilson, 2023), waste in Indonesia reaches 23.3 million tons every year, which is produced from 202 districts or cities, where waste is well managed, which is only 66.8% or as much as 15.6 million tons every year. This is due to the lack of public *awareness* about plastic waste and its negative impact on the environment. So it is necessary to process plastic waste to minimize its pile and impact on the environment (Amanullah, 2023). However, as time passes and time develops, several MSMEs raise

the value from sustainability to a product. Olah Plastic is one of the MSMEs located in Bandung that produces processed plastic waste products from LDPE, PP, and HDPE materials into *lifestyle* products and *furniture*, and has been established since 2020.

Olah Plastic has a sustainability concept that includes business and investment strategies that can improve business practicality by balancing future needs, especially community efforts in prioritizing social responses to the environment and the economy (Nurhabibah, 2023). This is related to *the Sustainable Development Goals* (SDGs) with sustainable development goals that aim to ensure that the world moves forward in sustainable development by involving social, economic, and environmental justice (Amanullah, 2023). This is related to Olah Plastic itself, which started its business in the field of *recycling* plastic waste because the awareness of plastic waste produced in the previous business is accumulating. Therefore, the *recycling process* from Olah Plastic waste is needed to minimize the negative impact on the environment. The *recycling process* is mainly related to the 3Rs, namely *Reduce*, *Reuse*, and *Recycle* (Lubis, 2015). One of them is Olah Plastic, which *recycles* plastic waste that has been chopped into plastic seeds, and a *pressing* or molding process is carried out to produce a board and accessory products.

Improper plastic processing can affect the products produced; this is because the sorting and cleaning process is not by the standards of Olah Plastic, so it is not by the Indonesian market share, which also wants products with a smooth surface; Olah Plastic is also inseparable from problems both in terms of operations and *finance*, as well as marketing, so that activities are needed that can increase public knowledge about plastic waste processing to increase public *awareness*. A *workshop* is an association that discusses certain problems and teaches something new to people with interests, concerns, and expertise in a certain field (Ørngreen & Levinsen, 2017). Therefore, *the workshop* is one of the ways to overcome the problem of using social innovation in the form of *workshops* or training for them and the need for design innovation from the remaining production waste to minimize the waste produced by Plastic Processing through the design innovation of printing block printing plates, so that the method used in this study is to use a qualitative method with a design approach. One of the gaps from previous research that is relevant to this study is by Asyifa Rachmadina Jiniputri with the title 'Experiment on Crochet and Weaving Techniques with Waste Materials of Plastic Bags and Coffee Wrappers in Fashion Accessories Products (Case Study of Cibunut Environmentally Friendly Village, Bandung)' using *a mix method* with research results in the form of alternative development in textile structures, attractive designs, Like the motif that arises on (Mikalef, Boura, Lekakos, & Krogstie, 2019).

the surface of the product and the resulting texture of such structures. Furthermore, by Astrid Jenifer with the title 'Development of *Fashion* Products Using Used Paper Materials for Cement Bags with *a Low-Impact Use Approach*' using *the method* of dyeing experiments, material tests, and exploration of shapes and visuals with the results of research on alternative basic raw materials from used paper for cement bags for use in

fashion products; next by Lilis Indra Lestari with the title 'Evaluation of "KANG PISMAN PROGRAM" With

Ecopreneurship *Concept Approach* to Contribute to Achieving SDG Target 11.6 Waste Management (Study on Cibunut Village in Bandung City)' uses *a mix method* with the results of research on high public awareness, the environment to be clean, and increasing side income for people who manage waste. Based on the three previous studies above, there is a gap that it has not been studied on workshop innovation as waste management and using qualitative methods with *a design thinking approach*

Research Methods

Data is indispensable in designing. Consciously or unconsciously, designers are sure to use data to create designs (Soewardikoen, 2021). This study uses the design thinking approach of the emphasize and defines stages as a research process. At the emphasize stage, observations and documentation are carried out at the workshop location, and interviews are conducted to explore thoughts, concepts and views from the manager. At the ideate stage, brainstorming activities, moodboards, theme determination and design concepts are carried out. At the prototype stage, a printed plate is made according to the specified concept, then the test stage is a test of the design work made.

