

# A Study of Strategies for Utilizing Production Waste from Processing Olah Plastic in Bandung City

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**Abstract**— Indonesia faces significant challenges in managing its growing plastic waste, which harms ecosystems and degrades soil fertility. Annually, Indonesia generates 38.34 million tons of waste, with 38.37% unprocessed, while Bandung City alone contributes 503,627.36 tons. This study examines Olah Plastic, a Bandung-based UMKM established in 2020, which recycles LDPE, PP, and HDPE plastics into lifestyle products and furniture. Despite its sustainability-driven approach aligned with the SDGs, Olah Plastic struggles with unprocessed production residuals. Using a qualitative case study method, this research explores strategies to minimize residual waste and achieve zero waste by integrating Reduce, Reuse, Recycle (3R) principles, advancing waste management innovation and environmental sustainability.

**Index Terms**— Plastic Waste, Recycling, Zero Waste, Olah Plastic, Sustainability, SDGs.

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## I. INTRODUCTION

Waste management remains an unresolved issue in Indonesia, with plastic waste being one of the most pressing challenges that continues to increase yearly, in line with human activities. This situation negatively impacts the environment, particularly due to the extended time required for plastic waste to decompose naturally, which can take hundreds of years and contributes to soil fertility degradation (Purwaningrum, 2016). According to data from the Ministry of Environment and Forestry (2023), Indonesia generates a total of 38,340,757.37 tons of waste annually, sourced from 367 districts or cities. Of this amount, only 48% or approximately 18,402,801.64 tons are well-managed, while waste reduction accounts for 13.63% or 5,226,550.25 tons. Overall, 61.63% or 23,629,351.89 tons of waste are handled, leaving 38.37% or 14,711,405.48 tons unmanaged. In Bandung City alone, waste generation reaches 503,627.36 tons, with 72,838.53 tons reduced and 419,237.23 tons managed. This problem is largely attributed to the lack of public awareness and discipline regarding cleanliness, placing Indonesia in a state of waste emergency, particularly concerning plastic waste (Putu Juniarti, 2020). This emergency reflects the public's indifference to waste management, which adversely affects the surrounding environment. Therefore, effective plastic waste management is essential to reduce the accumulation of plastic waste and its negative environmental impacts (Amannullah, 2023). On the other hand, with the passage of time and societal development, several UMKM have embraced sustainability values by transforming plastic waste into valuable products.

In West Java, there are three MSMEs focused on processing plastic waste into products with aesthetic and economic value. One of them is Newhun in Cimahi, which produces accessories, coasters, and watches with unique textures from plastic waste sourced from waste management systems. Another MSME, Pelastik Not Plastik, located in Dago, creates wallets, coasters, and t-shirts made from recycled plastic bottles and waste with a smooth finish. Meanwhile, Olah Plastic, based in Cihapit, produces coasters, tables, chairs, accessories, and displays with customizable finishes to meet client preferences. Their raw materials come from waste management systems and collaborations with various companies. Among these three MSMEs, Olah Plastic was chosen as the focus of the study due to its advantages in producing products made from LDPE, PP, and HDPE. In addition to offering a wider range of products compared to its competitors, Olah Plastic provides diverse finishing options. The company has also collaborated with brands like Pocari in events where participants experience bottle cap shredding firsthand. Furthermore, Olah Plastic serves clients from various brands such as Palanusantara, BKKABF,

Herd.BDG, and House of Luck. Established in 2020 in Bandung, Olah Plastic operates with a sustainability concept aimed at balancing future needs with social, economic, and environmental considerations. To produce a single board measuring 30x60 cm with a thickness of 1-2 cm, approximately 100 kg of plastic waste is required. The business originated from awareness of plastic waste accumulation from previous ventures, driving them to develop a zero waste strategy through recycling processes. To support the Sustainable Development Goals (SDGs), effective strategies are needed to minimize waste and negative environmental impacts while promoting sustainable development.

The recycling process primarily revolves around the 3R principles: Reduce, Reuse, and Recycle (Lubis, 2015). Olah Plastic, as one example, implements recycling by processing shredded plastic waste into plastic pellets, which are then pressed or molded into boards and accessory products. However, each production cycle still generates residual waste that accumulates in Olah Plastic's warehouse. According to FOE (2008), recycling can reduce the use of raw materials that would otherwise remain unprocessed or need to be newly produced. Recycling is therefore essential to minimize environmental damage and the depletion of primary materials, enabling the creation of products that mitigate harm to natural habitats. For this reason, recycling processes at Olah Plastic must be optimized to reduce the negative environmental impact of its waste. This study adopts a qualitative research method to explore effective recycling strategies for the residual waste produced by Olah Plastic.

Olah Plastic faces an issue where plastic waste produced during the manufacturing process is not properly reprocessed. Previous studies have highlighted the inefficiency of the Kang Pisman program in tackling waste problems, as well as the accumulation of unused cement bag paper and the ineffective implementation of school waste banks. Additionally, there are issues with monotonous textile structures and the improper handling of plastic waste. This presents an opportunity for innovation in plastic waste management, specifically through a zero-waste recycling approach, which will be explored in greater detail in this research. Furthermore, observations reveal a lack of design innovation at Olah Plastic to address the negative environmental impacts. As a result, this study employs a qualitative method with a case study approach to analyze these challenges.

## II. MATERIALS AND METHOD

This research uses a qualitative case study approach to analyze the recycling processes and waste management strategies at Olah Plastic, a Bandung-based SME. It focuses on plastic types like LDPE, PP, and HDPE, and production residuals. Data is collected through field observations, interviews, and document reviews to identify challenges in achieving zero-waste production. The study also reviews relevant literature to contextualize findings. The goal is to explore innovation gaps and opportunities to enhance recycling processes and design outcomes, contributing to sustainable waste management solutions.

## III. RESULT AND DISCUSSION

### A. Profile of Olah Plastic

Olah Plastic is an UMKM specializing in plastic waste recycling, located in Bandung City. Established by Rizal Aziz at the end of 2020 during the Covid-19 pandemic, Olah Plastic originated as an effort to repurpose plastic waste generated from its previous business, which focused on custom plastic packaging production. Since then, the company has continuously innovated by transforming plastic waste into valuable products, such as coasters, tables, chairs, accessories, and displays. With a team comprising a CEO, product designer, graphic designer, craftsman, research and development staff, and technology officer, Olah Plastic has developed its operations through personal funding and business partnerships. The company actively promotes its products on social media platforms such as Instagram (@olahplastic) and its official website (olahplastic.com). By adopting sustainability as the core of its operations, Olah Plastic demonstrates its commitment to innovation and environmental responsibility.



