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Business Value Creation through Circular Textile Waste Recycling: Implications For Sustainable Development Goals

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Abstract

The problem of textile waste caused by fast fashion culture is increasingly serious, especially in urban areas. This community service activity aims to process textile waste into valuable products through a circular economy approach. The program is implemented at the Palembang Ceria Learning House in collaboration with the "Tangan Ibu" community, using a community-based empowerment model, ranging from potential identification, waste processing training, production assistance, and digital marketing. As a result, participants' knowledge of the circular economy increased by approximately 50%, household incomes increased by 5–10%, and 150 kg of textile waste was successfully processed into products such as doormats, bags, and brooches with local motifs. The program also formed an 18-member creative business group and increased environmental awareness and women's economic independence. Overall, this program not only encourages more sustainable waste management but also strengthens social participation and economic opportunities in the community. This initiative also supports the Sustainable Development Goals, specifically SDG 12 Responsible Consumption and Production, SDG 13 Climate Action, SDG 4 Quality Education, SDG 11 Sustainable Cities and Communities, SDG 8 Decent Work and Economic Growth, SDG 1 No Poverty, and SDG 17 Partnerships for the Goals through increasing environmental awareness, community learning, and creating business opportunities and collaboration.

INTRODUCTION

Human demand for clothing continues to increase with population growth, thus driving the development of a more sustainable textile industry (Wardhani & Salsabila, 2021). The textile industry itself is a strategic sector that plays a vital role in the national economy, driving economic growth, creating jobs, and increasing exports (Riyanto & Firmansyah, 2020; Alizadeh et al., 2023; Asmara et al., 2014). However, despite its contribution, this industry also generates vast amounts of waste. Textile waste, from scraps of fabric, unused clothing, and discarded products, reaches approximately 92 million tons globally, with most of it ending up in landfills because little is recycled. If not managed properly, this waste can exacerbate soil, water, and air pollution. This problem is further exacerbated by the phenomenon of fast fashion, where rapidly changing trends encourage mass production and overconsumption (Muazimah, 2023). Affordable prices and easy access make people more likely to purchase clothing, but only use it for a short time. This has resulted in an increase in the volume of textile waste that is difficult to decompose (Hakim & Rusadi, 2022; Lynch et al., 2019; Klooster et al., 2024). Globally, this issue has also been highlighted through initiatives such as International Zero Waste Day, which emphasize the importance of waste management and shift toward more sustainable production and consumption patterns.

Amidst the environmental crisis and the growing need for more sustainable production practices, the utilization of textile waste is becoming increasingly important. Textile waste is often considered worthless, yet it has great potential when managed appropriately and innovatively (Raman et al., 2025; Persson & Hinton, 2023). Sustainable textile waste management can be achieved through upcycling techniques, creative design-based processing, and the use of

environmentally friendly technologies. With these various approaches, textile waste can be reprocessed into new products such as bags, accessories, home decor, and clothing with more modern designs. In addition to helping reduce pollution and extend the lifespan of materials, these efforts also support the realization of a circular economy through more responsible consumption patterns and sustainable community-based initiatives (Korhonen et al., 2018).

Beyond waste management, this process plays a crucial role in advancing the circular economy, an economic system that emphasises recycling and waste reduction (Yunisvita et al., 2025). This approach encourages more efficient, sustainable production and consumption patterns while minimizing waste. From a social perspective, this also opens up new business opportunities in the creative industry, particularly for MSMEs, housewives, and the younger generation interested in crafts or product design (Apriani et al., 2024). Furthermore, this activity creates new jobs, from the collection, processing, and marketing of textile waste products. Equally important, this effort also raises public awareness of the importance of a sustainable lifestyle and environmental responsibility (Lee, 2025; Muparadzi & Mukonza, 2026).

This entire process is a crucial part of achieving the Sustainable Development Goals (SDGs) (Humaidi & Prabowo, 2024), particularly SDG 12 on responsible consumption and production and SDG 8 on decent work and economic growth. Therefore, innovative and sustainable textile waste management serves not only as a solution to environmental problems but also as an inclusive economic strategy with broad impacts on sustainable development (Xie et al., 2021).