Results and Discussion

Empathize

Client

Rizal Aziz is the founder and owner of Olah Plastic, the beginning of his interest in processing plastic waste because of the waste generated from his previous business in plastic packaging. Which started at the end of 2020 and began to realize that every production process has accumulated waste and is not treated; this made Rizal Aziz start to engage in waste treatment and conduct some research on good materials and under Plastic Processing standards.



Figure 1. Rizal Aziz (CEO Olah Plastic)

Object

Plastic processing begins with producing plastic custom packaging, but each production process produces waste. This made the CEO, Rizal Aziz, switch to trying to process plastic waste and, until now, continue to innovate to process plastic waste into new products. Olah Plastic is one of the MSMEs that process plastic waste into *lifestyle products*, accessories, and *furniture*; established in 2020 during the pandemic by provides design, sample making, and custom surface *finishing* services. Generally, the technology used for the product manufacturing process uses *press machine* technology and moulding techniques.



Figure 2. Plastic Processing Logo
Source: Processed Plastic

Plastic processing was built with the aim of being a business opportunity and minimizing plastic waste into *lifestyle* and *furniture products*. The Plastic Processing Office is located on Jl. Salam, Cihapit, Bandung City, West Java. Jl. Greetings no.10, Cihapit, Bandung City, West Java, and the Olah Plastic Operational office are located in a strategic area, namely the Cihapit area in the middle of Bandung, which makes it easy to have meetings with *clients* or *clients* who want to *survey*. Meanwhile, the Olah Plastic production plant is located in Gedebage, which is indeed centred on an industrial location so that the residue from the production does not disturb the community's environment. HR Olah Plastic comprises the CEO, Finance, Product Designer, Graphic Designer, Craftsman, Research & Development, Photographer, and *Technology officer*. Meanwhile, Olah Plastic's marketing account is available through Instagram and the olahplastic.com website, which can be accessed through the Instagram bio. Olah Plastic also gets materials from intermediaries, namely waste collectors, cafes, and factories that work together, while manufacturing services are carried out through craftsmen and designers. This is because raw materials are obtained from *post-consumer* raw materials used daily and *post-industrial* from *factory-reject materials*. Each manufacturing process takes quite a long time, especially the moulding technique, with 4 hours of work and 2 hours of cooling, while the press technique takes as much as 3-4 weeks of work. Therefore, Olah Plastic has production stages as shown in the scheme below.

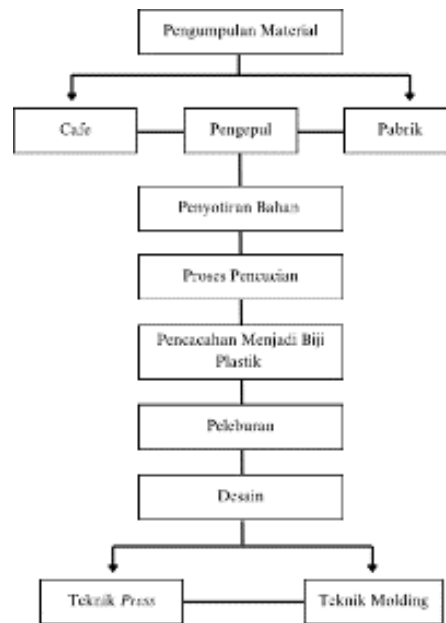


Figure 3. Plastic Processing Scheme Source: Plastic Processing

Based on the Scheme above, it can be concluded that there is a design process using press and moulding techniques to produce a design that is by the customer's wishes. This final stage is to determine whether the type of plastic used has melted well and formed according to the desired design.



Figure 3. Plastic Processing Products

Source: Processed Plastic

Figure 3 is the result of processing production from MSME plastic waste Processing Plastic using press and molding techniques that can produce accessory products in the form of *lifestyle* and *furniture products*. This product results in several products that are mixed *color* from chopped plastic seeds and then melted to produce marbling motifs.

