REACTIVATION OF THE GUMURUH VILLAGE COMMUNITY IN BANDUNG CITY BASED ON CREATIVITY THROUGH THE EXPLORATION OF PLASTIC WASTE INTO COMMERCIAL PRODUCTS

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ABSTRACT

Plastic waste is a huge environmental problem in lots of countries, and improper handling of this garbage puts ecosystems at risk. Upcycling plastic may help save natural resources, cut down on carbon emissions, and lessen waste and the need for new manufacturing. Significant economic benefits are also derived from recycling, which produces high-quality commercial goods, especially in the furniture sector. In order to create sustainable goods, people in Bandung's Gumuruh Village aggressively recycle rubbish, including biological waste. In order to design goods that will be offered to the community, academics and local SMEs collaborate using the Design Thinking approach to Service Learning.

Keywords: template, instructions, conference, publications

1. INTRODUCTIONS

One of the most pressing environmental issues faced by every country is the problem of plastic and paper waste. Although plastic and paper have remarkable benefits in various applications due to their lightweight, durability, and cost-effectiveness, they have become a serious threat to our planet's ecosystems. Every year, large amounts of plastic and paper are produced, and most of it ends up as waste. Poorly managed plastic and paper waste not only pollutes land but also oceans, causing irreparable damage to marine ecosystems, forests, and the wildlife within them. Given that plastic is difficult to decompose naturally, its accumulation in the environment has become one of the biggest challenges to sustainability.

Recycling plastic emerges as one of the most effective solutions to address this issue. The recycling process involves collecting, sorting, cleaning, shredding, and processing plastic waste into new reusable materials (Berliana et al., 2022; Maitlo et al., 2022). By recycling plastic and paper, we not only reduce the amount of waste polluting the environment but also decrease the need for new plastic and paper production, which requires significant natural resources and energy. This reduction contributes to lower carbon emissions and the preservation of limited natural resources.

Recycling these materials also has significant economic impacts. Through the recycling process, used plastic and paper can be transformed into various high-value commercial products, creating new business opportunities and jobs in the recycling and manufacturing industries(Roslinda et al., 2022). These products span various sectors, from building materials and clothing to household goods. One rapidly growing sector in the use of recycled plastic and paper is the furniture industry, where they serve as alternatives or replacements for other materials and functions(Kurniasari et al., 2019; Yosianita, 2022).

Furniture made from recycled plastic and paper offers various benefits, not only related to sustainability but also in terms of economic and functional aspects. The use of recycled plastic and paper in furniture manufacturing allows for durable, lightweight, and easy-to-clean products that meet the needs of modern consumers. Additionally, furniture made from recycled plastic and paper is often more economical compared to furniture made from conventional materials, making it an attractive choice for environmentally conscious and budget-oriented consumers. This approach has been implemented by one of the neighborhoods in Bandung City, Gumuruh Village.

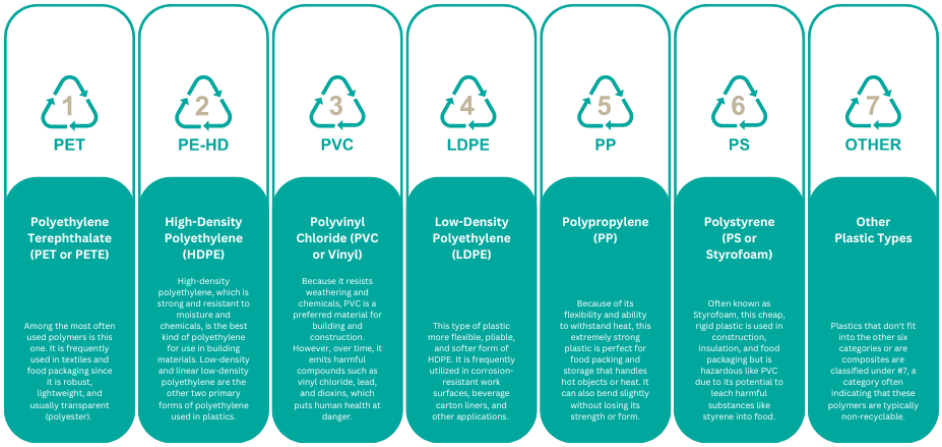
Kelurahan Gumuruh, one of the ten neighborhoods in Batununggal District, Bandung City, covers approximately 95 hectares with 12 community groups and 88 neighborhood groups, and has a population of around 18,538 people. This neighborhood demonstrates environmental awareness, with many residents actively involved in gardening and some running waste recycling businesses. Additionally, the neighborhood is active in recycling organic waste such as leaves, fruit peels, and branches into organic fertilizers.