Several previous studies have focused on the issue of excessive fast fashion consumption and its impact on the environment (Hakim & Rusadi, 2022; Muazimah, 2023; Lee et al., 2025). However, these studies have largely neglected local-level intervention strategies, particularly community-based approaches such as upcycling in rural areas. This gap highlights the need to develop practical, grassroots solutions, directly involving communities in sustainable waste management. In response, the innovation presented in this program lies in combining structured upcycling training with the "Tangan Ibu" community group as a model for implementing a circular economy aligned with the Sustainable Development Goals (SDGs), addressing environmental challenges while simultaneously improving community skills and creating sustainable economic opportunities.

This community service program is being implemented at Rumah Belajar Ceria Palembang, Sungai Pedado, Palembang, as a form of implementing creative and sustainable textile waste management. In collaboration with the "Tangan Ibu" community, this activity involves local housewives through training and mentoring in processing textile waste into products with added value. In addition, this program also aims to improve entrepreneurial skills, environmental awareness, and encourage the implementation of a circular economy. Furthermore, this activity also strengthens the synergy between educational institutions, social organizations, and the community in an effort to realize local sustainability and economic empowerment.

Based on the results of field identification of housewives and local communities regarding textile waste, the needs at the activity location can be explained in Table 1 below.

Table 1. Community Needs Assessment

No	Aspect	Community Needs
1	Knowledge	Education about the dangers of textile waste and the importance of recycling efforts
2	Skill	Training in making new products such as bed sheets, handicrafts, bags, brooches, and various other products
3	Technology	Simple equipment such as mini sewing machines, presses, looms, and other supporting equipment
4	Marketing	Assistance in promotion, product packaging, and digital marketing
5	Guidance	Support for small-scale business capital and simple bookkeeping

Source: Field Survey, 2025

Quantitative data on textile waste in South Sumatra is still very limited, even though Indonesia produces approximately 2.3 million tons of textile waste annually, indicating a weak

waste management system at the regional level. Field observations and focus group discussions (FGDs) revealed both a need and potential for education on waste management, production processes, and marketing. Based on this situation, this research aims to fill the gap by offering a community-based circular economy model that can process textile waste into value-added fashion products, while simultaneously strengthening sustainable consumption and production patterns and increasing the socio-economic resilience of local communities.

Table 2. Community Potential Identification

No	Aspect	Community Potential
1	Human resources	Housewives, youth group members, small and medium enterprise groups
2	Waste resources	Fabric waste from the garment/home industry
3	Social network	Batik aesthetics, local motifs, craft art
4	Local culture	Batik aesthetics, local motifs, craft art
5	Availability	Village hall, production house, community space

Source: Field Survey, 2025

Community-based textile waste management activities have a comprehensive impact, both economically, environmentally, and socially. People are beginning to view textile waste not as trash but as a resource that can be processed into valuable products (Ismail et al., 2025; Mukthar et al., 2024; Murray et al., 2017). However, previous research and programs in the field of sustainable fashion consumption and production tend to focus on green industry approaches and large-scale resource efficiency, as encouraged by the policies of the Ministry of Industry of the Republic of Indonesia. This places industry as the primary actor and pays less attention to the role of households and communities in the circular economy. Thus, there is a research gap regarding circular fashion models that integrate changes in consumption behavior, household economic empowerment, community-based textile waste processing, and market connectivity through digital marketing. The novelty of this program lies in its integrated and practical approach through education, technical training, appropriate technology, digital marketing, and the formation of community-based creative business groups that support the achievement of SDG 12 (responsible consumption and production) and SDG 8 (inclusive economic growth).

IMPLEMENTATION METHOD

This community service activity was carried out in Sungai Pedado, Kertapati District, Palembang, South Sumatra, from September to November 2025. This location was chosen because it has easy access to textile waste and the presence of an active community, as identified in the introduction. The target of this activity is approximately 18–20 housewives selected based on the results of the survey (Table 1), with the criteria of having an interest in crafts and access to textile waste.

This activity applies a participatory approach based on community empowerment combined with circular economy principles. It is implemented through collaboration between the implementation team, community partners, and students, ensuring active community involvement at every stage of the activity. This approach aligns with the view of Rogers et al. (2023), who stated that the Participatory Rural Appraisal (PRA) model is effective in increasing local participation while strengthening community capacity through collaborative learning processes.