User

The users in this study refer to customers who are in the city of Bandung. This is because Olah Plastic itself is located in the city of Bandung, and the people of Jakarta where Jakarta is one of the cities that is quite *aware* and is quite a lot of users of sustain products, one of which is also in the Bali area which is the center of *the sustain market*

with a target market of foreigners who stop by in Bali, and the café that has needs in the form of *café furniture* by prioritizing *sustainability*.

Stakeholders

Stakeholders are parties with interests in the company that can influence or be influenced by the business in general, divided into two parts, namely internal and external. Therefore, several parties have an interest in Olah Plastic in running its business, namely:

Table 1 *Plastic Processing Stakeholders*

NO	PEGAWAI	JABATAN	KETERANGAN
1	Rizal Aziz	Creative Director	Sebagai pemilik utama dari Olah Plastic dan memantau berjalannya Olah Plastic dengan baik.
2	Muhammad Reynaldi	Head of Finance	Kepala tim <i>finance</i> dalam keuangan Olah Plastic
3	Regina Dyami	Product Designer	Desain Produk hanya dilakukan oleh satu orang saja.
4	Cadrilla Bareno	Graphic Designer	Graphic designer hanya dilakukan oleh satu desainer saja.
5	Muhammad Razi	Research & Development	Pengerjaan ini hanya dilakukan oleh satu orang saja.
6	Aldiansyah Wahyu	Photographer	Fotografer untuk produk di katalog Olah Plastic hanya dilakukan oleh satu orang saja.
7	Akbar Sahiq	Technology Officer	Seluruh kegiatan operasional masih dilakukan oleh satu orang saja.

Based on table 1 above, there is Rizal Aziz's internal party as the owner of Processed Plastic, there are *finance*, *graphic* and product designers, technology officers and *research development*. As for the external, there is a *photographer*

Define

Business Model Canvas

Generally, the business model is depicted through the Business Model Canvas (BMC) in the following figure 4.3

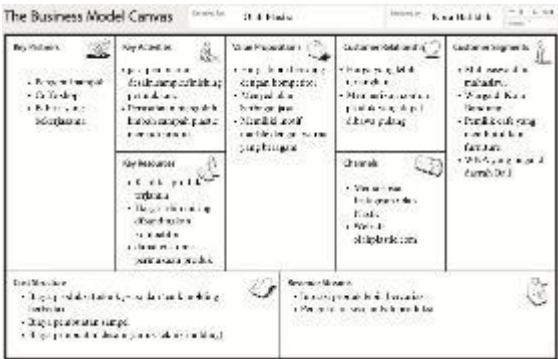


Figure 4. BMC Processing Plastic. Source: Collaborative Design Project Report

Based on the Business Model Canvas (BMC), it is known that Olah Plastic collaborates with 3 parties in the business process, namely collectors, cafes, and factories. Olah Plastic can also be reached through Instagram, the olahplastic.com website, and WhatsApp, which can make it easier for consumers to find other information related to

Olah Plastic. In addition, Olah Plastic also has several advantages regarding price compared to competitors, as well as a variety of products produced and providing services for manufacturing processed plastic waste products along with making designs that customers want, especially customers on the *surface finish* of the desired product. Therefore, the final outcome flow stage is intended for the materials needed, namely plastic waste that has been cleaned and is already at the enumeration stage. In contrast, the flow of *income* is obtained from the benefits of design and product manufacturing services.

Plastic Processing Brand Positioning

At this stage, it is used to find out the position of MSMEs in Plastic Processing by comparing them with 2 competitors who are running businesses in the field of *recycling*. The comparison can be seen in the table Under:

Table 2 Comparison of Plastic Processing with 2 competitors

KRITERIA	OLAH PLASTIC	NewHun	Precious Plastic Bandung
Tahun Berdiri	2020	2020	2014
Lokasi	Kota Bandung (Cihispi)	Cimahi	Bandung (Dago)
Jarak Lokasi	9,9 KM	20 KM	13 KM
Bidang Usaha	Recycle	Recycle	Recycle
Produk Utama	Pembuatan Produk Recycle, Aksesoris cincin gelang, coaster, Keychain, hanger, sisir, & Furniture.	Pembuatan Produk Recycle, Jam tangan, Jam dinding, Mug, Mirror, Tempat tisu, Keychain.	Pembuatan Produk Recycle, Coaster, furniture.
Media Sosial	Instagram, WhatsApp, Tokopedia, dan Website	Instagram, Shopee, Tokopedia	Instagram
Range Harga	> 45.000	> 150.000	> 148.000
Finishing	Halus	Bertekstur	Halus
Kategori pelayanan	Jasa pembuatan dan custom.	Jasa jual produk.	Jasa jual produk.