Inspired by the activities carried out in Gumuruh Village, we are motivated to design a recycling method, particularly for inorganic waste such as paper and plastic. This is driven by the presence of two government offices in this neighborhood, namely the Gumuruh Neighborhood Office and the Batununggal District Office, which are expected to generate a significant amount of paper and plastic waste.

2. LITERATURE STUDIES

Plastic Waste

There are hundreds of distinct variants among around 50 main kinds of plastics. In order to facilitate better categorization, the American Society of Plastics Industry created a standard labeling code to assist customers in identifying and sorting the primary categories of plastics. Polyethylene Terephthalate (PETE), High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE), Vinyl/Polyvinyl Chloride (PVC), Polypropylene (PP), Polystyrene (PS), and OTHER (Other types of plastic products) are the seven categories into which plastic products are classified and divided. Resin Identification Codes are the name given to this labeling system (RIC)(Yani et al., 2020).



Service Learning

Service learning is an educational approach that bridges the gap between theoretical knowledge and practical application by addressing real-world issues within a community or organization. Service learning is a type of education that applies knowledge to actual issues within a community or organization (Darby et al., 2013). Service learning is education coupled with service that includes responsibility, character development, and intellectual learning (Lake & Jones, 2008). Howard (as cited in Bagerrly, 2006) highlights that service learning also incorporates volunteer activities into the curriculum, deepening students' understanding through active participation. Collectively, these perspectives underscore that service learning is a multifaceted educational method that emphasizes service to oneself, society, and the environment by applying theoretical concepts to practical, real-world scenarios.

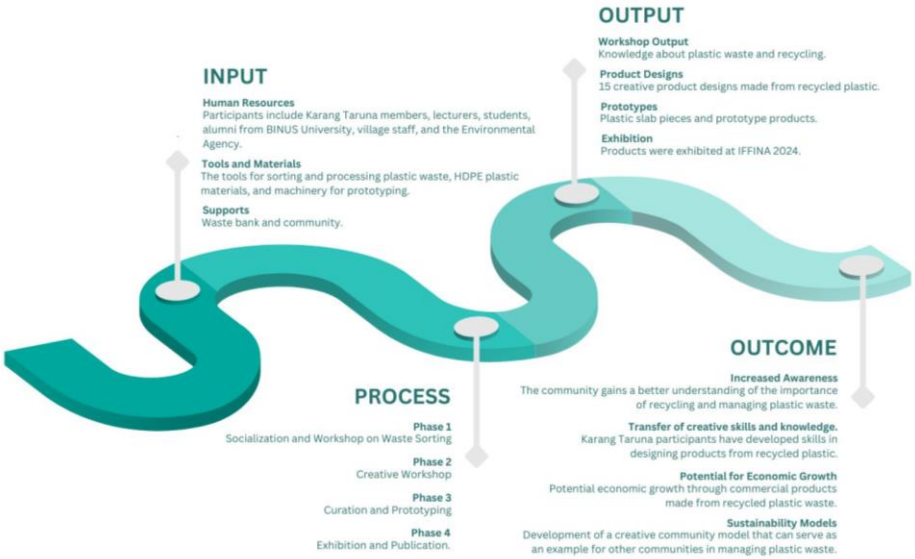
3. METHODOLOGY

In this case study, design thinking is applied in conjunction with a service-learning methodology. Through service learning, BINUS academics collaborate directly with SMEs in Gumuruh Village to produce goods that will be sold to the public. Service Learning as applying knowledge to real-life situations within a community or group (Ani et al., 2022; Musa et al., 2017). This method combines useful applications that benefit society with theory(Darby et al., 2013). A teaching strategy known as "service learning" integrates theory with hands-on, community- and environment-serving activities. Additionally, in order to come up with creative solutions for the problem of plastic bottle waste, this exercise uses the five phases of Design Thinking: Emphatize (problem analysis and SME discovery), Define (field research and literature study), Ideate (design inspiration and development), Prototype (constructing chair prototypes), and Test (product testing).

