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Ecodesign Practices in Plastic Waste Processing: A Design Study of Social Transformation and Environmental Sustainability at PASTE LAB Yogyakarta

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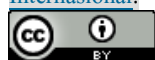
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ABSTRACT

The increasing problem of plastic waste and public awareness of environmental sustainability have encouraged the growth of creative industries based on recycling. One player in this industry is PASTE LAB Yogyakarta, which processes plastic waste into various eco-design products that have both functional and economic value. This study aims to analyze the production practices of eco-design products made from recycled plastic waste at PASTE LAB Yogyakarta from the perspectives of eco-design, circular economy, social transformation, and the community concept. The theories used include Eco-Design Theory, Circular Economy Theory, Social Transformation Theory, and Community Concept. The research uses an ethnographic method with a qualitative approach. Data collection techniques include observation, interviews, documentation, and literature studies. The results show that PASTE LAB processes types of plastic waste such as HDPE, PP, LDPE, and PS into furniture, interior decorations, and accessories through production processes based on recycling. The practice reflects the application of eco-design and circular economy principles because waste is reprocessed into materials and useful products. In addition, environmental education activities and the provision of drop boxes also encourage community involvement in waste management. However, PASTE LAB still faces challenges such as limited raw materials, production technology, capital, and industry competition

INTRODUCTION

Global awareness of the importance of environmental sustainability has significantly increased over the past few decades. Climate crises, plastic waste accumulation, ecosystem degradation, and excessive exploitation of natural resources have pushed the emergence of various new approaches that are more sustainability-oriented. In this context, the circular economy and eco-design have developed as alternative paradigms to the linear economic model that has long dominated modern production practices.

In Indonesia, environmental issues are becoming increasingly urgent and need to be addressed collaboratively. Quoting from the

Buleleng Bali Environmental Agency website on a post dated October 15, 2019, it emphasizes that environmental damage not only threatens the sustainability of natural resources but also directly affects human quality of life (Environmental Agency, 2019). Nature is the main source providing air, water, food, and livable space. Therefore, environmental damage means a decline in the overall carrying capacity for human life. Public awareness of this condition is also increasing. An Ipsos Global survey (2023) shows that around 80% of Indonesians recognize the urgency of real action in facing the climate crisis and support sustainability policies that involve broad community participation (Ipsos Global, 2023).

The country's commitment to environmental sustainability has been emphasized through various national regulations. The 1945 Constitution of the Republic of Indonesia Article 28H paragraph (1) guarantees every citizen the right to a good and healthy environment, while Article 33 paragraph (4) states that the organization of the national economy must be carried out based on the principles of sustainability and environmental insight (Fasa, 2021). These principles were later reinforced through Law Number 18 of 2008 on Waste Management and Law Number 32 of 2009 on Environmental Protection and Management, which regulate the reduction, handling, and systematic, sustainable management of waste (Fasa, 2021).

In practice, the Indonesian government has also started steering development towards a circular economy approach. Through the 2020–2024 National Medium-Term Development Plan (RPJMN) and Presidential Regulation No. 97 of 2017 on the National Policy and Strategy for Household Waste Management, the government encourages the development of an integrated waste management system, waste reduction, and the growth of green industries (Fasa, 2021). Plastic has become one of the priority sectors in implementing the national circular economy due to its high waste volume and ecological impact.

However, various studies show that the implementation of waste management policies in Indonesia still faces many challenges. This is reinforced by Quraisy's 2025 study, which states that there is still a gap between existing policies and their implementation on the ground (Quraisy, 2025). The gap between regulations and actual practice is still quite visible, especially in terms of community participation, infrastructure availability, environmental education, and the sustainability of community-based waste management systems. This situation is particularly noticeable in the Special Region of Yogyakarta, especially following the closure of the Piyungan Final Disposal Site (TPA), which had been the center of regional waste management for many years. The closure of the Piyungan landfill has created a garbage emergency

that directly affects the community, increases household waste volume, and strains the capacity of TPS-3R facilities to handle urban waste. Even ecologically, these piles of plastic waste risk contaminating groundwater and increasing fire hazards, similar to what has happened at other landfills in Indonesia (Zahrah et al., 2024).