The program's implementation method consists of six interrelated stages. Activities begin with identifying community needs and potential to ensure targeted interventions. They are then followed by education and outreach on textile waste recycling and its relationship to the SDGs to increase participant understanding and awareness. Next, participants undergo technical training on textile waste processing using appropriate technology, which is further enhanced through production and design mentoring to enable them to produce valuable, creative products.To expand market access, participants are also provided with digital marketing training and branding strategies. The final stage, monitoring and evaluation, is carried out to measure changes in knowledge, skills, economic, environmental, and social impacts, while ensuring the program's sustainability.

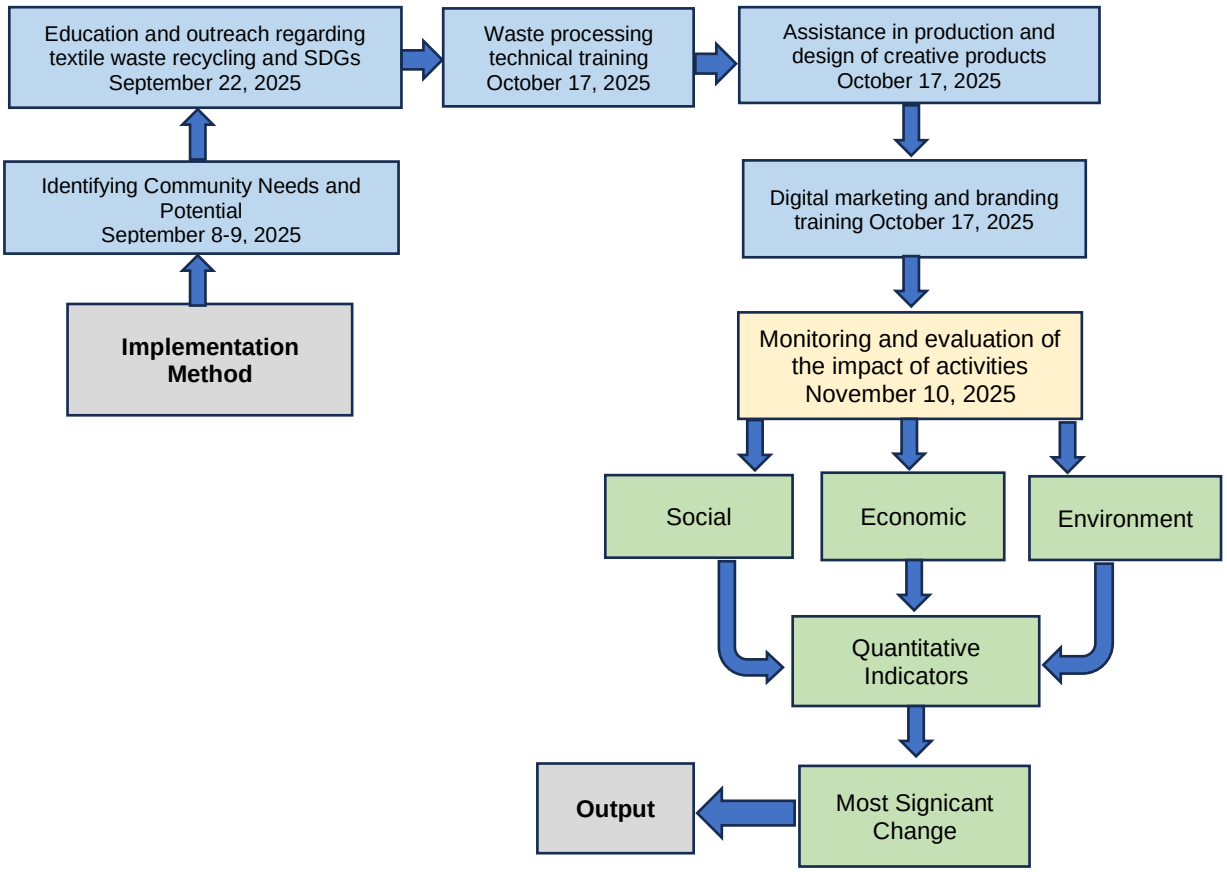

Figure 1. Activity Flow

The evaluation of the program implemented at Palembang Ceria Learning House with the "Tangan Ibu" community, involving 18 active mothers during the period of September–November 2025, was conducted using a participatory approach based on social, economic, and environmental impact indicators.

