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TRAINING ON RECYCLING WASTE INTO MARKETABLE PRODUCTS AT THE "TAMAN RESIK LESTARI CENTRAL WASTE BANK AND SANGGAR PAWUHAN" BANTUL

Trio Ardhian[1]*, Heri Maria Zulfiati[1], Azfa Mutiara Ahmad Pabulo[2], Elyas Djufri[1]
[1]Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia
[2]Universitas Mercu Buana, Yogyakarta, Indonesia
*trio.ardhian@ustjogja.ac.id

Abstrak: Sampah merupakan salah satu persoalan lingkungan mendesak di Indonesia, termasuk di Kabupaten Bantul, yang hingga kini masih didominasi praktik pengumpulan dan pemilahan sederhana tanpa memberikan nilai tambah ekonomi. Program pengabdian ini bertujuan untuk (1) meningkatkan keterampilan dan kreativitas mitra dalam mendaur ulang sampah menjadi produk inovatif bernilai jual tinggi, (2) memberikan akses pada teknologi sederhana untuk mendukung efisiensi produksi, dan (3) meningkatkan kesadaran masyarakat terhadap pentingnya pengelolaan sampah berkelanjutan. Metode yang digunakan adalah *Participatory Action Research* (PAR) yang dilaksanakan melalui tahapan perencanaan, aksi, observasi, dan refleksi secara partisipatif. Mitra kegiatan, yaitu Bank Sampah Induk "Taman Resik Lestari" dan Sanggar Pawuhan Kelola Sampah Jadi Berkah, terlibat aktif sejak tahap identifikasi permasalahan dan kebutuhan pelatihan, pelaksanaan pelatihan daur ulang, penggunaan teknologi sederhana, hingga evaluasi hasil dan perumusan tindak lanjut. Hasil kegiatan menunjukkan adanya peningkatan signifikan dalam keterampilan mitra, khususnya keterampilan teknis dan kreativitas dalam mengolah plastik bekas menjadi produk kalung dengan variasi desain, anyaman, dan warna yang lebih estetik. Akses terhadap teknologi sederhana seperti mesin pencacah plastik dan alat cetak manik-manik berhasil meningkatkan efisiensi produksi, ditandai dengan waktu pengerjaan yang lebih singkat, kualitas produk yang lebih baik, dan kapasitas produksi yang meningkat dua kali lipat. Temuan utama dari program ini adalah terbentuknya ekosistem pengelolaan sampah berbasis komunitas yang tidak hanya menekankan pada aspek teknis produksi, tetapi juga mencakup pemberdayaan sosial, dukungan kelembagaan, dan strategi pemasaran digital. Implikasi dari kegiatan ini adalah perlunya replikasi model pelatihan dan pemberdayaan ini di komunitas lain sebagai upaya memperkuat ekonomi sirkular berbasis masyarakat, sekaligus mendukung pencapaian SDG 12 tentang konsumsi dan produksi berkelanjutan serta SDG 8 tentang pekerjaan layak dan pertumbuhan ekonomi.

Kata Kunci: pelatihan daur ulang, bank sampah, kreativitas, teknologi sederhana, kesadaran masyarakat

Abstract: Waste is a major environmental challenge in Indonesia, including Bantul Regency, where waste management remains dominated by basic collection and sorting with limited economic value. This community service programme aims to (1) improve partners' skills and creativity in recycling waste into marketable products, (2) provide access to simple technologies to enhance production efficiency, and (3) increase public awareness of sustainable waste management. The programme applied a Participatory Action Research (PAR) approach through iterative stages of planning, action, observation, and reflection. Partners, namely the "Taman Resik Lestari" Central Waste Bank and Sanggar Pawuhan Kelola Sampah Jadi Berkah, were actively involved from problem identification and training design to implementation and evaluation. The results show significant improvements in partners' technical skills and creativity in producing recycled plastic necklaces with better designs and colour variations. The use of simple technologies, including plastic shredders and bead-moulding tools, reduced production time, improved product quality, and doubled production capacity. Overall, the programme contributed to the development of a community-based waste management ecosystem that integrates technical, social, and economic empowerment, supporting SDG 12 and SDG 8.