Therefore, the data in Table 2 is used to find out the position and services offered by each MSME and compare it with competitors displayed in the form of a *perceptual map*:

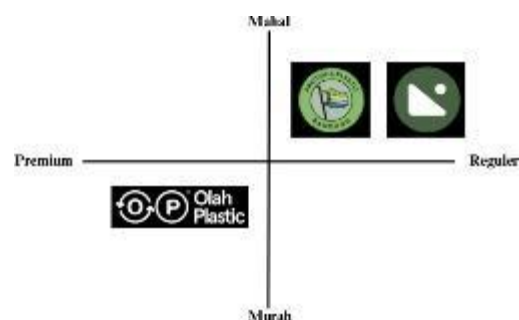


Figure 5. *Perceptual Map*

Source: Collaborative Design Project Report

Based on figure 5 above, it is known that Newhun and Precious Plastic Bandung's competitors are in the same position, namely expensive products with regular quality,

while Olah Plastic is in a different position, namely products that are sold at more affordable prices with premium quality.

1. *Brainstorming* Problems Based on the results of *brainstorming*

The problems found have been considered by the results of the analysis of the business model and the position of the competing MSMEs compared



Figure 6. *Brainstorming* Plastic Processing Problems. Source: Collaborative Design Project Report

In the *brainstorming* process, there are several problems in the form of variable categories; the main problem is the residual waste produced by Plastic Processing MSMEs that is not reprocessed so that it accumulates and the lack of variety of *lifestyle* products. Therefore, based on the three problems in operations, *finance*, and marketing, there are main problems related to this research. In the next stage, the main problem is solved with a design approach, which is the two main problems, namely:

- The problem of production waste from MSMEs Processing Plastic that is not reprocessed results in the accumulation of production waste.
- The problem is the lack of variety regarding *lifestyle products* in MSMEs Processing Plastic.

Provisional results were obtained in the form of problems in untreated production waste and the lack of variety of *lifestyle products*, which will be solved with the aim of continuing the validation of the problems in this study.

2. Problem Validation

Problem validation is carried out to measure the correctness of the problem assumption at the *brainstorming* stage. Validation is carried out by observation and interviews conducted by observing the Olah Plastic brand offline and observing supporters online to get the data needed. Observation and Interview took place on March 5, 2024 located in the city of Bandung.

a. Residual Production Waste

Based on the production aspect, there is a problem of residual production waste which is validated by documentation obtained from observations and interviews from Olah Plastic.



Figure 7. Production waste. Source: Processed Plastic

Based on figure 7, there is the rest of the production waste is a fairly large amount, ranging from the rest of the production waste with small sizes to large sizes that are shaped like frames and piled up in the warehouse of the Olah Plastic office. Therefore, it is included in Olah Plastic in the form of reprocessing production waste, whereas competitors NewHun and Precious Plastic Bandung do not process the residual production waste produced in each production and can be used as an opportunity that Olah Plastic *recycles* in its entirety by the vision and mission of Olah Plastic regarding *sustainability* in the form of minimizing plastic waste.

Lack of Variety of Lifestyle Products

The second problem is the lack of variety of Olah Plastic products based on the olahplastic.com website and obtained from direct and indirect observations and interviews on Olah Plastic

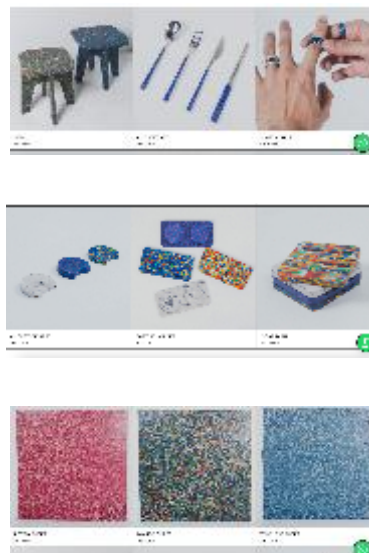


Figure 8. Product Variety.