Evaluation techniques included Participatory Rural Assessment (PRA), observation, interviews, Focus Group Discussions (FGDs), and pre- and post-tests to measure participant capacity building. Furthermore, the Most Significant Change (MSC) approach was used to capture meaningful changes from the perspective of beneficiaries, as recommended by Davies & Dart, (2005) as an effective method for evaluating empowerment outcomes through social change narratives. This approach also aligns with the findings of Tahir, T., et al (2025) who emphasize the importance of collaboration between communities, academics, and business actors in creating sustainable local innovations based on a green economy. In the context of textile waste, Raman et al. (2025) and Istiyani and Handayani (2022) show that the integration of a circular economy and community empowerment can increase resource efficiency while opening up new economic opportunities in sustainable supply chains.

The results of this activity include the formation of creative textile waste processing business groups, increased skills and income of participants, the use of appropriate technology, and the development of environmentally friendly products with economic value that support the implementation of SDG 12 on responsible consumption and production, in line with the findings of Yunisvita et al. (2025) which emphasizes the importance of community-based waste management in strengthening local capacity and sustainable development goals at the regional level.

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RESULTS

The implementation of community service activities in the Palembang Ceria Learning House environment with the Tangan Ibu community under the guidance of Satu Amal Indonesia showed positive results in increasing community capacity and economic independence based on circular economy principles. The participatory and community empowerment approach (Community-Based Empowerment) successfully encouraged active participation from the potential identification stage to product marketing. The participants were housewives aged 26–40 years who actively participated in the entire series of activities. According to Syamsiyah et al. (2025) and Dushkova & Ivlieva (2024), a participatory approach encourages communities to play a key role in the change process, rather than merely as recipients of aid, thereby making program outcomes more sustainable and appropriate to local socio-cultural conditions. The characteristics of the participants in this community service activity can be seen in Table 3.

Table 3. Participants Profile

Description	Total	Percentage	Description of Participant Characteristics
Total Participants	18	100%	All participants are domiciled in Sungai Pedado Village, Kertapati District, Palembang, South Sumatra
Gender	18	100%	All participants were women, consisting of members of Tangan Ibu with a social background of housewives and MSMEs but with a high level of environmental awareness.
Participants who graduated from high school	16	88,88%	The majority of participants, 16 (88.88%), were high school graduates. This educational background indicates that participants had sufficient basic knowledge to understand the training materials and actively participate in the textile waste management program.
Participants who have diploma and bachelor degrees	2	11,11%	Only 2 participants (11.11%) had diplomas or bachelor's degrees. This indicates that participants with higher education backgrounds are a minority, but they have the potential to play a supporting role in facilitating knowledge exchange during the training process.
Age Range 26-30 Years	5	27,7%	The participants were young, generally new to social activities, and enthusiastic about learning new things, especially those related to textile waste.
Age Range 31-35 Years	10	55,55%	The participants are of productive age, have experience in processing textile waste among "Tangan Ibu"
Age Range >35 Years	3	16,66%	Participants are mature adults, mostly experienced homemakers with a high level of concern for the environment and the sustainability of the program.

Source: Field Survey, 2025

In the initial stage, the Participatory Rural Appraisal (PRA) process was conducted to map the needs and potential of the local community of waste textile-based slipper artisans. The PRA results showed that household textile waste and home production residue have not been optimally utilized. Through the participatory identification process, the community discovered abundant raw material potential and opportunities to process waste into marketable products. This aligns with the findings of Rogers et al. (2023), which explains that PRA is effective in building critical awareness and community ownership of empowerment programs.

In the education phase, participants were given materials about the concept of circular economy and its relation to SDG 12: Responsible Consumption and Production. The results of pre-test and post-test show an average increase in participants' knowledge of more than 50%, from an average score of 65 to 95. This improvement indicates the success of the participatory-based education method. Some scholars (for instance, Winarni et al., 2025; Eisenreich & Fuller,

2023) also confirm that training based on active participation can significantly increase community green literacy.

The next stage involves technical training for textile waste processing with a hands-on training approach using appropriate technology such as mini sewing machines and simple fabric cutting tools. The activity results show that 100% of participants were able to produce at least one type of creative product, such as doormats, brooches, and scrap fabric wallets. Production time also decreased by approximately 20% after the training compared to before the activity. This achievement aligns with research findings of Sinaga (2024), which states that the use of simple technology in empowering women artisans can increase productivity and work efficiency.