Keywords: recycling training, waste banks, creativity, simple technology, public awareness

Introduction

Waste constitutes a significant environmental concern in Indonesia, particularly in Bantul Regency. The volume of garbage produced by homes and enterprises significantly surpasses the region's processing capability, resulting in socio-economic challenges, health concerns, and degradation of natural aesthetics (Abdillah et al., 2024; Yandri et al., 2023). A community waste bank, an alternative waste management strategy, can alleviate landfill pressure and enhance economic value (Fitriani et al., 2024). Nonetheless, its execution at the community level frequently encounters obstacles related to technology, innovation, and business viability (Aulia et al., 2025).

The 'Taman Resik Lestari' Central Trash Bank and the 'Sanggar Pawuhan Kelola Sampah Jadi Berkah' community are two engaged entities in trash management in Bantul. The Central Waste Bank 'Taman Resik Lestari' has mobilized over 300 members via a waste savings system; nonetheless, activities are confined to collection and sorting prior to selling to garbage collectors at comparatively low prices (Sya'diyah et al., 2025). Simultaneously, the Pawuhan Workshop, propelled by homemakers and young individuals, has generated many recycled products, including repurposed plastic bags, plant pots, and compost; nonetheless, the diversity, quality, and marketing of these products are significantly constrained. These two partners underutilize their economic potential (Atmojo et al., 2022; Dewi & Harsono, 2024; Suwerda et al., 2018).

Waste constitutes a significant environmental challenge in Indonesia, including in Bantul Regency, where the volume of waste generated continues to exceed local management capacity. In many communities, waste management practices are still dominated by basic collection and sorting activities that provide limited economic value and insufficient environmental impact (Abdillah et al., 2024; Yandri et al., 2023). As a response to this issue, community-based waste management initiatives, particularly waste banks, have been widely promoted as an alternative approach to reduce landfill pressure while encouraging community participation and environmental awareness (Fitriani et al., 2024; Suwerda et al., 2018).

Previous community service programmes related to waste banks and recycling have generally focused on environmental education, waste segregation, and basic recycling skills. Several initiatives have successfully strengthened waste bank institutions and improved community knowledge regarding waste management practices (Irawansyah et al., 2025). Other programmes have introduced simple recycling activities aimed at generating additional income, particularly for women and youth, through the production of handicrafts from plastic and other recyclable materials (Simondinata et al., 2025). These initiatives demonstrate the important role of community service in promoting environmental responsibility and social empowerment.

Despite these contributions, most existing programmes remain limited in terms of innovation, production efficiency, and long-term economic sustainability. Recycling activities are often implemented without adequate integration of product design innovation, appropriate technology, and market-oriented strategies, resulting in recycled products with low competitiveness and limited added value. In addition, many waste banks continue to rely on manual production processes and conventional marketing channels, which constrain production capacity and reduce economic viability (Majid et al., 2023). Community participation is also

frequently restricted to the implementation stage, with limited involvement in planning, evaluation, and decision-making processes, thereby reducing the transformative potential of empowerment-based programmes.

This program's uniqueness lies in its comprehensive approach, integrating technical production training, the application of basic technologies, enhanced business management, and digital marketing strategies through a series of empowerment initiatives (Asgari & Asgari, 2021; Konietzko et al., 2020; Trevisan et al., 2022). The novelty of this programme lies in its context-specific implementation. The programme simultaneously engages a central waste bank and a community-based recycling workshop, actively involves partners throughout all stages of the Participatory Action Research (PAR) cycle, and focuses on transforming recycled plastic into marketable jewellery products supported by digital marketing strategies. This integrated approach not only enhances technical skills but also strengthens social, institutional, and economic dimensions of community-based waste management. The novelty of this programme lies in its context-specific implementation. The programme simultaneously engages a central waste bank and a community-based recycling workshop, actively involves partners throughout all stages of the Participatory Action Research (PAR) cycle, and focuses on transforming recycled plastic into marketable jewellery products supported by digital marketing strategies. This integrated approach not only enhances technical skills but also strengthens social, institutional, and economic dimensions of community-based waste management. This program enhances individual ability while simultaneously fortifying the institutional capacity of partner communities for the sustainable implementation of activities (Thakur & Wilson, 2023). This initiative aims to generate recycled items and establish a community-based circular economic ecosystem that can be replicated elsewhere.