Amid these conditions, various community-based initiatives have emerged, aiming to create independent and sustainable waste management alternatives. One of them is PASTE LAB Yogyakarta, an interdisciplinary creative lab that integrates art, design, science, and environmental sustainability in plastic waste processing practices. According to the Pastelab Company Profile, the types of processed products include: Furniture Sets such as tables (various Stool and Low Table designs), chairs, trash bins, bar tools, and some promotional signs like billboards. Then there's Exterior Façade and The Samirano, which serve as window curtains or 'Krepyak' for the front and back exterior of buildings. For Convention & Exhibition purposes, PASTE LAB produces stages, stools and tables, event ID cards, box sets, and trophies. There are also merchandise products like wireless chargers, phone holders, keychains, combs, mirrors, tissue holders, coasters for cups/tumblers, Quran stands, and wall clocks. For custom products, PASTE LAB has made rocking horse toys as interior complements for hotels or home spaces. PASTE LAB is committed to sustainability and creativity, ensuring that every product they produce is unique and eco-friendly. For example, they use natural colors from waste materials. This way, PASTE LAB not only reduces the need for extra dyes but also showcases the beauty of recycled materials. This has become one of their recycled waste product design innovations. Currently, users of PASTE LAB's design products include PLN, Pertamina, Bank Indonesia, Ministry of Finance, Sucofindo. For the private sector, users keep increasing, including CIMB Bank, OCBC, Jokopi, Kopi Kenangan, Es Kopi, Erha, Toyota, Novotel, Sinarmas Land, Kitabisa.com, Kontan, Erajaya, and so on (Pastelab, 2025).

The cultural space run by PASTE LAB plays a dual role. On one hand, it acts as a producer of eco-design, and on the other, PASTE LAB serves as a community facilitator. They encourage local residents to bring household plastic waste to the studio as raw material for recycling, which is a direct implementation of micro-scale circular economy that has become a habit. The products created are not only aesthetically valuable but also carry a strong narrative about environmental responsibility. PASTE LAB believes that by making an impact on the community, it shows that PASTE LAB is accepted and can move to greater heights. The presence of a community like PASTE LAB also helps reduce waste problems in Yogyakarta. A study in Bangunjiwo (a village around Yogyakarta) shows that community-based interventions, when supported by education and appropriate technology, can improve plastic waste management to the point where more than 50% of residents actively sort their waste and support using waste as an ecological construction material (Zaki et al., 2024). This indicates that there is significant potential for practices that help build consistent waste-sorting habits.

Even so, until now there haven't been many studies that deeply examine community-based ecodesign practices from a design research perspective, especially those that see design as a medium for both social transformation and environmental sustainability at the same time. Previous research has mostly focused on technical aspects of waste management, community behavior, or the circular economy in general. For example, a study by Leal et al. emphasized the Design from Recycling approach, using recycled materials as direct raw materials, which requires designers to rethink the form, function, and aesthetics of products within the available materials (Leal et al., 2020). Then there's the research by Pratama & Asih, which identified emerging trends, methods, and research topics in the 2005-2024 period. This study shows that since 2019, there has been a surge in the number of studies due to the COVID-19 pandemic, which increased household activities (and generated more

plastic waste). This trend reflects the ongoing crisis in developing countries (Pratama & Asih, 2024). Next, Ocamica, Vasquez, and Murillo focused on creating strategy models that balance resource use with efficiency in circular economy programs. These models were developed using the Analytic Hierarchy Process (AHP) method (Ocamica, Vasquez, Murillo, 2025). From these various studies, there still isn't a conceptual model that explains how plastic-waste-based design practices can build a sustainable socio-ecological ecosystem while also having artistic and aesthetic value.

This study looks at the gap between circular economy-based waste management policies and their actual implementation at the community level. Various national regulations have encouraged waste reduction and the development of green industries, but there are still few academically documented design-based practice models that can be used as a reference for policy development or community empowerment models. The existence of PASTE LAB Yogyakarta shows that processing plastic waste through a design approach can create new value that is not only economic but also ecological and social. This practice demonstrates that waste is no longer seen as a worthless final residue, but as a material that can be reconstructed into artistic and aesthetic products through a sustainable creative process. In this way, design serves as a mechanism for transforming the meaning of waste and building ecological awareness in the community. Therefore, the eco-design practices of PASTE LAB become important to study as a possible alternative model for managing plastic waste based on creativity, social participation, and environmental sustainability.

Based on these conditions, this research becomes important to carry out in order to examine how the ecodesign practices applied by PASTE LAB Yogyakarta are able to create social transformation, community empowerment, and environmental sustainability through plastic waste management. This study is expected to provide theoretical contributions to the development of sustainability-based design studies, while also producing practical recommendations for developing community

ecodesign models that can be adapted into waste management policies and sustainable environmental development in Indonesia.

This paper argues that the success of community-based waste management is not solely determined by government policies or technical infrastructure, but is heavily influenced by the ability to build social participation, a collaborative culture, and behavioral change in the community. In this regard, the practices carried out by PASTE LAB show an integration of artistic approaches, community empowerment, circular economy, and environmental education that create a new socio-ecological ecosystem at the local level.