In addition to skill enhancement, there also emerged design innovations based on Palembang's local motifs that strengthened the product's appeal. Participants developed five new product variations from only two previous types. This local creativity demonstrates how the concept of local wisdom can serve as a foundation for innovation in the circular economy, as asserted by (2024), who argue that the application of local cultural values strengthens the sustainability of creative microenterprises.

Table 4. Description of Activities

Documentation Photo	Describtion
	Sorting raw materials from textile waste
	Brooch making activity (one of the craft products from textile waste)
	Doormats are one of the products of textile waste from community service activities
	Packaging the results of community service activities (brooches) for marketing

In the digital marketing phase, participants are introduced to eco-friendly branding strategies through social media platforms such as Instagram, WhatsApp Business, and Shopee. The community successfully formed the brand identity "Palembang Local Products Made by Mothers in Sungai Pedado" and marketed the products with a sustainability narrative ("environmentally friendly products from textile waste"). This result confirms the (LCID Indonesia,

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2021), which states that circular economy practices can provide direct economic benefits through cost savings, product innovation, and new market opportunities at the micro level.

Besides economic aspects, successful digital branding also strengthens community independence. According to Bahtiar et al. (2025), digital marketing has become an important factor in maintaining the existence of small businesses in the green economy era, especially for women's communities that rely on household production. Table 5 reveals the results of the community service activity evaluation.

Table 5 Service Activity Evaluation Results

Evaluation Aspect	Impact Indicator	Quantitative Results	Qualitative & Narrative Findings	Analysis / Interpretation
Social	Participant participation rate	100% active attendance throughout all activity stages	Active participants in discussions, showing high enthusiasm, and proposing new design ideas	High participation indicates that the Community-Based Empowerment approach has successfully created a sense of ownership and social responsibility
	SDGs & Circular Economy Knowledge Enhancement	Average pre-test score: 65 → Average post test score: 95	Participants understand the concept of 3R and its connection to SDG-12	Effective education increases environmental awareness, strengthens green literacy, and awareness of waste management
	Technical skill improvement	100% of participants were able to create at least 1 product (mats, brooches or keychains/small bags)	Participants feel more confident and are able to teach others	There was a transfer of skills which showed the success of participatory-based training (in accordance with the Participatory Learning Model theory).
Economy	Household income increase	Average income increases by 5-10% in the first month	Participants are able to sell products online with "eco friendly" branding	Strengthening the family economy is proven through a circular economy approach.
	Production cost efficiency	Efficiency increased by 15% compared to before training	Using cutting tools and mini sewing machines speeds up the process	Cost efficiency demonstrates the tangible benefits of appropriate technology and practice-based training.
	Product diversification	The number of variants increased from 2 → 5 product types	The design Concept emerged from the participants themselves based on local motifs	Innovation shows the growth of creativity and local market orientation, supporting local based entrepreneurship.

Environment	Reduction of textile waste volume	±150 kg of textile waste is processed in a short time	The surrounding environment is cleaner, leftover fabric is no longer discarded	Real ecological impact, supporting the Zero Waste Community principle
	Waste management awareness	80% of participant started sorting household waste	Participants start applying the 3R principle at home	Environmental behavior change; in accordance with the Behavioral Change in Circular Economy model
Institutional And Sustainability	Formation of a Business consortium	Participants: 25 housewives (18 active until the end, from the intro survey).	There is a division of production, promotion, and logistics tasks	Key indicator for social and institutional sustainability
	Digital marketing network	1 active Instagram, WhatsApp, and Shopee account	Increased engagement & initial orders from outside the community	Digital branding has become an important factor for the sustainability of the local creative product market.

Source: Based on evaluation results (data processed), 2025

The evaluation of the community service program demonstrated very positive results in social, economic, environmental, institutional, and sustainability aspects. Participant participation reached 100% across all stages of the program, accompanied by a significant increase in knowledge about the SDGs and the circular economy, as reflected in the increase in the average pre-test score from 65 to 95 in the post-test. Participants also experienced improved technical skills, were able to produce creative products independently, and demonstrated self-confidence and the ability to share knowledge. Economically, the program resulted in a 5–10% increase in household income, a 15% increase in production cost efficiency, and product diversification based on local motifs that encouraged community entrepreneurship. Environmentally, the program successfully processed approximately 150 kg of textile waste while raising public awareness of waste management, as evidenced by the majority of participants starting to implement the 3R principles at home. Furthermore, the formation of a business consortium and the utilization of a digital marketing platform are strong indicators of the program's sustainability, both institutionally and economically, enabling it to have a long-term impact on the target community.