Recycling training programs directly facilitate the attainment of the Sustainable Development Goals (SDGs), specifically SDG 12 concerning Responsible Consumption and Production, by augmenting knowledge, awareness, and responsible waste management practices at the household and community levels. These initiatives have demonstrated efficacy in diminishing trash volume and enhancing environmental quality. Furthermore, these initiatives align with SDG 8 on Decent Work and Economic Growth, as community-oriented programs and entrepreneurship training derived from waste can generate new employment opportunities, increase incomes, and empower marginalized groups, including women and youth. This program enhances the attainment of Key Performance Indicators (KPIs) for higher education institutions and the eight National Development Goals by reinforcing their significant role in community empowerment and enhancing well-being through environmentally based social and economic innovations (Bilderback, 2024). From a research standpoint, training focused on innovation and basic technology in waste management aligns with the objectives of the National Research Master Plan (BRIN), particularly in waste management and the advancement of sustainable innovations.

Informed by the background, identified gaps, and prior literature reviews, the objectives of this community service initiative are (1) to enhance the skills and creativity of partners in transforming waste into innovative, high-value products, (2) to facilitate access to basic technologies that promote production efficiency, and (3) to elevate public awareness regarding

the significance of sustainable waste management. These aims are to help the Central Waste Bank 'Taman Resik Lestari' and the Pawuhan Waste Management Workshop evolve into a profitable, innovative, and sustainable community-based waste management model.

Method

The method used in this activity is Participatory Action Research (PAR), a participatory research approach that integrates planning, action, observation, and reflection, and was applied iteratively throughout the programme. This cycle enabled continuous learning, improvement, and joint decision-making between the service team and the partner communities (Kaliongga et al., 2023). Through PAR, this activity actively involved 20 people from the Tamantirto village in Kasihan Bantul, consisting of nine housewives who were responsible for household waste management and product assembly, six waste bank administrators involved in waste collection, sorting, and organisational coordination, and five local youth members who contributed to product innovation and digital promotion activitiesstarting from identifying waste management issues and formulating training needs to implementing a recycling program for marketable products. This process emphasizes collaboration between the service team, the Central Waste Bank 'Taman Resik Lestari,' and the Sanggar Pawuhan Kelola Sampah Jadi Berkah, resulting in solutions tailored to local conditions and community potential. Table 1 depicts the stages of this community service program using the PAR approach.

Table 1. The Stages of Waste Recycling Training Activities using PAR

PAR Stage	Main Activities	Training / Activity Format	Expected Outcomes
Planning	Identification of waste management issues, consultation with partners, and assessment of skill and training needs	Focus Group Discussions (FGDs) and participatory consultations with community members	Identification of priority problems and selection of recycled products for development
Action	Basic and advanced training on waste recycling (plastic, paper, organic); production of innovative products (necklaces and crafts); introduction and application of simple production technologies; community socialisation on sustainable waste management	Workshops, hands-on practice, learning by doing, technology demonstrations, and community engagement activities	Improved technical skills and creativity; increased production efficiency; enhanced community participation and awareness
Observation	Monitoring of production processes, assessment of participants' skills, creativity, and product quality during training implementation	Direct observation, documentation, and informal interviews	Recorded data on skill improvement, product quality, and production efficiency
Reflection	Evaluation of training outcomes, identification of challenges and achievements, and formulation of follow-up strategies	Collaborative reflection forums and group discussions with partners	Agreement on improvement strategies, sustainability plans, and marketing directions

Results and Discussion

Improving the skills and creativity of partners in recycling waste

The training results showed an improvement in the skills of members of the 'Taman Resik Lestari' Waste Bank and the Pawuhan Waste Management Workshop in processing waste into products with commercial value. Through a learning-by-doing approach, participants were specifically trained to make necklaces from used plastic. The products produced after the training showed significant improvements in terms of design, weaving techniques, neatness, and color variations. This improvement is reflected in the average skill assessment scores, which increased from 2–3 before the training to 4–5 after the training. To ensure clarity in data interpretation, partners' skills and creativity were assessed using a five-point Likert scale (1–5). A score of 1 indicates very low performance, where participants were unable to perform the assessed skill independently. A score of 2 indicates low performance, limited ability, and the need for intensive guidance. A score of 3 represents moderate performance, where participants demonstrated basic competence with occasional assistance. A score of 4 indicates good performance, meaning participants were able to perform the skill independently with satisfactory quality. A score of 5 represents very good performance, characterised by high technical proficiency, developed creativity, and consistent product quality. Accordingly, scores of 4 and 5 were considered to have met the ideal competency targets of the training programme (Table 2 and Figure 1).