Figure 1. Logo Olah Plastic

Source: Instagram @olahplastic

Olah Plastic is an UMKM focused on processing plastic waste into valuable products such as lifestyle items and furniture. With a vision to minimize plastic waste, the company aims not only to create business opportunities but also to support plastic waste reduction in Indonesia. Olah Plastic's strategies include producing high-quality boards favored by consumers and being selective in collaborations with other brands. Through educational programs, Olah Plastic strives to raise awareness among the public about the wise use of plastics and the importance of waste sorting. These efforts reflect Olah Plastic's commitment to sustainability and innovation in the recycling industry.

#### B. Olah Plastic Product

The products offered by Olah Plastic are crafted from recycled plastic waste, featuring a marbled pattern created through pressing or molding techniques. These products are also customizable, allowing customers to specify their desired designs, colors, and textures. The coloring process uses specialized inks, making it easier for customers to achieve their preferred color choice.

Figure 2. Variety of Plastic Processing Products

Source: Instagram @olahplastic

Figure 2 showcases a variety of products available on the website olahplastic.com, including chairs, forks, accessories (rings), keychains, buttons, bag accessories, watch accessories, chopstick rests, coasters, soap dishes, and boards. These products are relatively expensive due to their environmental value, highlighting a commitment to sustainability. The items come in various colors and feature unique patterns. Additionally, there are innovative household items, such as spoons and forks, which further emphasize creativity in product design. Olah Plastic offers a range of services, including design creation, sample production, and custom surface finishing services. The main suppliers of plastic materials include partner factories, waste collectors, supplier companies, and cafes. Processing time molding technique requires 4 hours of work and 2 hours of cooling and pressing technique takes 3-4 weeks for completion. Raw material sources from post-consumer plastic materials commonly used in daily life and post-industrial factory reject items.

There are 6 process steps in Olah Plastic: Collecting materials, sorting the materials, Washing, Resizing/Shredding, Melting, Pressing. The current technology used by Olah Plastic involves a pressing machine and molding techniques. Olah plastic's have 4 policies for Restricting single-use plastics, Changing public habits regarding waste management, Enhancing producer responsibility, Expanding recycling programs. Olah Plastic End Users (Customers), the people of Bandung, the people of Jakarta, the people of Bali, particularly foreign nationals visiting Bali, and cafe owners, for their cafe furniture needs. Olah Plastic has competitors in recycling companies from NewHun and Pelastik Not Plastik. Actually Olah Plastic have intermediaries in materials waste collectors and factories, but from production are craftsmen and designers.

Olah Plastic Environmental Conditions have the operational office is located in a strategic area, specifically in Cihapit, in the center of Bandung, making it easy to meet with clients or those wishing to conduct surveys and the production facility is located in Gedebage, an industrial area, ensuring that production waste does not disturb the local community.

#### C. Observation Data

##### 1) Company Selection Process

This observation was conducted on several small and medium enterprises (UMKM) located in West Java, chosen based on their relevance to the study's focus on plastic waste management. A table was created to identify the UMKM that would be studied in depth as the foundation for this research. Additionally, the table aims to simplify the selection process by considering factors such as the business sector, main products, raw material sourcing, location, distance, finishing capabilities, ease of data and location access, product processing capabilities, and marketing capacity.

Table 1 Company Selection

NAMA PERUSAHAAN	NEWHUN (Cimah)	OLAHPLASTIC (Cihapit, Bandung)	PELASTIK (Dago, Bandung)
BIDANG USAHA	RECYCLE	RECYCLE	RECYCLE
PRODUK UTAMA	AKSESORIS, COASTER, JAM TANGAN	COASTER, MEJA, KURSI, AKSESORIS, DEKAY	DOMPET, COASTER, T-SHIRT
PEROLEHAN BAHAN BAKU	WASTE MANAGEMENT	WASTE MANAGEMENT & PERUSAHAAN	WASTE MANAGEMENT & BOTOL MINUMAN
LOKASI	Cimah	Bandung	Bandung
JARAK (dari Telkom University)	20 KM	9,9 KM	13 KM
FINISHING	Berhokur	Halus	Halus

INDIKATOR	NEWHUN (Cimah)	OLAH PLASTIC (Cihapit, Bandung)	PELASTIK (Dago, Bandung)
KEMUDAHAN AKSES DATA	3	5	4
KEMUDAHAN AKSES LOKASI	2	5	4
KEMAMPUAN PENGOLAHAN PRODUK	3	5	4
KEMAMPUAN PEMASARAN	5	4	5
JUMLAH SKOR	13	19	17

(a) (b)

Based on Figure 3 above, it is evident that the company selected with the highest points and meeting the required criteria for this study is UMKM Olah Plastic. Therefore, Olah Plastic is chosen as the subject of observation for this research on plastic waste processing UMKM located in Bandung.

### 2) Company Selection Process

The observation of Olah Plastic was conducted on March 3, 2024, at 2:00 PM WIB, followed by a second observation on March 5, 2024, at 12:00 PM WIB. Both observations took place at Jl. Salam No.10, Cihapit, Bandung City. This observation focused on one of the UMKM located in West Java, Olah Plastic. Olah Plastic is an UMKM that processes plastic waste into products with added value and marketability.

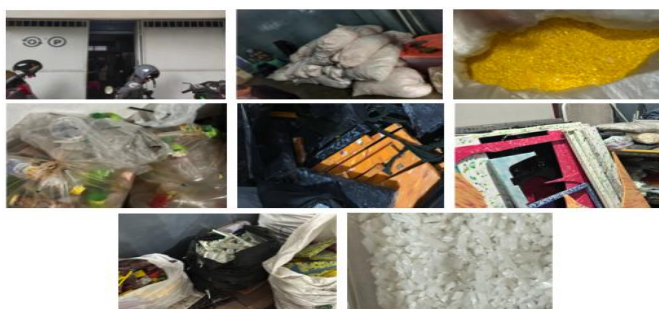


Figure 3. Observation Results of Plastic Processing  
 Source: Author's own work

Based on Figure 4, the observation of Olah Plastic began with a direct visit. At the Olah Plastic office, there was an identification board with the letters "OP" indicating that the building served as Olah Plastic's office. During the researcher's tour around the premises, it was observed from the outside that the garage housed piles of plastic waste materials to be processed, stacks of leftover processed plastic waste products, and heaps of materials ready for use, such as beverage bottles. Additionally, there were shredded raw materials ready for processing.

### 3) Observation ASUS Telkom University

Observations of ASUS at Telkom University were conducted on March 3, 2024, at 2:00 PM WIB, and a second observation was carried out on March 5, 2024, at 12:00 PM WIB. These took place at Telkom University, Bandung City. The observation focused on one of Telkom University's waste management programs, known as ASUS. Among its initiatives is the "Green Campus" program, which aims to process organic and inorganic waste into products of value and marketability.