With an interdisciplinary approach to design research, this study aims to build a new understanding of how design can function as a tool for social-ecological transformation through community-based plastic waste management practices. The research findings are expected to provide a conceptual contribution regarding the relationship between ecodesign, the circular economy, social transformation, and environmental sustainability in the context of urban communities in Indonesia. Based on the description above, this study aims to examine how ecodesign practices in plastic waste management carried out by PASTE LAB Yogyakarta can create artistic and aesthetic products as a form of social transformation, community empowerment, and sustainable environmental development based on the circular economy.

Ecodesign Theory

The theory of ecodesign developed in response to the growing global environmental crisis caused by modern production and consumption patterns that exploit natural resources. Ecodesign is a design approach that considers the environmental impact throughout a product's life cycle, from selecting raw materials, production processes, distribution, usage, to waste management after the product's lifespan ends. That way, ecodesign isn't just focused on function and aesthetics, but also makes ecological sustainability an integral part of the design process.

One important figure in the development of eco-design theory is Victor Papanek, who stressed that design has a moral and social responsibility toward human life and the environment. In his work *Design for the Real World* (1971), Papanek criticized modern design practices that tend to focus on mass consumption without considering their ecological impact. According to him, design should be a tool for solving social and environmental problems, not just creating consumer products.

Ecodesign contains the same holistic aspects as eco-architecture but differs in its focused scope. According to Frick (2006) as cited in Olivia, Robertha, Yovita (2019), the four principles of ecological sustainable development include using natural raw materials at a rate no faster than nature can regenerate them, creating systems that use renewable energy, allowing only by-products (scraps, waste, etc.) that can be consumed or used as raw materials for other production, and enhancing functional adaptability and biological diversity. The principle is to pay attention to circulation, material chains, and the precautionary principle (Olivia, Robertha, Yovita, 2019). Eco-design also has eight discussion aspects and parameters that are covered, namely space organization, selection of materials, lighting systems, ventilation systems, water sanitation, indoor pollution, electromagnetic emissions, and also, waste management within the space (Kusumarini, 2007).

This view shows that design is no longer understood just as an aesthetic activity or creating visual objects, but as a strategic practice that has ecological and social implications. In the context of sustainability, eco-design encourages the use of eco-friendly materials, energy optimization, waste reduction, and the creation of more regenerative production systems. In this way, eco-design theory positions designers as social change agents who are responsible for environmental sustainability.

The theory of ecodesign becomes relevant in this study because the practices carried out by PASTE LAB Yogyakarta show an integration of artistic, aesthetic, material sustainability, and ecological awareness aspects. Turning plastic waste

into furniture, art installations, or household products not only demonstrates material innovation but also reflects efforts to reconstruct the meaning of waste into a resource with new value. In this way, PASTE LAB's practices can be understood as a form of ecodesign implementation that not only produces functional products but also builds environmental awareness and community-based social transformation.

Theory of Social Transformation

According to Atkinson (1987) and Brooten (1978) in Kharisma, Paranoan, Nasir (2019), the definition of change is an activity or process that makes something or someone different from their previous state and is a process that causes a change in the behavior patterns of individuals or institutions (Kharisma, Paranoan, Nasir, 2019). Social transformation is the process of changing the structure, values, behavior patterns, and social relationships in society, which occurs gradually or systematically. These changes can be influenced by developments in technology, culture, economy, education, or the collective awareness of society toward a particular social issue. In the context of the environment, social transformation is important because successful environmental management is determined not only by policies and technology but also by changes in the mindset and behavior of people toward the environment.

PASTE LAB aims to build ecological awareness through creative activities, education, community collaboration, and public involvement in both collecting and processing plastic waste. As a result, the design practice it carries out doesn't just stop at producing objects, but grows into a social process that encourages environmental culture change at the local level. Through this approach, this study sees design as having the potential to act as a medium for social transformation, connecting ecological, cultural, economic, and community participation aspects all at once. That's why the theory of social transformation is used to analyze how PASTE LAB's eco-design practices contribute to raising ecological awareness and changing

people's behavior regarding plastic waste management in Yogyakarta.

The Concept of Circular Economy

The theory of circular economy emerged as a critique of the linear economic model that has long dominated global production systems. The linear economic model, based on the principle of "take-make-dispose," has proven to cause excessive exploitation of natural resources and increased waste volumes that are difficult to manage. As an alternative, the circular economy offers a regenerative approach that sees waste as a resource that can be fed back into the production cycle to create new value. In the concept of a circular economy, goods are produced and consumed, and after consumption, they generate waste. However, this waste is collected, sorted, and then recycled to make new products. The waste is remade, reducing the impact of hazardous waste on the environment and can be reused as new products or as raw materials for other products (Malihah & Magfiroh, 2024). The concept of a circular economy can be said to be the opposite of a production-based economy that focuses on linear calculations.