Source: Processed Plastic

Based on Figure 8 above, several variations of products are traded on the olahplastic.com website, such as chairs, forks, accessories (rings), chopsticks, coasters, soap dishes, and boards. Therefore, the product variety in Figure 4.7 is less varied, and more variety of lifestyle products is needed to make it easier for customers to choose the products sold.

Ideation

Theme Determination

The theme in this study is determined based on the *mood board* and the concept that has been made. Based on this determination, the theme that will be applied to this research will be selected.

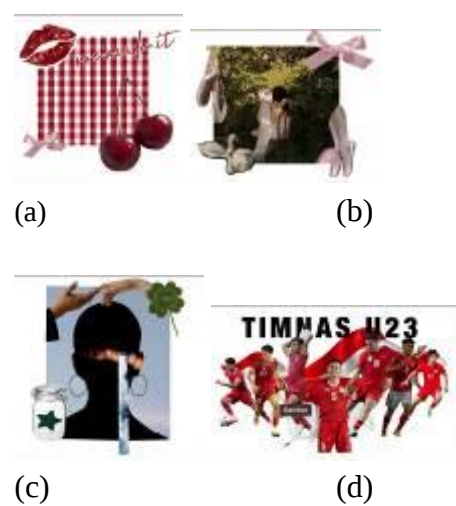


Figure 9. *Moodboard* (a) Coquette, (b) Balerina, (c) QOT, (d) U23

Figure 9 shows a *moodboard* with a concept and will be applied to this study based on observation of trends on social media, especially on TikTok media. Still, it is necessary to choose a theme so that it can be applied to this research. So the following themes are determined:

Table 3 Theme Determination

INDIKATOR	COQUETTE	BALERINA	QOT <i>(queen of trend)</i>	U23
DESAIN SIMPLE	5	4	3	5
TREND	5	5	4	4
BOOMING	5	5	5	4
DIGEMARI	5	5	5	4
MUDAH DIAPLIKASIKAN	4	4	3	5
TOTAL	24	23	20	22

Based on the determination of the theme in Table 3, the coquette theme is the theme with the highest total suspension, which is 24 scores. The determination of the theme is carried out with indicators in the form of *simple designs*, *trends*, *booming*, *popular*, and *easy to apply*.

Alternative Solutions

Waste Management of Innovation Production Through The Printing Block Printing Plate Workshop Using *The Design Thinking Approach*

The stages of alternative solutions that can be applied and then further developed are alternative ideas for the initial solution, such as printing block printing plates on *T-shirts*, *scarves*, and *tote bags*.



Figure 10. Alternative Solutions.
Source: Collaborative Design Project Report

After determining several alternative solution ideas, the next process is the application of printed plates on alternative solutions on *t-shirts*, *scarves*, and *tote bags*. So it is interesting for a group of people who participate in the *workshop* with the benefit of alternative solutions. This is done to attract a lot of interest to participate in the *workshop*, which is carried out by getting several interesting benefits apart from the experience obtained when participating in the *workshop*, and these benefits are only obtained when participating in the implementation of *the workshop* with a more *exclusive purpose*.

Final Concept of the Workshop



Figure 11. Workshop Concept
Source: Collaborative Design Project Report

Based on the initial scheme, the next stage is determined based on the concept of *the workshop* so that the design-making process can be directed and appropriate. Therefore, at the initial stage, it is determined with 3 aspects in the direction of the *workshop*:

The first aspect related to *Customer Insight*, which contains the main target of the process of carrying out the activity *Workshop* (students, the wider community, and community groups care about the environment, determine the benefits obtained from participating in the activity *Workshop*, as well as its pride in contributing directly to minimizing plastic waste and negative impacts on the environment).

The second aspect is determining the theme of the printed plate design and

workshop activities and their objectives. The theme used is the processing of production waste from Plastic Processing into printed plates that use the concept of coquette to attract many students, especially women. In addition, the *workshop's* purpose is to improve *the* community's awareness of plastic waste.