Figure 4. Waste Processing Media and Processes  
 Source: Author's own work

One of the implementations of the Green Campus program involves processing organic waste using maggots to break down food scraps from the cafeteria, as well as fruit peels from the same source, which are transformed into eco-enzyme cleaners for toilets. Additionally, collected leaf waste is processed into charcoal after undergoing several steps. Meanwhile, inorganic waste is separated and broken down through evaporation processes, with the remaining materials repurposed into plant pots.



Figure 5. Waste Processing Results into Products

Source: Author's own work

Figure 5 above showcases the products created through the Green Campus program. These include plant pots made from the evaporation process, charcoal, and compost derived from the processing of organic waste within Telkom University. Additionally, plastic waste is molded into products through a separation and heating process. Each of these processes results in marketable products that carry significant value.

#### 4) Observations Subdistricts Panyileukan

An observation was conducted on October 21, 2024, at 2:20 PM WIB in Cipadung Kidul and Cipadung Kulon Subdistricts, Panyileukan District, Bandung City. This observation focused on one of the subdistricts located in West Java. Cipadung Subdistrict is notable for its environmental awareness, particularly concerning plastic waste. The local governments of Cipadung Kidul and Cipadung Kulon has implemented several programs to address household waste, both organic and inorganic. These programs process waste to create products with added value and marketability.



Figure 6. Observations Subdistricts Panyileukan

Source: Author's own work

Based on Figure 7, which illustrates the results of the observation in Panyileukan District, particularly Cipadung Kidul and Cipadung Kulon Subdistricts, the study began with direct observation. At the Buruan Sae, organic waste is processed into fertilizers used for cultivating plants such as onions, mustard greens, lettuce, hydroponic crops, papaya, celery, eggplant, chili, raspberry, tomatoes, and basil. The harvested produce is then sold to local residents. During further exploration, piles of plastic waste were observed scattered and mixed with organic waste. According to the informants, plastic waste is collected only once a week, largely due to the residents' lack of awareness regarding waste segregation and the insufficient cooperation among the community in managing waste.

#### D. Interview Data

##### 1) Olah Plastic Interview

The interview was conducted with the CEO of Olah Plastic (Rizal) and the team (Regina and Aldi) at the Olah Plastic operational office located at Jl. Salam, Cihapit, Bandung City. Below are the results of the interview:



Figure 7. Documentation of the CEO & Team

Source: Author's own work

On Tuesday, March 5, 2024, an interview was conducted with Rizal, the CEO of Olah Plastic. From the perspectives of the CEO and employees, it was concluded that the Olah Plastic office comprises five main areas: a display room, a workspace, an owner's office, a production area (garage), and a lounge that also functions as a storage area. The office is staffed by five employees. However, Olah Plastic faces several challenges, including inefficiencies in the collection system, a lack of educational initiatives, limited product innovation, and the accumulation of production waste in the warehouse. These issues negatively affect product quality and hinder innovation. Additionally, the company's operations are not aligned with a zero-waste approach, resulting in the buildup of leftover production waste in the operational warehouse.

## 2) Interview with ASUS Telkom University

The interview was conducted with Irman Noermansyah, the Head of Recording and Asset Management at ASUS (Assets and Sustainability) and the Telkom University Waste Bank, located at Telkom University, Bandung. Below are the results of the interview conducted:



Figure 8. Documentation with ASUS Head of Recording and Asset Management  
Source: Author's own work

On Tuesday, June 11, 2024, an interview was conducted with Irman Noermansyah, Head of Recording and Asset Management at ASUS and the Telkom University Waste Bank. According to Mr. Irman, Telkom University operates as a green campus that implements circular zero-waste management. The Telkom University Waste Bank transforms organic and inorganic waste into valuable products, including compost, charcoal, flower pots, coasters, and maggots for animal feed. These outputs are reinvested into campus operations or sold, demonstrating the principles of a circular economy. However, the primary challenge faced is waste sorting due to limited student awareness, despite the availability of labeled and color-coded bins. As a result, staff must conduct additional sorting at the waste processing site. Despite these challenges, the university continues to innovate by recycling plastic bottles and caps through cleaning, shredding, melting, and molding processes.

## 3) Interview with RW 02, Panyileukan District

The interview was conducted with Mr. Dodi Mochamad, the Subdistrict Secretary, and Mr. Maulana, the Economic Development Officer for Cipadung, at Buruan Sae, located in RW 02, Cipadung Kidul and Cipadung Kulon, Panyileukan District, Bandung City. Below are the summarized findings from the interview:



Figure 9. Documentation with the Team at Buruan Sae

Source: Author's own work

On Monday, October 21, 2024, an interview was conducted with Dodi Mochamad, Subdistrict Secretary, and Maulana, Economic Development Officer, from the Bandung City Government. They explained that Panyileukan District faces significant challenges in waste sorting due to limited facilities, insufficient personnel, and low public awareness about environmental issues. Organic waste in the district is processed into compost through Buruan Sae, a government agricultural program that cultivates various crops such as lettuce, chilies, and tomatoes, with the harvests sold locally. However, inorganic waste is only sold to collectors because the government has difficulty developing products and innovations from plastic waste to promote a circular economy.

#### E. Internal Analysis

Internal analysis is conducted to identify the strengths and weaknesses of the Olah Plastic UMKM, which will be used to determine the strategies applied in this research. The following is the internal analysis that has been carried out:

Tabel 2 Analysis

	STRENGTH	WEAKNESS
ASET & INFRASTRUKTUR PERUSAHAAN	1. Memiliki kantor dan pabrik sendiri. 2. Memiliki teknologi <i>press</i> dan <i>heater</i> sendiri.	1. Jenis mesin Olah Plastic yang terbatas.
BUDAYA PERUSAHAAN	1. Memiliki komitmen terhadap inovasi dalam menghasilkan papan yang berkualitas. 2. Terbuka untuk berkolaborasi antar tim guna menciptakan lingkungan yang suportif.	1. Jumlah karyawan yang terbatas mengakibatkan ikut campurnya divisi lain terutama dalam hal desain.
KENDALA SDM	1. Karyawan memiliki background yang sesuai dengan jabatan yang diemban. 2. Memiliki kemampuan dalam berkolaborasi antar tim dalam menghasilkan produk yang berkualitas.	1. Kurangnya pengembangan perusahaan dalam bidang <i>workshop</i> untuk meningkatkan kemampuan karyawan.
KENDALA PRODUKSI	1. Jaringan suplai dan distribusi baik dan semi tetap. 2. Memiliki tanggung jawab terhadap lingkungan dan sosial dengan pemisahan kantor dan pabrik berdasarkan areanya.	1. Produksi yang dilakukan Melalui tersertifikasi. 2. Pemasokan bahan baku yang tidak stabil. 3. Produksi CNC masih tergantung pada pabrik lain. 4. Limbah sisa produksi terbilang cukup banyak.
KENDALA PEMASARAN	1. Pemasaran hanya melalui <i>mouth to mouth</i> baik reputasi perusahaan dan kualitatif produk papa yang dihasilkan.	1. Bergantung pada penjualan online tanpa adanya strategi pemasaran. 2. Kurang aktif dalam mengenalkan produk Olah Plastic.
KENDALA PEMODALAN	1. Terlalu banyaknya project B2B yang membuat perputaran <i>cost</i> produksi lebih cepat dan terjamin. 2. Adanya produk unggulan terbuat dari olahan sampah plastik menjadi papan yang menjadi pemasukan tetap	1. Pemodalan bergantung pada perseorangan yang mempengaruhi keuangan perusahaan.
RELASI PEMASOK	1. Memiliki pemasok tetap dari pengepul dan dari perusahaan.	1. Pemasok terkadang tidak dapat memenuhi kuantiti yang dibutuhkan oleh Olah Plastic.
NERACA LABA-RUGI	1. Olah Plastic memiliki dirisi <i>finance</i> sendiri dalam perusahaanya.	1. <i>Finacial</i> perusahaan masih dikelola oleh satu orang.

Based on Table 2, the internal analysis highlights several issues faced by Olah Plastic MSME, including challenges related to company assets and infrastructure, corporate culture, human resource constraints, production obstacles, marketing difficulties, processing challenges, supplier relationships, and the balance sheet of profits and losses. These factors are mapped as strengths and weaknesses. One notable issue is marketing, where Olah Plastic relies solely on word-of-mouth promotion. Additionally, production challenges include unprocessed waste residues from their operations. Therefore, Olah Plastic has been selected as the subject of observation for plastic waste processing UMKM in Bandung.

#### F. SWOT Analysis

This study uses SWOT analysis to evaluate the plastic waste processing carried out by Olah Plastic UMKM, aiming to identify its strengths, opportunities, weaknesses, and threats. Based on this analysis,

opportunities can be developed, while weaknesses and threats can be addressed. Below is the SWOT analysis of Olah Plastic:

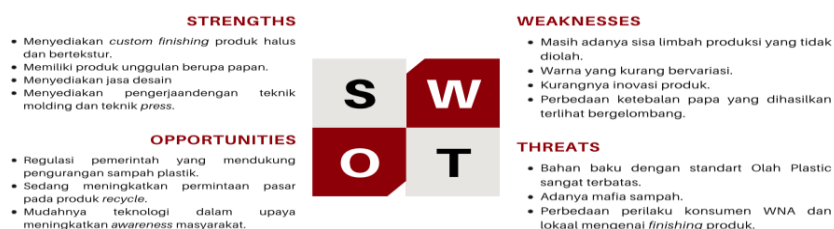


Figure 10. SWOT Analysis  
 Source: Author's own work

The analysis shows that Olah Plastic's strength lies in its flagship product, the board, which is considered superior to competitors due to research on thickness, durability, and finishing processes. However, Olah Plastic faces weaknesses, such as competitors having better machinery and financing, allowing them to produce a wider variety of products. With the growing market demand for recycling, Olah Plastic is expected to increase awareness of its products and values, supported by more research and innovation. A major threat is the rise of waste mafia groups driving up plastic waste prices, which in turn increases the cost of recycled products due to raw material shortages. Additionally, changes in consumer behavior may reduce interest in recycled products due to high prices, especially among domestic consumers.

Combining strengths with the opportunity of government regulations and a predicted market demand increase (2024-2030), Olah Plastic can capitalize on its flagship products. However, the company must address the threat of the Indonesian market's high standards and the weakness of not implementing a zero-waste system, leading to production waste affecting the environment.

### G. Brainstorming Problems

This study uses brainstorming to analyze the challenges faced by Olah Plastic in terms of operations, finance, and marketing. The problem brainstorming analysis will be examined in-depth to explore the available opportunities in this research. Below is the problem brainstorming analysis of Olah Plastic:

Tabel 3 Grouping Problems in Plastic Processing

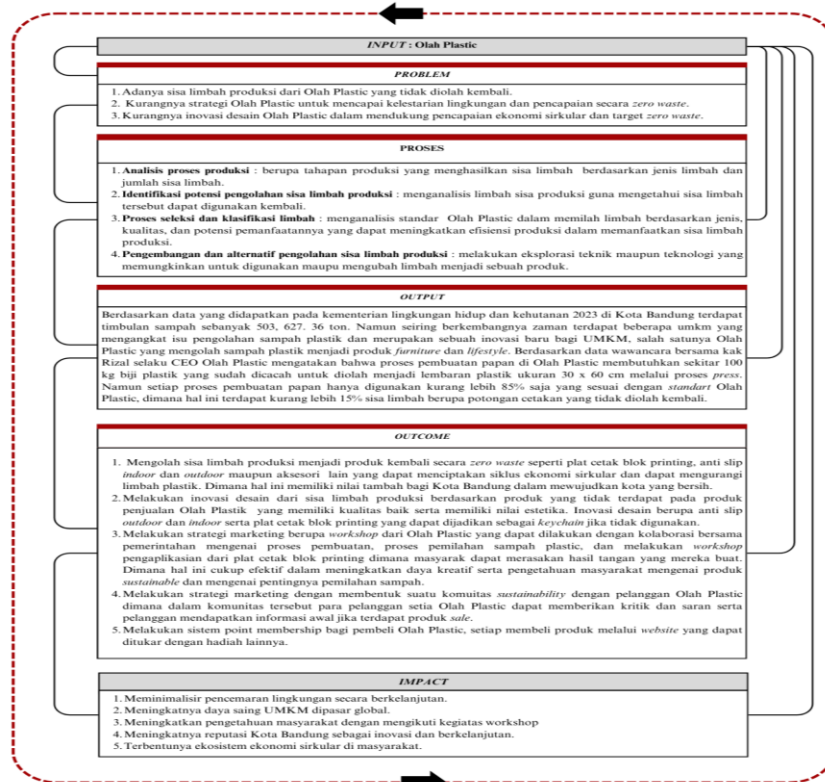
PERMASALAHAN	KETERANGAN
OPERASIONAL	<ol style="list-style-type: none"> <li>1. Kurangnya perolehan bahan baku yang sesuai dengan standar Olah Plastic.</li> <li>2. Kurangnya ketersediaan bahan baku yang sesuai standar konsumen dalam variasi pilihan warna.</li> <li>3. Kurangnya kemampuan mesin dalam mengontrol toleransi ketebalan pada produk jenis <i>board</i> atau papan.</li> <li>4. Kurangnya kemampuan memilah dan mengolah sampah berdampak pada kualitas produk yang dihasilkan.</li> <li>5. Sedikitnya pengumpulan limbah plastik yang terdapat di <i>coffee shop</i>, karena banyaknya pesanan <i>takeaway</i>.</li> <li>6. Kurangnya riset Olah Plastic dalam meminimalisir <i>product defect</i> atau cacat.</li> <li>7. Lamanya estimasi pembuatan molding 3 - 4 minggu yang disesuaikan dengan rumitnya desain molding.</li> <li>8. Adanya batasan estimasi pemakaian cetakan molding dengan maksimal pencetakan 1000 pcs untuk setiap desain.</li> <li>9. Adanya potensi bahan terbakar jika bahan yang digunakan tidak sesuai dengan standar Olah Plastic.</li> <li>10. Kurangnya jenis bahan yang digunakan untuk teknik molding yang masih sebatas plastik jenis <i>Polypropylene</i>.</li> <li>11. Adanya limbah sisa hasil produksi dari Olah Plastic yang belum diolah kembali sehingga terjadi penumpukan.</li> <li>12. Warna yang mudah luntur ketika tidak di <i>finishing</i> dengan cara yang benar sehingga berpengaruh terhadap kualitas produk.</li> <li>13. Adanya sisa limbah produksi yang menumpuk di gudang dan tidak digunakan kembali.</li> </ol>
FINANCE	Adanya mafia sampah yang membuat harga bahan baku fluktuatif.
MARKETING	<ol style="list-style-type: none"> <li>1. Harga bahan baku yang mahal membuat Olah Plastic enggan memasarkan produknya secara B2C karena melihat pasar yang belum mampu menerima produk <i>recycle</i> dengan harga yang mahal.</li> <li>2. Ketergantungan oleh approach B2B.</li> <li>3. Kurangnya kemampuan team dalam membaca trend yang ada untuk produk yang akan dijual.</li> <li>4. Kurangnya edukasi pemulung dalam pemilahan sampah plastik berdasarkan bahan plastik.</li> <li>5. Kurangnya support dari pemerintah.</li> <li>6. Kurangnya pemahaman brand lain terhadap TnC kolaborasi Olah Plastic.</li> <li>7. Desain molding hasil kolaborasi tidak dapat digunakan kembali untuk dikomersilkan karena bersifat eksklusif.</li> </ol>