Figure 2 shows a comparison of pre-test and post-test scores across four assessment aspects: social, economic, environmental, and sustainability. The results indicate an increase in scores across all aspects after the training program, indicating increased knowledge, awareness, and skills among participants regarding textile waste management.

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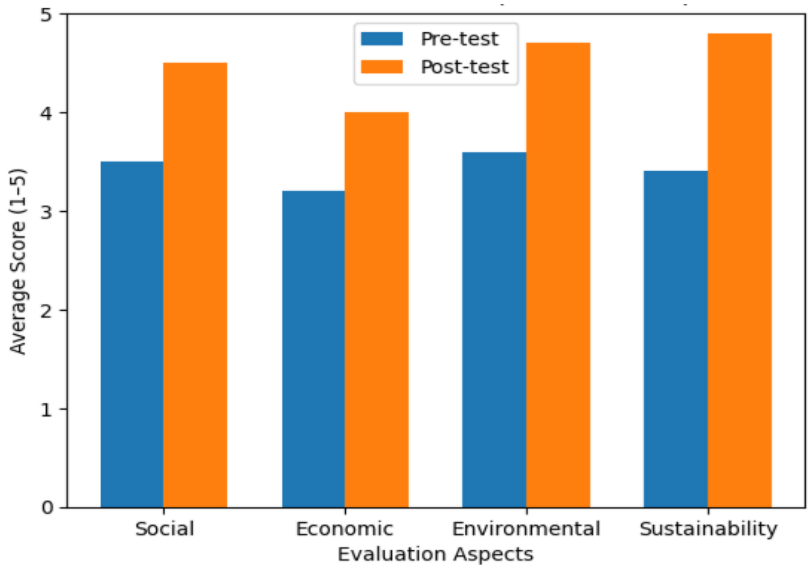

Figure 2 Evaluation Score per Aspect

The social aspect, which reflects participants' awareness, participation, and collaboration in community-based activities, increased from an average pre-test score of 3.5 to a post-test score of 4.5. This indicates that the program successfully strengthened social engagement and a sense of shared responsibility among participants. The economic aspect, which measures participants' understanding of the economic value and income potential of textile waste processing, also increased, from 3.2 in the pre-test to 4.0 in the post-test. This increase indicates that participants increasingly understand the economic opportunities of textile waste utilization. Furthermore, the environmental aspect, which relates to participants' knowledge and attitudes toward environmental protection, waste reduction, and the impacts of textile waste, increased from 3.6 to 4.7. This indicates that the educational intervention was effective in raising environmental awareness. Meanwhile, the sustainability aspect, which reflects participants' commitment and readiness to continue the program long-term, experienced the most significant increase, from 3.4 in the pre-test to 4.8 in the post-test. These findings indicate that the program not only improved participants' understanding but also encouraged their intention to continue the program in the future.

DISCUSSION

The evaluation indicators used in this study were designed to describe the social, economic, environmental, and sustainability dimensions of community-based textile waste management, while linking them to the Sustainable Development Goals (SDGs). The social aspect reflects participants' level of awareness, participation, and collaboration in joint activities. Improved scores on the post-test indicate that the program successfully strengthened social engagement and learning processes within the community. This finding aligns with previous research that suggests participatory and community-based education can enhance social cohesion and community engagement in waste management initiatives (Wilson et al., 2012). In this context, the social dimension supports SDG 4 (Quality Education) by enhancing knowledge and learning capacity, and SDG 11 (Sustainable Cities and Communities) by encouraging active community participation in environmental action at the local level.

The economic aspect of this study was used to assess the extent to which participants understood the economic value and income potential of textile waste processing. Improved scores on the post-test indicated that participants increasingly understood how to transform waste into value-added products. This finding aligns with various studies on the circular economy and waste utilization, which confirm that community-based training and innovation can open up new livelihood opportunities and strengthen local economies (Geissdoerfer et al., 2017; Kirchherr et al., 2017; Camacho-Otero et al., 2018). Therefore, this dimension is closely related to SDG 8

(Decent Work and Economic Growth) and SDG 1 (Eradication of Poverty), as skills development in waste management can support micro-enterprises and income diversification at the household level.