Table 2. Partner Skill and Creativity Scores in Making Handicraft Products from Waste

Skill Aspect	Score Before Training	Score After Training
Creative Design	2.3	4.4
Weaving Technique	2.2	4.7
Product Neatness	2.9	4.9
Color Variation	2.4	4.3

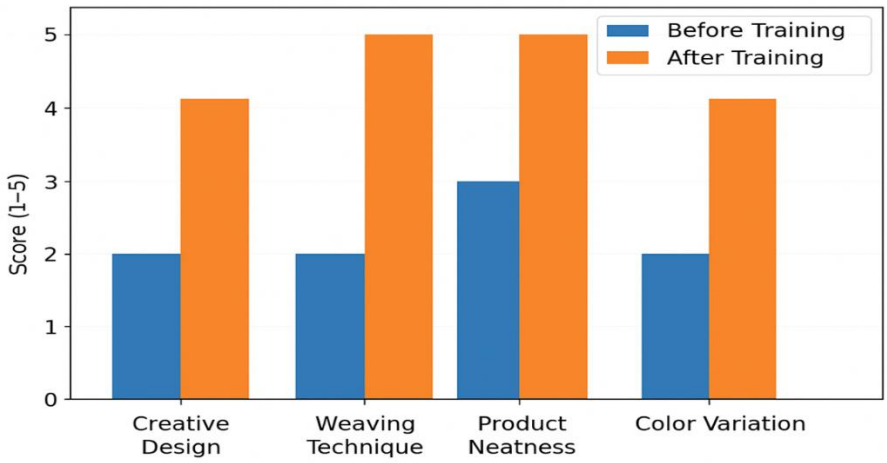

Figure 1. Graph showing the improvement in the skills and creativity of partners

These findings are consistent with previous community service initiatives that emphasise experiential and participatory training in waste recycling. Sulistiyani (2022) and Khoiruman et al. (2024) report that hands-on recycling programmes significantly enhance participants' technical competencies and confidence in producing value-added recycled products (Khoiruman et al., 2024; Sulistiyani, 2022). Similarly, Joleha et al. (2024) found that participatory recycling activities foster creativity when participants are encouraged to engage directly in product design and production processes. The substantial improvement observed in weaving techniques and product neatness in this programme indicates that participants successfully mastered fundamental technical skills, while increased scores in creative design and colour variation suggest the development of aesthetic innovation.

Compared to conventional waste bank activities that primarily focus on waste collection and basic sorting (Suwerda et al., 2018), this programme demonstrates a shift towards innovation-oriented recycling practices that generate higher economic value. Nurhayati & Nurhayati (2023) highlight that recycling initiatives integrating product design elements tend to produce more sustainable empowerment outcomes than those limited to technical waste handling. The present findings therefore reinforce existing theories of community-based empowerment and circular economy practices, which emphasise skill development, creativity, and local innovation as key drivers in transforming waste into marketable products (Asgari & Asgari, 2021).

The hands-on learning approach in this programme enabled participants to directly translate theoretical knowledge into practice, as evidenced by the production of recycled-plastic necklaces that required specific skills in design, weaving, and colour selection. Documentation of the training process (Figure 2) further illustrates high participant engagement during practical sessions. Overall, the results indicate that the programme not only aligns with but also strengthens existing evidence that participatory, innovation-driven recycling training can effectively enhance community skills and creativity while supporting sustainable, value-added waste management practices. The trash recycling program at the Central Trash Bank, 'Taman Resik Lestari,' and the Pawuhan Waste Management Workshop employed a hands-on learning method, enabling participants to immediately apply ways for converting waste into marketable products. A necklace crafted from recycled plastic has been produced, necessitating specialized abilities in design, weaving, and color selection. The documentation in Figure 2 illustrates the participants' enthusiasm during the crafting session, including the creation of necklaces.

Figure 2. Key stages of recycled necklace production and final products

Providing Access to Simple Technology to Support Necklace Production Efficiency

This training also provides partners with access to simple technology that supports the production process of recycled necklaces from used plastic. Before the training, most of the process was still done manually, from shredding the plastic to forming the beads, resulting in limited production and requiring a long time. Through this activity, participants were introduced to small-scale plastic shredding machines, bead molding tools, and simple finishing equipment. The documentation in Figure 2 shows the training process for using the tools, where participants actively tried and practiced the technology.

