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EMPOWERING TPS 3R THROUGH PROCESSING ORGANIC AND INORGANIC WASTE INTO ECONOMIC VALUE PRODUCTS

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ABSTRAK

Abstrak: TPS 3R mengubah sampah organik dan anorganik menjadi sumber daya yang berharga dan mempromosikan pembangunan berkelanjutan. Program Pemberdayaan Kemitraan Masyarakat TPS 3R Mandiri Kalampangan Berkah bertujuan untuk meningkatkan kemampuan mitra dalam mengolah sampah, keterampilan produksi produk kerajinan tangan dari bahan daur ulang, dan pemasaran produk. Metode yang digunakan dalam pelaksanaan kegiatan meliputi ceramah, diskusi dan pelatihan. Mitra kegiatan adalah 30 orang pengurus TPS 3R Mandiri Kalampangan Berkah. Sistem evaluasi menggunakan observasi dan daftar pertanyaan. Hasil dari program ini mencakup peningkatan kemampuan dan keterampilan masyarakat dalam mengolah sampah dan memproduksi produk daur ulang. Sebelum program, mitra mengolah sampah organic sebesar 53.33% dan anorganik sebesar 13.33%. Materi pengolahan sampah anorganik juga merupakan hal yang baru bagi mitra (86.67%) dan dirasa mudah untuk dilakukan (100%). Mitra juga termotivasi untuk mempraktekkan pengelolaan sampah anorganik menjadi produk daur ulang (100%). Produk daur ulang yang dihasilkan berupa tas dari koran bekas, bunga dari botol plastic bekas, pigura dari kardus bekas, dan kertas daur ulang. Hasil pemberdayaan juga menunjukkan peningkatan pengetahuan mitra menggunakan e-commerce sebagai sarana penjualan produk daur ulang (60%). Secara keseluruhan, program ini diharapkan dapat memberdayakan masyarakat, meningkatkan kesejahteraan ekonomi, dan menciptakan lingkungan yang lebih bersih dan sehat.

Kata Kunci: Pengelolaan Limbah; Anorganik; Organik; Ekonomi Sirkular; Pemberdayaan Masyarakat.

Abstract: *TPS 3R is a process that converts organic and inorganic waste into valuable resources, thereby promoting sustainable development. The TPS 3R Mandiri Kalampangan Berkah Community Partnership Empowerment Program aims to increase the capacity of partners to process waste, develop production skills for handicraft products derived from recycled materials, and promote these products on the market. The methods used included socializations, discussions, and training. The partners were 30 administrators of TPS 3R Mandiri Kalampangan Berkah. The evaluation system used observation and a list of questions. The results of this program include an increase in the ability and skills of the community in processing waste and producing recycled products. Before the program, partners processed organic waste at a rate of 53.33% and inorganic by 13.33%. The inorganic waste processing material was also new to the partners (86.67%) and easy to do (100%). Partners were also motivated to practice inorganic waste management into recycled products (100%). The recycled products produced are bags from used newspapers, flowers from used plastic bottles, frames from used cardboard, and recycled paper. Additionally, the empowerment results also showed an increase in partners' knowledge of using e-commerce as a means of selling recycled products (60%). Furthermore, this program is expected to empower the community, improve economic welfare, and create a cleaner and healthier environment.*

Keywords: *Waste Management; Organic; Inorganic; Circular Economic; Community Empowerment.*

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A. INTRODUCTION

The issue of waste management has become increasingly complex due to the rapid growth of the population, urbanization, and changes in lifestyle over the last few decades. Various factors have contributed to the increase in global waste, resulting in a significant challenge for those responsible for waste management on a global scale. By the data provided by the Ministry of Environment and Forestry, it has been estimated that in 2021 Indonesia produced approximately 67.8 million tons of waste. However, the level of waste management remains suboptimal (KLHK, 2021).

In addition to the scarcity of landfill space, the lack of public awareness regarding the importance of waste segregation and management, and the low recycling rates, there are a number of factors that contribute to this problem. In the context of these challenges, the 3R concept (reduce, reuse, recycle) was developed and implemented in various waste management programs. Based on the 3R concept, it is intended to reduce the volume of waste generated, reuse items that can still be used, and recycle materials that have economic value (Ristya, 2020). The 3R concept can be implemented in various ways, one of which is the establishment of 3R waste management sites based in the community (Fadillah et al., 2024).

Community-based waste management has become a strategic approach to reducing the negative impact of waste on the environment while empowering communities socially and economically. In this case, it involves communities in the entire waste management process, from sorting, and collection, to recycling. For example, Indonesia's waste bank program allows communities to deposit their segregated waste in exchange for economic incentives, which not only helps reduce waste volumes but also increases the community's environmental awareness (Raharjo et al., 2015; Setiadi, 2015; Utomo, 2024). One strategy is to process organic and inorganic waste into products of economic value. Organic waste, such as food waste and agricultural waste can be processed into compost or organic fertilizer whic is very useful in improving soil fertiliy and supporting the agricultural sector. On the other hand, inorganic waste such as plastic, metal, and paper can be recycled into products that have a selling value, such as handicraft items or industrial raw materials (Sulistiyani, 2022).

TPS 3R Mandiri Kalampangan Berkah represents a community empowerment initiative situated within the Kalampangan area, Palangka Raya district, Central Kalimantan province. The establishment of this facility was driven by the objective of enabling the local community to assume responsibility for the management of waste through a participatory approach. This TPS serves as a multifaceted hub for community education and empowerment, encompassing not only waste collection but also the promotion of sustainable waste management practices. The communities in the Kalampangan area play a multifaceted role in the waste management system. In addition to their role as consumers, they also serve as agents of change,

actively engaged in all stage of the management process, from waste sorting at the source to collection, processing, and utilization of recycled products. Islami, (2022) stated that community -based waste management is consistent with the principles of the circular economy, which prioritizes the efficient utilization of resources. The waste is processed and returned to the production cycle, enabling its reuse.