The environmental aspect of this study focused on participants' knowledge and attitudes toward environmental protection, waste reduction, and the ecological impact of textile waste. Significant increases in post-test scores indicate that the educational intervention successfully increased environmental awareness and encouraged more environmentally friendly behaviors. These results align with previous research that suggests environmental education and community engagement play a crucial role in improving sustainable waste management practices (Switch-Asia, 2021; Wilson et al., 2012). Therefore, this dimension directly contributes to SDG 12 (Responsible Consumption and Production) by encouraging waste reduction and recycling practices, and supports SDG 13 (Addressing Climate Change) by reducing environmental impacts and encouraging more sustainable lifestyles.

The sustainability aspect reflects participants' commitment and readiness to continue the program and ensure its long-term implementation, including knowledge transfer and the sustainability of activities. High post-test scores in this aspect indicate that the program not only improved short-term knowledge and skills but also strengthened participants' motivation to sustain the initiative. This is consistent with literature emphasizing that the long-term success of community-based waste management depends on local ownership, sustained engagement, and multi-stakeholder collaboration (Geissdoerfer et al., 2017; Wilson et al., 2012). In the context of the SDGs, this dimension is closely linked to SDG 17 (Partnerships for the Goals), as sustainable community programs require collaboration among community members (Filho et al., 2019), local institutions, and other stakeholders, while simultaneously strengthening the long-term goals of SDGs 11 and 12.

Overall, improvements in these four aspects indicate that the educational intervention not only successfully increased participants' knowledge but also strengthened their social capacity, economic awareness, environmental responsibility, and commitment to sustainability. These results align with various international studies showing that community-based participatory approaches to waste management and the implementation of a circular economy can simultaneously address social, economic, and environmental goals (Murray et al., 2017; Ramirez-Escamilla et al., 2024). Systematic reviews indicate that strategies such as reuse and recycling are key to reducing environmental impacts and promoting sustainability in the textile and fashion sectors (Biyada & Urbonavičius, 2025; Shamsuzzaman et al., 2025). Furthermore, studies on circular economy transitions emphasize how the adoption of sustainable practices by the industry can contribute to environmental and socio-economic goals aligned with the SDGs (Raman et al., 2025). These findings support this study's emphasis on community education and participatory approaches as mechanisms to enhance circularity at the local level.

CONCLUSIONS

The results of community service activities at the Palembang Ceria Learning House with the Tangan Ibu Community, it can be concluded that the application of circular economic principles through a textile waste upcycling program has a significant impact from an economic perspective. Microeconomically, this intervention increases household productive capacity, with an average income increase, and encourages the diversification of creative products with competitive market value. In terms of resource efficiency, participatory and technology-based textile waste processing increases labor productivity, while reducing environmental externalities resulting from waste accumulation. This program demonstrates that the integration of technical training, market education, and community collaboration can generate added economic value from waste, support local economic development, and simultaneously strengthen the community's adaptive capacity for sustainable economic practices.

This program needs to be developed through strengthening partnerships with universities, local governments, and businesses to expand access to capital, raw materials, and markets. Ongoing support needed to maintain the production and digital marketing processes. Furthermore, product innovation and market diversification are crucial for entering the recycled fashion and eco-friendly gift segments. Continuous improvement in digital and financial literacy is

necessary to ensure participants become more independent in marketing and business management. This circular economy-based service model can also be replicated in other regions with contextual adjustments and developed through collaborative research.

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ETHICAL CONSIDERATIONS

Not applicable.

CONFLICT OF INTEREST

The authors declare that this study has no conflict of interest.

AUTHOR CONTRIBUTIONS

Deassy Apriani (D.A) (corresponding author: deassyapriani@fe.unsri.ac.id), Feny Marissa (F.M) and Hamira (H) is a master's lecturer in the Department of Development Economics, Universitas Sriwijaya, Indonesian. Bernadette Robiani (B.R) is a professor in the Department of Development Economics, Universitas Sriwijaya, Indonesian. Imam Asngari (I.A) is a doctor in the Department of Development Economics, Universitas Sriwijaya, Indonesian. Authors' contributions: D.A., F.M., H: Conceptualization, methodology, I.A.: formal analysis, writing original draft. B.R.: Conceptualization, supervision, resources. D.A: final draft, funding acquisition.

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