In the context of this research, circular economy theory is important because the plastic waste processing practices carried out by PASTE LAB show the application of circularity principles within the creative community scale. Plastic waste that was previously seen as a worthless material is processed into new products that have function, aesthetic value, and economic value. In addition, the implementation of the circular economy by PASTE LAB not only produces recycled products but also builds public awareness of the importance of changing consumption patterns and managing domestic waste. Therefore, in this study, circular economy theory is used to understand how waste-based design practices can shape alternative production models that are more ecologically and socially sustainable.

Community Concept

The concept of a community refers to a group of individuals who share social bonds, values, interests, activities, or common goals within a certain environment. In the modern social context, a community is understood not just based on geographical proximity, but also on shared vision, practices, and collective identity built through ongoing social interactions. As Hudhriaha et al. noted, the word 'community' comes from the Latin *communitas*, which means 'sameness,' and can be derived from *communis*, meaning 'same, public, shared by all or many' (Hudhriaha, Rahmana, Rayhansyaha, Nisaa, 2024). According to Mac Iver in Hudhriaha, et. al. (2024), a community is referred to as a fellowship of life or association and is understood as a societal area characterized by several levels of social group connections with each other (Hudhriaha, Rahmana, Rayhansyaha, Nisaa, 2024). The existence of a community is usually based on several things. Quoting Nasrullah (2012), the definition of a community can be approached through: (1) being formed by a group of people, (2) having social interactions among the members of the group, (3) having common goals or needs within themselves, (4) having individual spaces that are open to other group members, for example, time (Nasrullah, 2012).

The existence of PASTE LAB shows how creative communities can act as agents of social and environmental change at the local level. The collaborative practices they build allow for knowledge exchange, the development of ecological awareness, and the creation of new cultures around waste management and sustainable consumption. Therefore, the concept of community in this study is used to understand forms of social participation, collaboration patterns, and the dynamics of relationships between actors in plastic-waste-based eco-design practices in Yogyakarta.

METHODS

This research was carried out at PASTE LAB, an environmentally-based creative industry initiative located in Bangunjiwo, Kasihan, Bantul Regency,

Yogyakarta. This location was chosen because PASTE LAB has become a pioneer in community-based plastic waste management and practices the principles of a circular economy on a micro scale. The study used an ethnographic method with a qualitative approach. As explained by Yin (2011) in Ardhojo (2023), in exploratory studies, data validity heavily relies on the researcher's sensitivity in capturing the dynamics of context and the subjectivity of participant narratives. According to Kirk and Muller in Adnyana, qualitative research originates from qualitative observation, which naturally emphasizes aspects of quality because it relates to understanding, concepts, values, and attributes inherent to the research object (Adnyana, 2017).

According to (Nastiti et al., 2024), the qualitative approach is very suitable to use when researchers want to explore the meaning behind social or cultural phenomena and understand how people make sense of the world around them. Another quote says that qualitative methods allow researchers to understand holistically how individual perspectives influence the meaning of messages (Ardhojo, et al, 2026). So, it can produce recommendations that can be used by the government or parties interested in community empowerment programs through managing plastic waste.

Data collection techniques were carried out through interviews, documentation, and literature studies. The researcher also conducted observations. Participant observation allows the researcher to see and conclude information that might not be mentioned by people during interviews (Pebryani, Prihatini, Sudharsana, 2022). This was done to obtain data regarding Plastic Waste Recycling at PASTE LAB Yogyakarta. Data collection techniques play a crucial role in exploring meanings, social practices, and creative processes that occur naturally in the community being studied (Spradley, 1979). As for the data analysis steps according to Miles et al. (2014), they include data collection, data reduction, data presentation, and drawing conclusions. In qualitative research, data validity is needed, where at this stage the validity required can be determined using verification techniques. This can be done through triangulation techniques. According to Moleong (1990) in Nugrahani (2014), triangulation is a technique used to check the validity

of data by using something outside of the obtained data as a comparison. For data analysis results, it contains both informal and formal descriptions. Quoting Arshiniwati, informal descriptions present the analysis results in a narrative way, while formal descriptions present the analysis results in the form of images, charts, or photos which are used to support the quality of the narrative of the analysis results (Arshiniwati, 2014).

RESULTS AND DISCUSSION

Analysis

Currently, PASTE LAB focuses on recycling waste made of HDPE (High-Density Polyethylene) (code 2), PP (Polypropylene) (code 5), LDPE (Low-Density Polyethylene) (code 4), and PS (Polystyrene) (code 6). This is because these four types of plastic are easy to process, abundant, and more durable compared to other types. PASTE LAB continues to conduct research to be able to process all types of plastic waste, so that PASTE LAB can recycle even more plastic. Besides running activities like workshops and training, PASTE LAB produces products that generally include plaques, furniture, home decor, and interior architecture essentials like facades, tiles, and lamps. Here's some information about these products.