4. DISCUSSIONS

The community service program in Kelurahan Gumuruh involves various inputs such as human resources, materials, and support from stakeholders like Karang Taruna participants, lecturers, students, and local agencies. The program is structured into four phases (as shown as picture 1): initial socialization and workshops on plastic waste education;

a creative workshop focusing on design, color theory, and product development; prototyping recycled plastic into slabs and products; and finally, showcasing and testing products at IFFINA 2024. Outputs include enhanced knowledge on recycling, creative designs, prototypes, and exhibitions. The outcomes are increased public awareness, improved skills in recycling, potential economic benefits from commercial products, and the creation of a sustainable community model for managing plastic waste.



Picture 1. Process Diagram of Reactivation of The Gumuruh Village Community In Bandung City Based on Creativity Through The Exploration of Plastic Waste Into Commercial Products Activities (Source: Private Documentation, 2024).

Phase 1: Plastic Waste Socialization and Plastic Waste Sorting Workshop.

Begin with the results from Phase 1, which involved a seminar and workshop on plastic waste sorting held on June 22, 2024, at the Gumuruh Village Office in Bandung. The event was attended by 15-20 participants from Karang Taruna, a youth organization active in social and environmental activities. During the event, participants received educational material presented by the head of the community service team in collaboration with the Plastavfall community. The focus was on the negative impacts of waste on the environment and the significance of recycling, particularly plastic waste. Participants gained a comprehensive understanding of recyclable plastic types and how recycling can mitigate environmental harm.

Picture 2. Presentation of Material by a Partner from the Community (Plastavfall) on the Topic of Plastic Waste Categories (Source: Private Documentation, 2024).

In Phase 1, the material on waste types was presented by Rizqia from the Plastavfall community as shown in picture 2. Plastavfall is a waste management company that specializes in waste collection, processing, education, and consulting. One of the key components of Phase 1 was the seminar and workshop on waste management, which was crucial for understanding proper waste management practices from experts. As a result, the target audience, including

the Karang Taruna participants and the Gumuruh community, gained a better understanding of waste management in the Gumuruh neighborhood.

The workshop aimed not only to raise environmental awareness but also to equip participants with practical skills applicable in daily life. It was hoped that with this new knowledge and skill set, participants would become change agents in their communities, promoting broader and more sustainable recycling practices. Additionally, the event sought to inspire participants to explore economic opportunities in plastic recycling, such as creating commercial products from the recycled plastic pellets.

Picture 3. The Plastic Waste Sorting Workshop (Source: Private Documentation, 2024).

The event also featured a practical session where participants engaged directly in sorting and shredding plastic to convert it into reusable plastic pellets. Under expert guidance, they learned the basics of plastic recycling, including sorting by type, shredding, and melting processes. The educational waste management workshop, held outside the Gumuruh village area, involved 14 participants from the local youth organization, Karang Taruna, who actively engaged in group activities. These included sorting various types of plastic waste, separating bottle caps, and categorizing them by color. The focus on sorting bottle caps was crucial, as they are made from HDPE plastic, an essential material for producing plastic slabs. The bottle caps were first shredded using the village's waste shredding machine. The waste shredding process is a crucial activity to assess the amount of collected waste and determine the quantity of shredded material that will later be melted into plastic slabs. Before reaching this stage, product design is carried out in Phase 2, which involves a creative workshop.

Picture 4. The Plastic Waste Shredding Process Workshop (Source: Private Documentation, 2024).

Phase 2: Creative Workshop Ideation Inspired by Plastic Slab Materials.