Finally, it is to determine the channel for the process *Workshop* it is determined online through social media and offline through *workshop*.

Based on the three aspects above, it indirectly contains 3 values, namely:

- a. An invitation to implement so that the community is more *aware* of the environment, one of which is by minimizing plastic waste, especially in separating plastic waste.
- b. The next experience felt by Participants was applying and processing printing block plates made from production waste. This activity also allows participants to make new friends with the same hobby and obtain benefits that can only be obtained when participating in the *Workshop*.
- c. c. The final stage involves setting goals that can reach the community, especially increasing awareness by minimizing waste from production through product innovations.

Prototype

After determining the product to be made and the concept for the Plastic Processing product, the next stage of the idea development process is formed according to the visuals realized in the physical form, which is finally determined from the final design *of the prototype*. Therefore, the *prototype stage* is divided into 3 stages, namely:

2D Printing Block Printing Plate



Figure 12. 2D Printing Plate Design

There are 3 stages of the 2D Printing Block Plate design process, namely:

- a. The initial concept determination is based on the selected theme through the highest suspension, which is then carried out when determining the sketch contained in the *mood board object*.
- b. The selected sketch will continue at the colouring stage, adjusted to the selected mood board.

- c. Furthermore, the creation of the selected design will be adjusted in detail, one of which is the texture contained in the lips design.

3D Printing Block Printing Plate

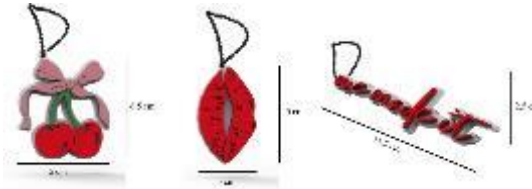


Figure 13. 3D Printing Plate Design

There are 3 stages of the 3D Printing Block Plate design process, namely:

- a. At this stage, the selected design will be carried out in 3D stages so that the selected design looks realistic, such as there are designs that arise and do not.
- b. The next design will be enhanced by adjusting the customized size of each 3D design on the printed plate to make the shape of the 3D design more visible.
- c. The final stage of the 3D design will be given a colour that adjusts to the 2D design.

Keyring



Figure 14. Front, Side, and Rear View 3D Printing Plate Keyring Design

There are 2 stages of the 3D Printing Block *Keyring* design process, namely:

- a. At this stage, the 3D design will be combined into a keyring or keychain that has been adjusted to the size of each printing plate.
- b. This stage provides a chain and a hole at the end of the printed plate, making it easert, theing the keychain chain easier.
- c. The next Stages show the view from the front, side, and back sides so that the thickness and final 3D design of the printed plate can be clearly seen.

Testing

The trial stage has not been carried out directly; it's just that it has just been displayed in the form of 3D modelling. So it can be concluded that the 3D design of the printing block

printing plate is made with a cherry size (5 x 6.5 cm); *lips* (3 x 5 cm); and we make it (11.5 x 2.5cm) where the 3D design of the three designs will be combined and realized into a *keyring* or keychain. Where the usefulness of 3D design is a design stage that can show the creation of a real design both from the front, side, and back sides

Conclusion

From the research that has been carried out, it can be concluded that Olah Plastic has advantages in the form of products produced by Olah Plastic, which have premium quality but at affordable prices compared to competitor brands and provide various services. One of the problems that is also used as urgently is the remaining waste from the production of plastic processing and the lack of innovation in *lifestyle* products. So that the results of the *defined* stage are included in operational and marketing problems that are not optimal. The solution applied to this research is through a *workshop* with various benefits obtained by *workshop participants*, to increase *public awareness* about the negative impact of plastic waste on the environment, which still has a selling value. However, the solution to the remaining production waste is used as a printing plate to minimize the remaining plastic processing production waste.

Meanwhile, suggestions that can be made in this study are both further research, namely, conducting testing of the design *prototype* in this research to the public, in order to find out the suggestions that get Used to improve this research. Therefore it is recommended to do *Workshop* by practicing printing block printing plates made from the waste of Plastic Processing production and aiming to improve *Awareness* community regarding the processing of plastic waste that has a selling value.

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