The uniqueness of PASTE LAB isn't just in its technical ability to turn plastic waste into new products, but also in its social approach built through design practice. PASTE LAB uses design as a tool for social transformation, encouraging people to change their behavior toward waste, raising ecological awareness, and creating a collaborative ecosystem between communities, creatives, the government, and local residents. PASTE LAB uses plastic waste as a design medium to produce various furniture items, art installations, merchandise, and interior products that carry artistic, aesthetic, and ecological value. In this context, design is no longer

just seen as an aesthetic practice or object production, but as a social, ecological, and cultural instrument capable of driving collective behavioral change.

Besides that, the eco-design practices carried out by PASTE LAB show an interdisciplinary connection between art, aesthetics, material technology, the circular economy, and community empowerment. The products they create not only serve practical purposes but also carry ecological narratives about environmental responsibility and sustainable living. In this way, PASTE LAB becomes an important example of how design can act as a medium for rethinking the meaning of waste, driving social transformation, and promoting sustainable environmental development at the local level.

There are 2 main workflow groups in PASTE LAB. The first is the waste management flow and the second is the recycled plastic production process carried out by PASTE LAB. In the waste management flow, it starts with receiving waste deliveries from the community or PASTE LAB collecting it from designated areas. Next, the collected waste will be sorted again by the lab according to type and color. Sorting takes about 2 to 4 weeks. The next stage is choosing one of the options. First, the collected waste can be reprocessed by PASTE LAB into new products. Or second, clients / waste donors can use their waste as raw material to make products. The product price will be reduced by the cost of materials (around 5-20%, depending on how much waste can be managed from the collected materials). In addition, clients/donors will receive a report showing the actual amount of waste, details of how much waste can and cannot be processed (in percentages), and the output products from the collected waste.

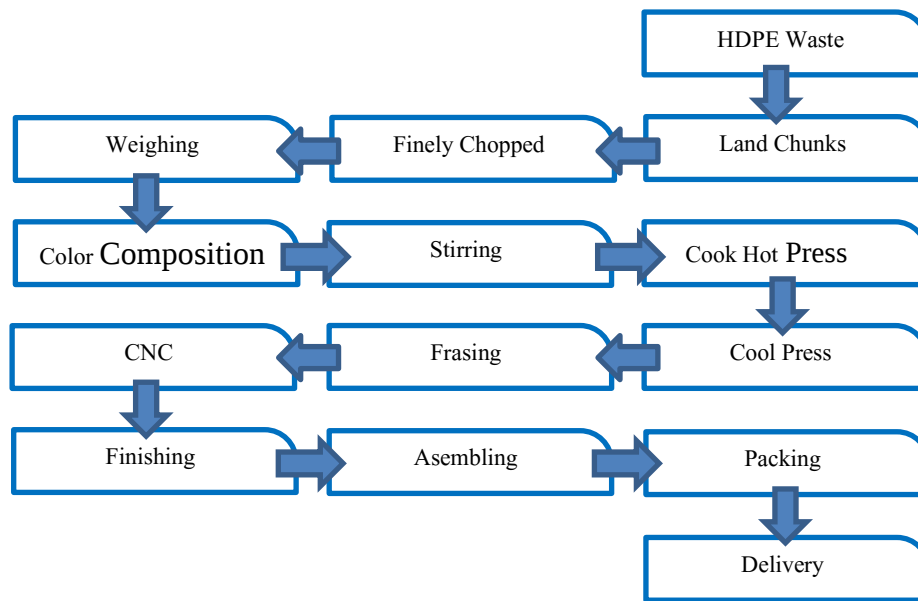


Figure 1: Flow of Plastic Waste Recycling
Production Process at PASTE LAB

Next, the production process flow for recycling plastic waste carried out by PASTE LAB is shown in Figure 1. The production process description starts with the first stage, which is collecting raw materials like HDPE, PP, LDPE, and/or PS plastic waste. These types of waste can be recycled at PASTE LAB because of the desired material properties: strong, flexible, and not brittle. The second stage is coarse shredding, where HDPE waste is put into a shredder machine to produce chunks. Third is fine shredding. The chunks are further shredded in a fine shredder machine to produce smaller pieces, making it easier to compress the material in molds during the heating process. Fourth, weighing; the base color material (main color) is weighed according to production needs. Fifth is determining the color composition, by adding several colors to the main material according to the color composition formula owned by PASTE LAB. Sixth, mixing, meaning the main color and additional colors are mixed in a mixing machine. Seventh is cooking the mixed material and compressing it into square molds to be cooked in a Hot Press machine. Eighth is cooling press, where the cooked material is moved to a Cooling Press machine so the material doesn't change shape. Ninth is frasing, where the material is ready to be polished with a special and

secret system. Tenth is CNC, which means the material is ready to be cut according to the design using a CNC program. Eleventh is finishing, where the cut results are smoothed so they are not sharp and have aesthetic value. Twelfth is assembling. Thirteenth is packing, where the assembled products are wrapped in boxes, wooden pallets, or just bubble wrap depending on the product type. Fourteenth is shipping, which is sent directly to the customer, since PASTE LAB has minimal storage space and wants the process to be completed quickly until the client receives it.