Based on Table 3, derived from observations, interviews, and analyses, the identified problems are categorized into operational, finance, and marketing issues that can be addressed within the design field. The problems related to operations and finance cannot be solved within the scope of design. However, this research also delves deeper into operational issues, such as the accumulation of production waste at Olah Plastic that has not been processed, leading to waste buildup. Regarding marketing, the study

discusses the lack of education for waste pickers on sorting plastic waste by material type. This is linked to public awareness levels and a lack of education, partly due to limited access to information. These issues indicate a lack of education and information, resulting in low public awareness of plastic waste management and sorting practices.

#### H. Drawing Conclusion

Based on the analysis of the research findings, the study proposes solutions for Olah Plastic in the form of strategic recommendations derived from the combination of the company's "Weaknesses" and "Opportunities." The WO (Weakness-Opportunity) strategies will serve as the foundation for these recommendations. Below are the proposed strategies for Olah Plastic



Scheme 1 T  
 (Theory Of Change)

OC Strategy

Based on Scheme 1, it can be concluded that the Theory of Change (TOC) strategy is applied in this research through the analysis of input, problem, process, output, outcome, and impact. According to the data collected, the input for this study is Olah Plastic, which faces challenges including unprocessed production waste, a lack of strategies to achieve environmentally sustainable zero-waste production, and limited design innovation. Therefore, the proposed processes include production process analysis, identification of waste management potential, waste selection and classification, and the development of alternative production waste processing methods. The output of this research uses data from the Ministry of Environment and Forestry in 2023, which recorded a total waste volume of 503,627.36 tons. One relevant small business, Olah Plastic, transforms plastic waste into furniture and lifestyle products. According to an interview with the CEO of Olah Plastic, Rizal, producing a 30x60 cm plastic board requires approximately 100 kg of plastic pellets, with each production cycle still generating about 15% waste in the form of leftover pieces. The proposed outcome for this research is the implementation of zero-waste production strategies to create a circular economy cycle. This includes introducing design innovations not currently available in Olah Plastic's catalog, such as block printing molds that can be used in workshops and repurposed as keychains when no longer needed. Another proposed innovation is anti-slip design for both indoor and outdoor use, featuring textured aesthetics and marketable value. Additionally, a marketing strategy involving workshops in collaboration with the government is recommended. These workshops aim to provide hands-on experiences in waste processing and sorting, enhancing creativity and public awareness of sustainable products and the importance of waste management.

Furthermore, this study recommends establishing a sustainability community comprising Olah Plastic customers and individuals interested in sustainable products. This community would assist Olah Plastic in evaluating its business performance by providing feedback and suggestions while offering members early access to product launches and special offers. Additionally, implementing a membership point system on Olah Plastic's website could enhance customer loyalty. Points earned from purchases could be redeemed for rewards or other products. The anticipated impact of these strategies includes reducing environmental pollution sustainably, increasing Olah Plastic's competitiveness in the global market, raising public awareness and knowledge through workshops, enhancing Bandung's reputation as an innovative and sustainable city, and fostering a circular economy within the community.

The application of the Theory of Change (TOC) in this research is appropriate as it provides a comprehensive framework for addressing environmental issues faced by Olah Plastic. TOC enables long-term goal identification by connecting actionable strategies. Therefore, the proposed design recommendations need to be clearly visualized to effectively achieve the desired outcomes of this study. The following are the proposed design recommendations:

### 1) Recommended Model for Anti Slip Indoor and Outdoor Surface

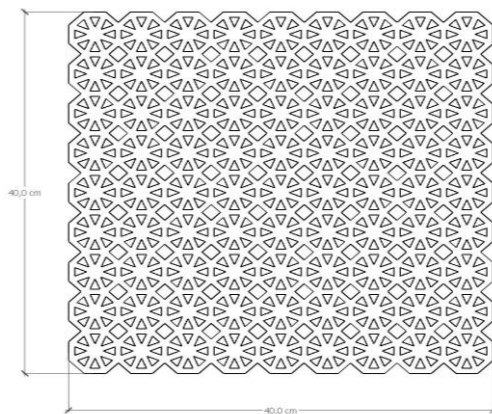


Figure 11. Initial Sketch of Anti Slip Indoor and Outdoor  
Source: Author's own work

Based on Figure 13, the initial sketch of the indoor and outdoor anti-slip surface is presented as a visualization of the outcome in this research, with dimensions of 40 cm x 40 cm. The design incorporates multiple holes that act as grips to prevent slipping, making it suitable for both indoor and outdoor spaces. According to data from Olah Plastic, they currently do not offer an anti-slip product for indoor and outdoor use, presenting an opportunity for product innovation. The anti-slip innovation used in this research visualization is a new product concept for Olah Plastic, making it a potential product recommendation for the company.