The impact of using this simple technology is reflected in improved work efficiency and production output. The data in Table 3 and Figure 3 show a reduction in production time per unit from 30 minutes to 15 minutes, as well as an increase in the number of necklaces produced per production session from 10 to 25 (see Figure 3). Additionally, product quality has improved, as indicated by an increase in tidiness scores from 3 to 5, while worker exhaustion levels have decreased from 4 to 2 (see Figure 3).

Table 3. Necklace Production Efficiency Pre- and Post-Implementation of Basic Technology

Production Indicator	Before Training (Mean ± SD)	After Training (Mean ± SD)
Unit production time (minutes)	29.6 ± 2.4	15.2 ± 1.8
Quantity of necklaces produced per session	10.4 ± 1.9	24.7 ± 2.6
Product tidiness rating (scale 1–5)	3.2 ± 0.6	4.8 ± 0.4
Worker exhaustion level (scale 1–5)*	4.1 ± 0.5	2.3 ± 0.6

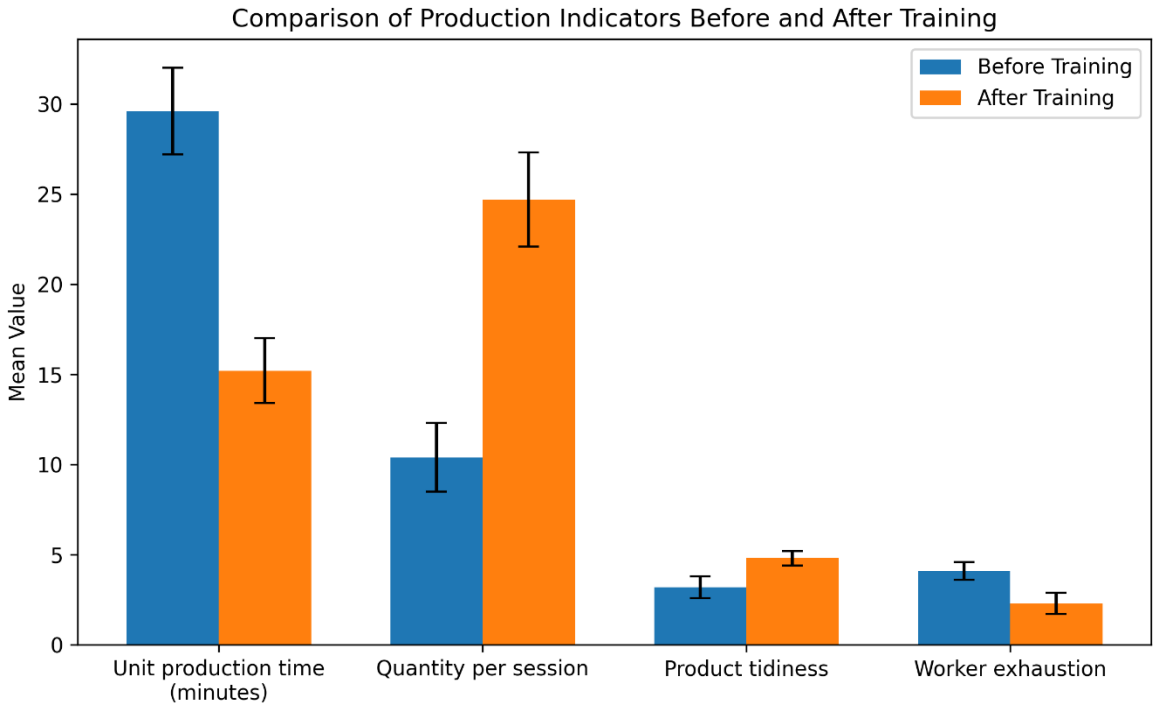

Figure 3. Graph illustrating the enhancement in necklace production efficiency prior to and after the adoption of basic technologies

Heightened public consciousness on sustainable waste management

Qualitative data were collected through semi-structured interviews conducted with selected participants at the end of the programme to explore changes in awareness and perceptions regarding sustainable waste management. To ensure confidentiality and analytical transparency, all informants were anonymised using participant codes.

The interviews revealed a marked enhancement in public consciousness. Participant 1 (housewife and waste bank member) stated that prior to the programme, she perceived plastic waste solely as household refuse, but now recognised its potential to be transformed into handicrafts that could contribute to household income. Similarly, Participant 6 (local youth involved in the Pawuhan Workshop) expressed a growing sense of pride and responsibility, emphasising that youth participation demonstrated that environmental consciousness is not limited to older community members but can be actively driven by younger generations.