Discussion

The success of sustainability-based creative industries is heavily influenced by the ability to build social relationships and sustainable community collaborations. Based on the research goal to analyze the eco-design recycling practices of plastic waste carried out by PASTE LAB Yogyakarta from the perspectives of eco-design, circular economy, social transformation, and community concepts, this study shows that PASTE LAB has developed a sustainable creative industry model that integrates environmental, economic, social, and community education aspects into a single plastic recycling-based production system.

Research results show that PASTE LAB not only acts as a producer of recycled products, but also as a developer of alternative materials based on plastic waste that have functional, aesthetic, and economic value. The products they create, such as furniture, interior decorations, accessories, and even architectural needs, demonstrate that plastic waste can be transformed into new materials with high utility value through a structured design and manufacturing process. In practice, PASTE LAB applies the principle of form follows function, where product function, material efficiency, and market needs are the main focus in the design process.

From the eco-design theory perspective, this study found that sustainable design practices at PASTE LAB are pragmatic and contextual. Design isn't just seen as an aesthetic expression but as a production strategy that considers product usefulness, material efficiency, and environmental impact. Using plastic waste as the main material shows an effort to reduce environmental pollution while also extending the material's lifecycle through recycling.

Meanwhile, based on circular economy theory, this study shows that PASTE LAB has built a production system that keeps plastic waste within the usage cycle through

processes of collection, sorting, processing, and reproduction into new products. The drop box system, collaboration with various brands, and involving the community in waste collection show practices of a circular economy that include social participation in the sustainable production chain.

From a social transformation perspective, PASTE LAB's activities also show efforts to change the way people think about plastic waste. Through workshops, training, environmental education, and waste management campaigns, PASTE LAB tries to build ecological awareness that plastic waste is not just trash, but a material resource that can be reused creatively and economically. So, the transformation happening isn't just about the material, but also about the social awareness of people regarding the environment and sustainability.

This study also found that the success of PASTE LAB's sustainability practices cannot be separated from community support and collaborative networks. The involvement of local communities, stakeholders, creative communities, business institutions, and various partners shows that eco-design-based circular economy practices require a strong collaborative system to run sustainably.

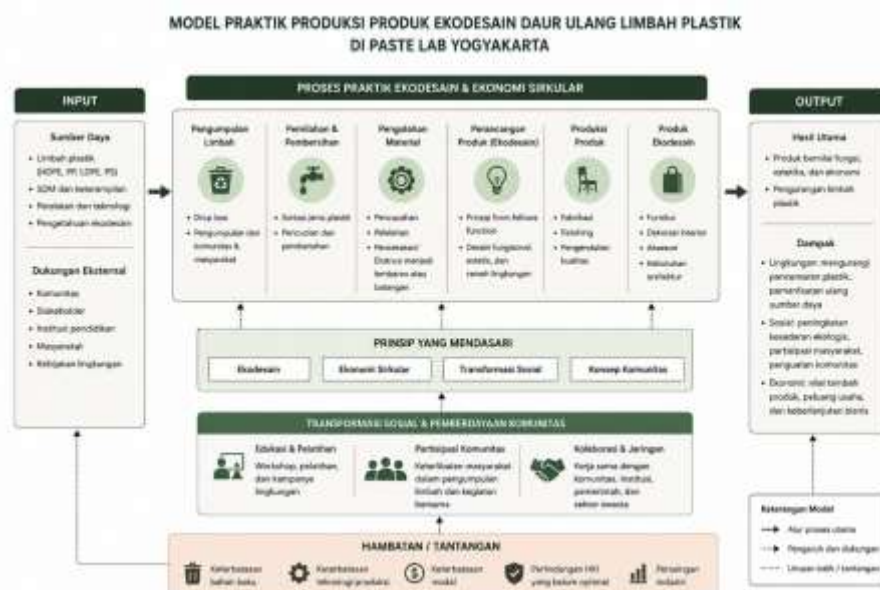


Figure 2: Practice Model for Eco-Design Product Production from Recycled Plastic Waste at PASTE LAB Yogyakarta

Figure 2 is the Research Outcome Model showing that PASTE LAB develops eco-design practices based on the circular economy through an interconnected relationship between plastic waste, creative production processes, sustainability values, and community social transformation. At the initial stage, plastic waste is positioned not as trash, but as a material resource with economic and aesthetic potential. This perspective becomes the main foundation in the circular economy paradigm applied by PASTE LAB, which is to return used materials into the production cycle so they have new utility.