Figure 12. Visualization of Anti Slip Indoor and Outdoor  
Source: Author's own work

Based on Figure 14, the visualization of the application of the anti-slip product for both outdoor café areas and indoor bathroom spaces can feature either a smooth or rough texture, depending on the needs

of each room. The product also adopts the same patterns as Olah Plastic's products to create harmony. The product is visualized in 3D to give a clear picture of how the anti-slip product will be applied in both indoor and outdoor spaces. This is important because the anti-slip product is made from Olah Plastic's production waste. With variations in texture, pattern, and functionality, the product offers added value that can enhance marketability and supports the circular economy while reducing environmental impact.

This anti-slip model has several advantages, including a surface that can be customized with finishes according to customer preferences. Additionally, the anti-slip boards are designed to be detachable, making cleaning easier. The texture on the boards also helps reduce the risk of slipping, particularly in bathrooms and outdoor spaces. This innovation uses production waste materials, supporting the acceleration of SDG 11.9, and contributes to the circular economy. However, there is a limitation to this model: the color of the anti-slip boards may fade when used outdoors for extended periods, requiring careful selection for long-term outdoor use.

2) Recommended Model for Block Printing Plate Design

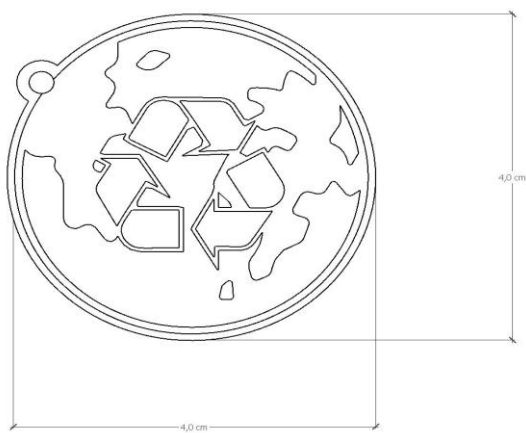


Figure 13. Initial Sketch of Anti Slip Indoor and Outdoor  
Source: Author's own work

Figure 11 presents an initial sketch of the block printing plate design, serving as a visualization of the outcome in this study. The plate measures 4 cm x 4 cm and is designed with a modular concept. This design allows the plate to be repurposed as a keychain when it is no longer used for block printing. The modular block printing plate is intended for repeated use, aligning with the sustainability principles promoted in this research, thereby reducing new waste and preventing resource wastage. This innovative block printing plate design is a product not yet available in the Olah Plastic catalog, making it a potential recommendation to expand their product range. The design emphasizes aesthetic value, functionality, and high marketability. To enhance understanding and clarify the proposed strategies, a 3D visualization is used to provide a more concrete depiction and support the implementation of this study's findings.



Figure 14. Visualization of Block Printing Plate  
Source: Author's own work

Based on Figure 4.12, the visualization of the block printing plate is designed by incorporating a recycling logo within the 3D model, reflecting the sustainability concept. The design adopts textures and patterns

that are similar to Olah Plastic's products, and the 3D visualization displays the plate from the front, side, and top views to clearly show its thickness. The texture, pattern, and color used are consistent with Olah Plastic's products, and the plate is made from unprocessed production waste, further supporting sustainability. This design not only enhances the market value through its aesthetic and functional elements but also allows the block printing plate to contribute to a circular economy by helping to reduce waste and minimize environmental impact.

The model offers several advantages. It presents a unique design innovation that is not available from competitors. The modular concept allows the plate to be repurposed as a keychain once it is no longer used for printing. Its reusable design also supports workshops that help raise public awareness about sustainable products. Additionally, the texture of the plate creates attractive patterns when applied, enhancing its aesthetic value. By utilizing discarded production waste, it contributes to a circular economy and supports the achievement of SDGs, particularly goal 11.9, by promoting innovation using production waste.

However, there are some limitations to the block printing plate model. The production costs are higher due to the use of molding techniques instead of press printing. Furthermore, the application of color on fabric media is limited, as only one color can be used, which may reduce the flexibility of the design.

#### I. 4P Marketing Strategy

Based on the research findings, a marketing strategy adopting the 4P marketing mix concept – product, price, place, and promotion – is formulated as a framework for developing effective marketing strategies for products made from recycled production waste. This strategy is designed to enhance the competitiveness and optimize the marketing of sustainable products created by Olah Plastic SMEs. The following outlines each element of the 4P strategy:

##### 1) Product



Figure 15. Visualization of Anti Slip Indoor and Outdoor & Block Printing Plate Cetak Block Printing

The products created from production waste by UMKM Olah Plastic are designed with a focus on functionality, aesthetics, and high market value through innovative design. One of the recommended product developments in this study is the production of anti-slip mats and block printing plates as exemplary product models. Therefore, the marketing strategy is centered on enhancing the quality of waste-based products by considering appealing and sustainability-oriented designs to boost consumer interest. Additionally, product diversification aligned with market needs and preferences is a key step in expanding market reach and strengthening product positioning.

##### 2) Price

The determination of the cost of production for waste-based products manufactured by UMKM Olah Plastic, including anti-slip products for indoor and outdoor use and block printing plates, aims to set competitive prices aligned with the targeted market segment. In this study, cost analysis was conducted to identify the production expenses associated with each product unit. This approach provides a robust

foundation for developing an optimal pricing strategy, reflecting the product's value while meeting market expectations focused on sustainability and innovative design:

a. Cost of production of indoor and outdoor anti-slip

HPP			
MATERIAL NAME	QUANTITY	UNIT PRICE	AMOUNT
Plat cetak block printing	1 pcs	50.000/pcs	50.000
Carabiner or bag hook	1 pcs	1.500/pcs	1.500
Packaging	1 pcs	3.000/pcs	3.000
<b>TOTAL</b>			54.500

TOTAL PRODUKSI	JUMLAH
4 Product anti slip indoor dan outdoor x 1.223.000	4.892.000
<b>TOTAL</b>	4.892.000