On July 21, 2024, a workshop began with a 15-minute presentation on color theory and entrepreneurship in design, delivered by lecturers and experts. The goal was to provide a foundational understanding of how color impacts design and how entrepreneurial principles can be applied to create innovative, marketable products. Following the presentation, participants from Karang Taruna Kelurahan Gumuruh explored various product types, including furniture, decorations, and fashion accessories, through creative brainstorming and initial sketching. They received guidance from experts to refine their concepts, focusing on both functional and aesthetic aspects, as well as market potential. The workshop aimed to enhance participants' design skills while instilling an entrepreneurial mindset, helping them view their creations as both artistic works and viable commercial products.

Picture 5. Group Discussion for Ideation Process in Creative Workshop (Source: Private Documentation, 2024).

Phase 2 involves a creative workshop focused on designing product prototypes. Before the actual design process begins, participants are introduced to color theory, which helps guide the creation of plastic slabs that match the product designs. The workshop covers the significance of color perception and its application in commercial products, using color theory principles such as complementary, analogous, and triadic color schemes. The aim is to ensure that the colors used in the prototypes align with the desired product outcomes and their emotional impact, including warm, soft, cool, and bold colors. This approach is intended to enhance the final product's aesthetic appeal and usability.

Phase 3: Prototype Design Workshop for Finished Products.

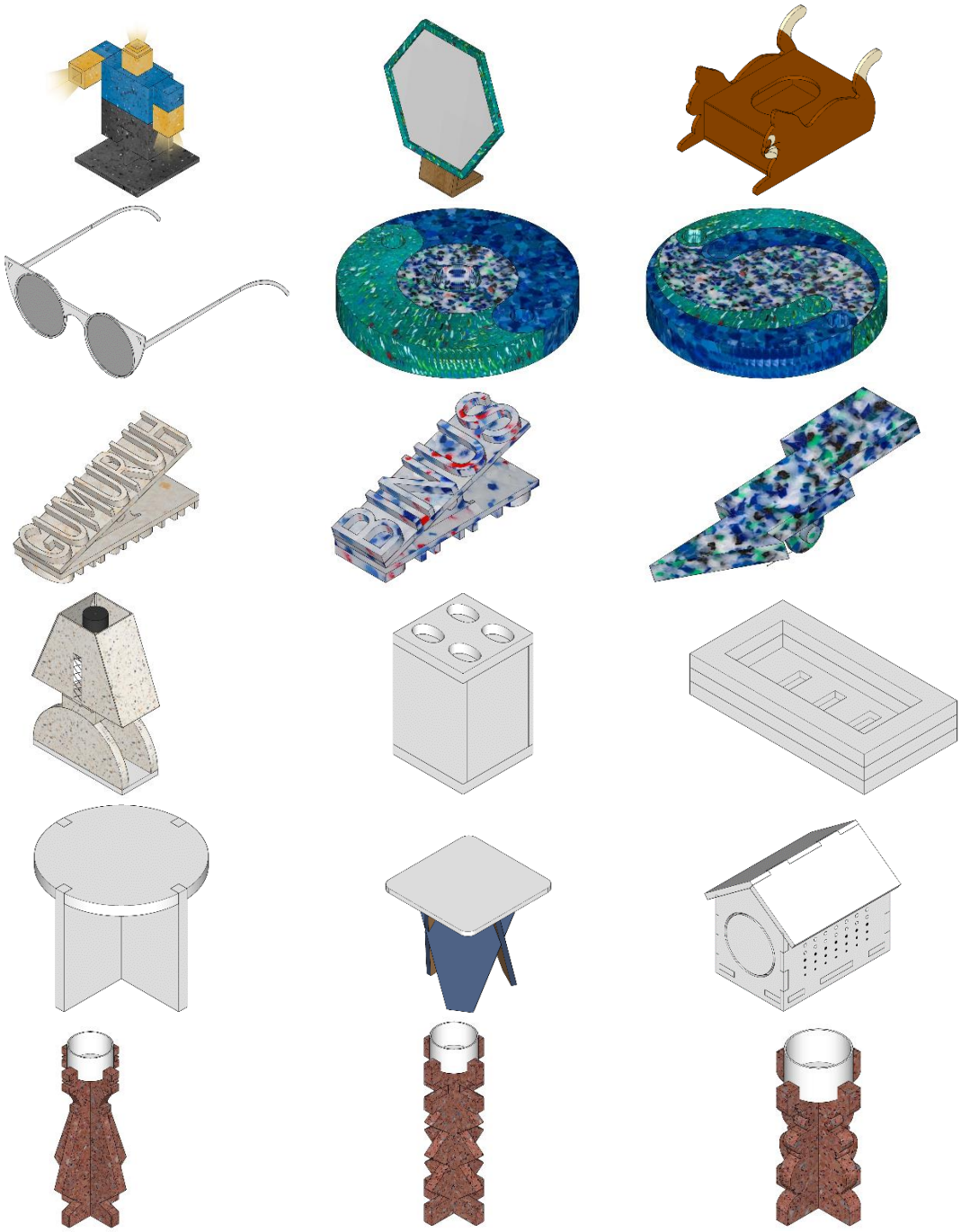
Picture 6. Plastic Slab Samples for Prototyping (Source: Private Documentation, 2024).