Next, the production process carried out by PASTE LAB shows the application of eco-design principles, where waste materials are processed through sorting, shredding, color composition, molding, and finishing to create products that are functional, aesthetically pleasing, and marketable. In this model, it's clear that the design orientation doesn't just focus on the visual aspects but puts more emphasis on function, material efficiency, and production sustainability. The principle of form follows function forms the basis of the design approach used by the company. The model also shows that the success of eco-design practices doesn't depend solely on the internal production process but is also influenced by community involvement, stakeholders, and collaborative networks. The presence of drop boxes, educational programs, training, and partnerships with various parties shows that PASTE LAB carries out a social transformation role by raising public environmental awareness. So, production activities don't just result in recycled products, but also help shape a new culture around waste management and environmental sustainability. On the other hand, this model shows challenges that can affect the system's sustainability, like rising raw material costs, limited production technology, weak intellectual property protection, limited production space, and industry competition. These challenges show that circular economy practices in the creative industry don't run perfectly, but require adaptability, technological innovation, stronger organization, and support from a sustainable business ecosystem. Overall, this

model highlights that PASTE LAB is not just a plastic recycling industry, but represents an integration of eco-design, circular economy, creative innovation, and environmental social movements. The products created aren't just functional items, but also educational tools and symbols of changing how people see plastic waste as a valuable and sustainable material.

However, this study also found various challenges faced by PASTE LAB, such as rising prices of plastic waste raw materials, limitations in production technology, the lack of intellectual property protection, limited production space, as well as internal organizational dynamics and industry competition. These conditions show that sustainability practices in the creative industry don't operate ideally, but rather have to deal with market realities, limited capital, and increasingly complex industry competition.

Overall, this study concludes that PASTE LAB Yogyakarta has demonstrated sustainable-based creative industry practices that not only focus on producing recycled goods but also foster social and ecological cultural transformation through material innovation, environmental education, and community collaboration. These practices show that eco-design and the circular economy can be strategic approaches for developing a more environmentally friendly, participatory, and sustainable creative industry amid modern industrial challenges. While these practices also encourage social transformation through environmental education and community involvement in waste management, PASTE LAB still faces various obstacles in implementation, such as limited raw materials, production technology, capital, and industry competition. Overall, this study shows that the creative industry based on plastic recycling can be a sustainable business model that integrates environmental, social, and economic aspects.

Synthesis and Theoretical Implications

Research Synthesis

Based on the research results that have been analyzed through eco-design theory, circular

economy theory, social transformation theory, and the concept of community, it can be summarized that the production practices carried out by PASTE LAB Yogyakarta are a form of integration between material innovation, environmental sustainability, industrial creativity, and community-based social change. PASTE LAB's activities are not only focused on producing goods from plastic waste, but also on building a socio-ecological system that involves the community, business partners, creative communities, and a network of stakeholders within a sustainability ecosystem.

From an eco-design perspective, this study shows that recycled product design is no longer seen just as an aesthetic activity, but as a production strategy that takes into account material efficiency, product function, and environmental impact. The 'form follows function' principle applied by PASTE LAB shows that sustainable design is more focused on usefulness, production efficiency, and flexibility to market needs rather than creating idealistic aesthetic symbols. So, eco-design in the context of the recycled-based creative industry is pragmatic, adaptive, and contextual.

Meanwhile, the circular economy theory explains that PASTE LAB has built a production system that tries to keep plastic materials in the usage loop through collection, sorting, processing, and reproduction into new products. Plastic waste that was previously considered worthless is transformed into alternative economic materials with functional, aesthetic, and commercial value. This research shows that the circular economy is not just about waste management, but also creates a new economy model based on material sustainability.

On the other hand, social transformation theory shows that PASTE LAB's activities have dimensions of cultural change and public awareness about environmental issues. Through workshops, training, drop boxes, and community collaborations, PASTE LAB not only produces goods but also builds ecological awareness and changes people's behavior in how they view plastic waste. What was previously seen as useless residue is turned into a creative resource with social and economic value. In this way,

the transformation occurs not only in the plastic material but also in people's mindset about the environment and consumption.

Next, the concept of community shows that the success of PASTE LAB's sustainability practices can't be separated from the involvement of various social actors. The community becomes an important foundation in building the waste supply chain, public education, production collaboration, and spreading sustainability values. This study shows that circular economy practices based on eco-design need strong social networks so that sustainable production processes can run collectively and continuously.

Overall, the synthesis of this research shows that PASTE LAB has developed a sustainable creative industry model that integrates environmental, economic, social, and community aspects into a production system based on recycling plastic waste. This model demonstrates that sustainability practices in the creative industry are not just about the technical process of waste management, but also involve design innovation, cultural transformation, social participation, and the ability to adapt to market dynamics.