Selling price

$$1.223.000 + (1.223.000 \times 20\%) = 1.223.000 + 1.467.600 = 2.690.600$$

Berdasarkan analisis harga pokok produksi, produk anti-slip untuk kebutuhan indoor dan outdoor dengan ukuran 40 x 40 cm memiliki harga jual yang dibulatkan menjadi Rp 2.691.000. Tingginya harga per unit produk ini disebabkan oleh penggunaan material yang berasal dari limbah produksi, yang memberikan nilai tambah berupa aspek keberlanjutan. Selain mendukung konsep ramah lingkungan, produk ini dirancang dengan mempertimbangkan nilai fungsional, estetika, serta daya jual yang tinggi. Kombinasi atribut tersebut menjadikan produk anti-slip sebagai solusi inovatif yang sejalan dengan prinsip ekonomi sirkular dan berpotensi menarik minat konsumen yang peduli terhadap keberlanjutan.

b. Cost of production of block printing printing plates

HPP			
MATERIAL NAME	QUANTITY	UNIT PRICE	AMOUNT
Block printing printing plate	1 pcs	50.000/pcs	50.000
Carabiner atau kait tas	1 pcs	1.500/pcs	1.500
Packaging	1 pcs	3.000/pcs	3.000
<b>TOTAL</b>			54.500

TOTAL PRODUCTION	AMOUNT
20 Product plat cetak block printing x 54.500	1.090.000
<b>TOTAL</b>	1.090.000

Selling price

$$54.500 + (54.500 \times 20\%) = 54.500 + 65.400 = 119.900$$

Based on the cost of production analysis, the block printing plate measuring 4 x 4 cm is priced at Rp 120,000 after rounding. The relatively high unit price is influenced by the use of recycled production waste materials, adding sustainability value to the product. In addition to providing an eco-friendly solution, this product also excels in terms of functionality, aesthetics, and high commercial value. These added values position the block printing plate not only to meet market demand for innovative products but also to support sustainable design principles in the development of recycled-based products.

### 3) Place

The distribution strategy (place) in this study is designed to ensure that recycled products are optimally accessible to the target market. The distribution approaches aim to enhance market reach while ensuring efficiency in delivering products to the appropriate consumers. The following are the proposed distribution methods in this research:

- a. Direct distribution involves selling products directly to consumers through participation in creative product exhibitions, environmental bazaars, and events that promote recycled goods. Additionally, UMKM Olah Plastic can leverage physical stores as a distribution channel, either by establishing their own retail space or collaborating with local shops specializing in sustainable and innovative products.
- b. Digital distribution leverages online platforms to expand market reach more effectively. Marketing through e-commerce facilitates a more efficient sales process using marketplaces such as Tokopedia, Shopee, and Bukalapak. Additionally, social media platforms like Facebook and TikTok are utilized for both promotional activities and direct sales, enhancing product visibility and consumer engagement on a broader scale.
- c. Distribution through partnerships involves strategic collaboration with third parties that support eco-friendly initiatives. This includes leveraging concept stores and eco-friendly boutiques that specialize in recycled and innovative design products, where goods can be consigned for sale. Additionally, partnerships with environmental communities and social organizations promoting sustainable lifestyles can broaden market reach. Collaborating with cafes or creative galleries offers another effective opportunity, as these venues are frequently visited by young people and design enthusiasts with a strong interest in sustainable and innovative products.
- d. Distribution through CSR programs or government initiatives serves as a strategic approach to expanding the reach of recycled products. Products can be delivered through corporate social responsibility (CSR) initiatives aimed at promoting environmental sustainability. Additionally, leveraging government programs focused on waste management and the adoption of recycled products at city or national levels plays a critical role in fostering broader acceptance of eco-friendly solutions.

Therefore, this study formulates a distribution strategy that can be evaluated to understand how the current distribution channels enhance sales, expand product accessibility, and optimize the environmental impact of Olah Plastic products. The strategy also aims to assess the efficiency of distribution from a sustainability perspective while ensuring broader market reach, both locally and internationally.

### 4) Promotion

The promotional strategy in this study focuses on communication efforts aimed at raising public awareness about the importance of sustainable products. One key approach is utilizing social media

platforms for environmental awareness campaigns, particularly regarding the use of eco-friendly recycled products. This strategy includes creating product narratives that highlight the transformation process of Olah Plastic's production waste into high-value goods. Additionally, collaborations with influencers and communities supporting sustainable environmental initiatives are strategic measures to enhance the promotion of products, such as block printing plates and indoor-outdoor anti-slip mats.

Hence, this study adopts the 4P marketing strategy integrated into process and output elements. This approach aims to comprehensively evaluate marketing components to optimize the utilization of production waste. One of its primary focuses is to create innovative, appealing, and sustainable products, which are expected to enhance competitiveness and support the sustainability of UMKM Olah Plastic in Bandung City.

## J. Target Marketing

Based on the analysis of the 4P marketing strategy in this study, market targeting was mapped to identify segments that provide optimal impact on the sustainability of Olah Plastic's business while ensuring product alignment with the intended market needs. The identified market segmentation and target audiences are as follows:

### 1. Market Segmentation

The market segmentation in this study is categorized into the following:

**Demographic:** Individuals, both male and female, aged 18 to 45 years with a middle to upper-income level, including students, university students, and professionals who are environmentally conscious

**Geographic:** Consumers located in Bandung and other urban areas with a high level of environmental awareness.

**Psychographic:** The target market embraces a minimalist lifestyle and eco-consciousness, with a focus on waste reduction, sustainability, and the use of eco-friendly products.

**Behavioral:** Consumers who seek innovative products made from recycled materials, with a tendency to support social and circular economy initiatives.

### 2. Target Market

Based on the identified market segmentation, the relevant target market for UMKM Olah Plastic includes several strategic groups:

**Government and Private Institutions:** Encompassing local government agencies and organizations supporting waste management initiatives and creative economy development rooted in recycling.

**Educational Institutions and Social Communities:** Schools, universities, and social organizations that contribute to raising awareness about environmental preservation and education on plastic waste management.

**Creative Communities and Unique Design Enthusiasts:** Consumers who appreciate innovative designs made from recycled materials, focusing on products such as anti-slip mats for indoor and outdoor use and block printing plates with high aesthetic value.

**Environmentally Conscious Consumers and Eco-friendly Product Enthusiasts:** Individuals actively seeking sustainable and eco-friendly alternatives made from recycled materials.

Therefore, this research develops strategies to reach the target market through effective promotional approaches. One proposed initiative involves organizing workshops in collaboration with government entities and environmental communities. These workshops will focus on education regarding sorting, processing, and the application of sustainable lifestyle practices. This initiative aims to enhance public awareness of the importance of environmental sustainability. Additionally, public education programs

can be implemented to highlight the social and environmental benefits derived from the use of Olah Plastic products.