After the exploration and sketching phase of the creative workshop, the top 15 product designs were processed further. This involved sorting plastic waste by color to ensure uniformity and aesthetics in the final products. The sorted plastics were then shredded into small pieces and melted to a thickness of 5mm to 1cm, ensuring even distribution and no air bubbles. The melted plastic was cast into uniform slabs, which were then cut to match the initial design specifications. The slabs were assembled into various furniture and commercial products, paying close attention to detail and quality. The final products were tested for strength and quality before mass production, resulting in 15 innovative items ready for exhibition and commercial production. This structured process transformed previously worthless plastic waste into valuable, aesthetically pleasing products, creating new economic opportunities for the Karang Taruna Kelurahan Gumuruh participants.

Phase 4: Prototype Design Workshop for Finished Products.

After progressing through stages of material collection, creative design, and production, all curated products will be showcased at IFFINA 2024. This exhibition highlights the work of Karang Taruna Kelurahan Gumuruh participants, presenting plastic waste transformed into valuable items. The event provides a platform for publicizing these products and raising awareness about recycling and creativity in commercial design. Successful prototypes will be mass-produced with local artisans and manufacturers, ensuring high quality. Market testing through bazaars will offer consumer feedback and potential for new collaborations. Overall, this program demonstrates how creativity and innovation can convert environmental challenges into economic and ecological benefits, with the IFFINA 2024 exhibition marking a significant achievement.

5. RESULTS



Picture 7. 3D Modeling of Fifteen Curated Works from Ideation Workshops (Source: Private Documentation, 2024).

The potential research outcomes could reveal that frequent participant turnover in community programs hinders effective knowledge transfer, while identifying successful strategies like peer mentoring that mitigate these challenges. The study may demonstrate that sustainable product designs using recycled HDPE plastic are both durable and cost-effective, influencing broader adoption in product design. Additionally, it could show that community workshops significantly enhance environmental awareness and lead to long-term behavioral changes, while also highlighting gaps that need addressing. The research might further uncover the economic viability of upcycled products, especially in niche markets, and identify logistical challenges in material collection, offering solutions like improved collection systems or community incentives. Overall, these findings could advance understanding in community engagement, sustainable design, environmental education, and waste management, providing practical solutions to real-world challenges.

6. CONCLUSION

The community empowerment activities in Gumuruh Village achieved notable success in addressing local needs and challenges. The program effectively engaged the community through hands-on recycling workshops, enhancing participants' understanding of plastic waste management and its environmental benefits. By transforming plastic waste into reusable products, the initiative addressed pressing issues such as waste accumulation and provided practical solutions for sustainable living. The activities aligned well with the community's needs, such as improving waste management practices and creating economic opportunities through upcycling. The practical sessions not only educated participants on recycling processes but also involved them in meaningful, creative work that supports local environmental goals.

The impact of these activities has been significant, with increased awareness of recycling among the community and a demonstrated ability to convert waste into valuable products. This has not only improved waste management but also provided economic benefits through the potential commercialization of recycled products. For future community empowerment, it is recommended to continue expanding educational efforts, enhance collaboration with local stakeholders, and explore additional markets for the recycled products. Engaging more community members and diversifying recycling materials could further enhance the sustainability and economic impact of the initiative..

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