Support for the programme also emerged from institutional and civic actors. Participant 12 (village official) noted that the initiative assisted local government efforts to reduce the village's waste burden by equipping residents with both conceptual understanding and practical skills to produce marketable recycled products. In parallel, Participant 15 (environmental cadre) reported increased confidence in encouraging neighbours to sort household waste, as the training enabled her to provide concrete examples rather than relying solely on verbal appeals. These testimonies indicate that the programme fostered awareness not only at the individual level but also within broader community and governance structures.

The observed shift in awareness can be directly attributed to the iterative reflection and action cycles of the Participatory Action Research (PAR) approach. During the reflection phase, participants collectively discussed local waste problems and explored their environmental and economic implications, which challenged the prevailing perception of waste as merely a domestic burden. This critical reflection laid the foundation for awareness transformation. Subsequently, the action phase—implemented through hands-on training, collaborative production, and environmental campaigns—reinforced this awareness by allowing participants to experience tangible outcomes from recycling activities. The realisation of economic potential, combined with the collaborative nature of the workshops, proved to be a decisive catalyst in sustaining participants' engagement and consciousness.

The training and environmental initiatives conducted at the Central Waste Bank "Taman Resik Lestari" and the Pawuhan Workshop "Kelola Sampah Jadi Berkah" have demonstrated their effectiveness in enhancing community knowledge of responsible waste management. Prior to the initiative's commencement, the majority of individuals saw waste only as a domestic encumbrance requiring disposal, with little consideration for sorting or processing. Interventions such as socialization, training, and environmental campaigns facilitated a transition towards a more positive perspective.

This phenomenon underscores the notion that the efficacy of community-based programs is predominantly influenced by heightened collective awareness. The Bantul community is not only a recipient of training but has also evolved into an active catalyst for cultural transformation in trash management (Joleha et al., 2024). Active community engagement, cooperation with local authorities, and the provision of incentives and infrastructural assistance have demonstrated efficacy in enhancing collective knowledge and participation in waste management (Lazuardi et al., 2023; Nurhayati & Nurhayati, 2023).

This study demonstrates that the shift in participants' consciousness was not triggered by a single factor but by the interaction between the reflection and action cycles of the Participatory Action Research (PAR) approach. During the reflection phase, participants were encouraged to critically examine local waste-related problems and collectively reassess the value of household waste. This process initiated cognitive awareness by reframing waste from an environmental burden into a potential economic resource. However, awareness remained abstract at this stage.

The subsequent action cycles played a decisive role in transforming this awareness into sustained consciousness. Through collaborative, hands-on workshops, participants directly experienced the economic and creative potential of waste by producing marketable products together. The economic value of recycled products acted as an initial motivator, while the collaborative nature of the workshops functioned as the key reinforcing mechanism, strengthening confidence, mutual learning, and collective ownership. This combination explains why the observed change in consciousness extended beyond individual behaviour to a shared community mindset, thereby reinforcing the findings of

Consequently, it can be inferred that heightened community awareness is manifested not only in technical behaviors such as waste sorting and recycling but also in the development of a collective sense of responsibility for environmental protection. Testimonials from residents,

youth, village officials, and environmental cadres demonstrate that this program has enhanced awareness across community groups while creating substantial prospects for the sustainability of community-based trash management activities in Bantul.

Conclusion

This study demonstrates that the Participatory Action Research (PAR) approach facilitated both measurable improvements and transformative change in community-based waste management in Bantul. Quantitative results show consistent post-training gains in participants' technical skills and productivity, accompanied by increased production efficiency. The average unit production time decreased from 29.6 ± 2.4 minutes to 15.2 ± 1.8 minutes, while output per session increased from 10.4 ± 1.9 to 24.7 ± 2.6 units. Improvements in product quality and reduced worker fatigue further indicate that the intervention strengthened technical capacity without imposing additional physical strain.

The most influential stage of the PAR cycle was the action phase, where hands-on, collaborative production enabled participants to experience the tangible economic value of recycled waste. In contrast, collective reflection fostered initial awareness, and sustained action transformed waste from a perceived domestic burden into a shared economic resource. This waste-to-wealth shift fostered a new social norm, reinforced by the active involvement of youth, housewives, and environmental cadres as local change agents. Rather than merely achieving technical outputs, the programme embedded circular economy practices into everyday community life, aligning substantively with the principles of responsible consumption, production, and decent work.

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