#### K. Problem Validation

The issues identified through categorization, including operations, finance, and marketing, were directly validated by Olah Plastic through observations and interviews. The main problem faced by Olah Plastic is the accumulation of production waste that is not processed, leading to a buildup in the warehouse. Additionally, there is a lack of product variety and insufficient education on sorting different types of plastic waste. As a result, a strategy mapping was conducted based on the combination of “Weakness” and “Opportunity,” with the outcome of the WO combination forming strategic recommendations for Olah Plastic to address the current issues. To better understand the outcomes and impacts of the strategies, the Theory of Change (TOC) approach was applied, helping identify the most suitable strategies for implementation and recommendation. Consequently, a strategy model was recommended using production waste materials from Olah Plastic, visualized in 3D, with patterns and textures tailored to Olah Plastic’s products. Therefore, the product visualization and innovation can serve as valuable recommendations for Olah Plastic.

The TOC strategy is also applied to address the marketing challenges faced by Olah Plastic, leading to strategic recommendations aimed at boosting sales and enhancing the brand image. One of the proposed strategies is the implementation of workshops in collaboration with the government, focusing on waste sorting, processing, and application. This initiative can help increase public awareness about the importance of sustainability for the environment. Additionally, a sustainability community of loyal Olah Plastic customers is recommended, allowing them to provide feedback and suggestions. This community would also benefit from early access to information about product sales. Furthermore, a membership points system is suggested for Olah Plastic customers, where every purchase through the website earns points that can be redeemed for other rewards. These recommendations can serve as effective marketing strategies for Olah Plastic.

The Theory of Constraints (TOC) strategy is also applied to address marketing challenges faced by Olah Plastic. Consequently, this study offers marketing strategy recommendations aimed at boosting sales and enhancing brand visibility. One recommendation involves conducting workshops in collaboration with the government, focusing on educating the public about sorting, recycling processes, and their applications to raise awareness of environmental sustainability. Additionally, forming a sustainability community of loyal Olah Plastic customers can provide feedback and suggestions, while also offering perks like early access to sale products. Another suggested strategy is implementing a membership point system, where customers earn points for purchases made via the website, which can be redeemed for rewards. These strategies are expected to form an effective marketing approach for Olah Plastic. Moreover, the 4P marketing strategy and target market analysis in this study are designed to evaluate marketing elements that support the optimization of production waste utilization and extend market reach through well-planned promotional efforts.

#### IV. CONCLUSION

The conclusions of this research are as follows :

- 1) Based on the conclusions of this study, the data obtained regarding the plastic waste processing practices of the Olah Plastic SME show a significant impact on the environment. Olah Plastic implements six stages in processing plastic waste collected from suppliers and partner companies. The first stage involves gathering materials such as bottle caps and vape caps from waste collectors and waste trading networks. This is followed by sorting the materials and then washing them to meet Olah Plastic’s quality standards. After cleaning, the plastic waste is shredded into smaller pieces, which are then melted in the next stage. At this point, two techniques are applied: molding and press methods.

The press and molding techniques produce various items, including plastic boards that can be transformed into furniture, while the molding method is primarily used to create lifestyle products. Despite generating some production waste, Olah Plastic maintains high-quality products with aesthetic and commercial value. Through its waste processing system, Olah Plastic significantly minimizes the environmental impact of plastic waste, contributing to the annual reduction of plastic waste in Indonesia.

Additionally, Olah Plastic successfully implements a circular economy model and supports the achievement of Sustainable Development Goals (SDGs).

2) Based on the findings of this study, an effective waste management strategy for Olah Plastic in achieving zero waste targets is the application of the Theory of Change (TOC) approach. This strategy is designed to promote environmental sustainability and was developed through internal analysis, SWOT analysis, and brainstorming sessions. The conclusion indicates that implementing TOC yields outcomes such as processing production waste into new products with zero waste, including block printing plates and anti-slip mats for indoor and outdoor use. These innovations create a circular economy that reduces production waste while adding value to Bandung's efforts in becoming a clean and sustainable city.

In addition, product innovation using production waste must emphasize high quality and aesthetic appeal. Marketing strategies are crucial for enhancing branding and increasing sales. Suggested marketing strategies include conducting collaborative workshops with government institutions to raise public awareness about the importance of waste sorting, waste processing, and its practical applications. Another recommendation is establishing a sustainability community for Olah Plastic customers, where members can provide feedback and gain early access to sale information. Additionally, a membership point system is proposed, allowing customers to earn points from purchases made through the website, which can be redeemed for exclusive Olah Plastic merchandise, fostering customer loyalty.

Through this approach, waste-based products can gain high market value while simultaneously promoting environmental sustainability and broadening consumer appeal. Based on the implementation of the 4P marketing strategy, this study maps out the target market to enhance the sustainability of the Olah Plastic business, focusing on a demographic segment of individuals aged 18 to 45 with middle to upper income levels and professions that are environmentally conscious. Geographically, the market includes Bandung City and other urban areas with a high level of environmental awareness. Psychographically, the target audience comprises consumers with a minimalist and eco-conscious lifestyle, while their behavioral tendencies lean toward supporting innovative products made from recycled waste. Key target markets include government agencies, educational institutions, creative communities, and environmentally aware consumers. Proposed promotional strategies include collaborative workshops with various stakeholders and public education programs highlighting the social and environmental benefits of Olah Plastic products.

3) Based on the findings of this study, the waste management strategy using the circular economy and zero-waste concepts for Olah Plastic SMEs resulted in two recommended models that utilize 15% of unprocessed production waste. This remaining waste has the potential to be developed into new products that support zero waste, thereby creating a circular economy. The strategy was analyzed using the Theory of Change (TOC) approach to identify effective methods for processing production waste. One proposed strategy is transforming waste into new products, such as block printing plates, which serve as a recommended development model for Olah Plastic to build a circular economy ecosystem and reduce environmental pollution sustainably.

The block printing plate model is designed with a modular system, allowing it to be repurposed as a keychain once its printing function ends. This model offers advantages, including a unique design innovation not found among competitors. It can also serve as an educational tool in workshops to raise public awareness about sustainable products. With its customizable texture and patterns that create attractive prints, the block printing plate has economic value, supporting circular economy cycles and reducing unused production waste. This model aligns with the achievement of SDGs, particularly SDG 11.9. However, the model has limitations, such as higher production costs due to molding rather than press printing and restricted color application on fabric, allowing only one color.

Additionally, the recommended anti-slip model for indoor and outdoor use incorporates textures and patterns inspired by Olah Plastic's products. This model can be customized to fit different room requirements, with textures adaptable to customer preferences. Its benefits include adjustable surface finishes, modular design for easy cleaning, and the ability to reduce the risk of slippery floors in bathrooms and outdoor spaces due to its textured surface. Like the block printing plate, this model also supports

innovation using production waste, contributes to the circular economy, and advances SDG 11.9. The primary drawback of the anti-slip model is that its color may fade when used in outdoor spaces.

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