Theoretical Implications

This research has several theoretical implications that can enrich studies on ecodesign, circular economy, social transformation, and communities in the context of sustainability-based creative industries. As an implication for Ecodesign Theory, this study expands the understanding of ecodesign theory by showing that sustainable design practices in the creative industry are not always oriented toward aesthetic idealism or philosophical symbolism. In the case of PASTE LAB, ecodesign is more flexible and pragmatic because it is influenced by market needs, material efficiency, and client demands. These findings suggest that in contemporary creative industry practice, the success of ecodesign is determined not only by artistic value but also by the design's ability to meet functional, production, and economic sustainability needs simultaneously.. Thus, this research indicates that the theory of ecodesign needs to be understood not just

as an environmentally friendly design approach, but also as an adaptive strategy for the creative industry in facing the dynamics of the modern market.

Next, the implications for Circular Economy Theory. This study strengthens the circular economy theory by showing that plastic waste can be transformed into economically valuable alternative materials through design and manufacturing innovations. However, the study also found a paradox in the circular economy, namely the increasing competition for obtaining plastic waste due to the involvement of large industries in the recycled material supply chain. These findings imply that implementing the circular economy in industrial practice doesn't always go ideally and equally. Factors like capital, industry power, access to raw materials, and control over technology still affect the sustainability of small and medium recycling businesses. Therefore, the circular economy theory needs to be understood not just as a technical material management system, but also as an economic-political arena involving power relations and industry competition.

For implications on Social Transformation Theory, this study shows that environmentally-based social transformation can take place through creative industry activities. PASTE LAB not only produces products but also fosters changes in public awareness about plastic waste through education, collaboration, and community participation. Ecological social transformation can happen through the creative economy and sustainable design practices. Recycling-based creative industries can act as social change agents, shaping a new culture around consumption, waste management, and environmental awareness. Therefore, social transformation theory in the context of sustainability needs to consider the role of the creative industry as a key player in building ecological cultural change in contemporary society.

As an implication for the Community Concept, this study shows that communities play a strategic role in supporting the success of circular economy practices and ecodesign. The involvement of the public, local stakeholders, creative

communities, and business partners demonstrates that the sustainability of the recycling industry can't work in isolation. These findings imply that the community concept in the context of sustainability should be understood as a collaborative ecosystem connecting social, economic, environmental, and production aspects. Communities don't just function as social groups, but also as participatory networks that support the production chain, material distribution, environmental education, and social legitimacy for sustainability practices.

Recommendation

This study recommends that PASTE LAB strengthen its raw material collection network by collaborating with waste banks, communities, educational institutions, and CSR programs to maintain a stable supply of plastic waste. In addition, there is a need to develop more modern and efficient production technology to improve production capacity and quality. PASTE LAB is also advised to protect intellectual property rights for its brand, designs, and material innovations to boost business competitiveness. On the other hand, strengthening digital branding, environmental education, and collaboration with the government, academics, and the private sector should continue to be developed to expand social impact and business sustainability. More broadly, this study also recommends policy and funding support for the recycling-based creative industry as part of developing the circular economy and sustainable development in Indonesia.

Research Limitations

However, this study has several limitations. First, the research only focuses on one study object, namely PASTE LAB Yogyakarta, so the results cannot yet be generalized to the entire recycled plastic eco-design industry in Indonesia. Second, the study emphasizes the production process, eco-design practices, and social transformation aspects, so it does not delve deeply into economic aspects such as profitability, market analysis, and business financial sustainability. Third, the limited research time means that observation of social and environmental impacts

could not be conducted in the long term. In addition, this study still relies on interview data and internal company observations, so the perspectives of consumers or product users have not been explored more broadly.

To address these limitations, future research is suggested to expand the study objects by comparing several recycled plastic eco-design industries in different regions to get a more comprehensive picture of circular economy practices in Indonesia. In addition, the next research could develop analysis on economic and business aspects, such as profitability, marketing strategies, consumer behavior, and business financial sustainability. Longitudinal studies are also needed to see the social, economic, and environmental impacts in the long term. Besides that, data collection should involve more external perspectives, like consumers, environmental communities, the government, and collaborative partners, so that the research results become more objective and thorough.

CONCLUSION

This study concludes that PASTE LAB Yogyakarta is able to process plastic waste into artistic, aesthetic, and useful products through a circular economy approach. This practice not only supports environmental sustainability but also promotes social transformation and community empowerment through education, collaboration, and public involvement in managing plastic waste. However, its development still faces challenges such as limited raw materials, production technology, workspace, intellectual property protection, and competition in the recycling-based creative industry.

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