The success of community empowerment in TPS 3R Mandiri Kalampangan Berkah is contingent upon the collaboration between the government, local communities, and other stakeholders. Government provides support in the form of regulations, financing, and technical assistance. Furthermore, the involvement of local communities is a crucial factor in encouraging active community participation and ensuring the sustainability of this program. The circular economy approach is an important framework in waste management at TPS 3R, where waste is no longer viewed as a waste item but as a resource that can be recycled, reused, or processed into new valueable products. Not only supports environmental sustainability but also opens up local economic opportunities through innovation in waste management (Karimah et al., 2023; Indarti & Riani, 2023; Miswar et al., 2023).

It is anticipated that the empowerment of the local community at TPS 3R Mandiri Kalampangan Berkah will facilitate an enhancement of their knowledge and skills in waste management, as well as take advantage of economic opportunities from recycling and waste processing activities through circular economy approach (Karimah et al., 2023). The objectives of the program is to enhance community awareness regarding waste management practices and to facilitate the conversion of organic and inorganic waste into economically valuable products, including ecoenzyme and handicraft items. Additionally, the program aims to serve as a model for other regions in addressing waste issues through a sustainable community-based approach.

B. METODS

This community service activity was carried out at TPS 3R Kalampangan Berkah, Kalampangan Village, Sebangau District, Palangka Raya City in September 2024. This training was attended by members of TPS 3R Kalampangan Berkah and residents of Kalampangan Village totaling 15 participants. The method used in this community service is presentation and discussion related to inorganic waste processing, types of materials, and products that can be produced, then continued with the practice of processing inorganic waste into goods that have selling value. This activity was carried out in three stages consisting of preparation, implementation, and evaluation, as shown in Figure 1.

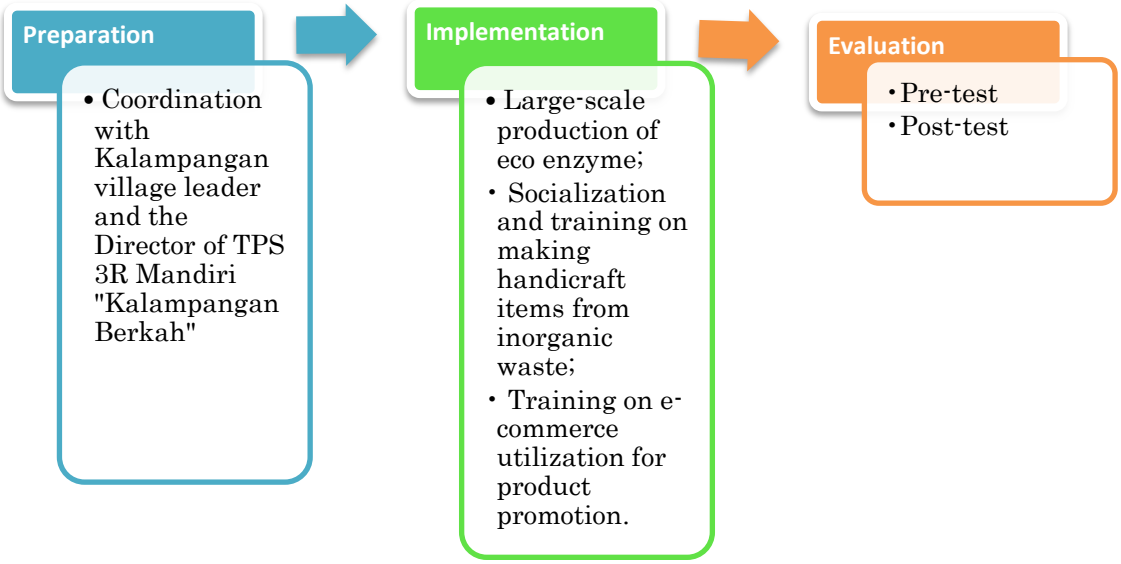

Figure 1. Three stages of the implementation of the empowerment program.

Before the implementation of the program, coordination was conducted with the Kalampangan head and the TPS 3R director to guarantee that the program was executed in accordance with the partners' requirements and to ensure the active involvement of the partners. The socialization and training on the management of organic and inorganic waste into value-added products. Organic product was eco enzyme, while inorganic products include bags crafted from used newspapers, floral arrangements created from repurposed plastic bottles, frames constructed from repurposed cardboard boxes, and recycled paper products. The digitization of material delivery via barcode scanning will be linked to the TPS 3R Kalampangan YouTube channel. Additionally, training was provided on the utilisation of e-commerce for the promotion of the products. The e-commerce targeted were Shopee and Tokopedia, as well as to create a TPR 3R Mandiri website. The enhancement in partner empowerment was measured using a pre and post-test questioner and presented with a graph

C. RESULTS AND DISCUSSIONS

Socialization and training were conducted on September 21, 2024 at TPS 3R Mandiri Kalampangan Berkah located on Jl. Mawar, Kalampangan village, Sabangau district, Palangka Raya city. The socialization and training were attended by partners (members of TPS 3R), the team and students from University of Palangka Raya, the Director of TPS 3R Tugimah, Head of Kalampangan Yunita Martina, SH, MAP, and Babinsa. At the time of program implementation, it was also coincided with the implementation of the Adipura assessment, with the one of the assessment components located at TPS 3R Mandiri Kalampangan Berkah. The results of activities at each stage are:

1. Preparation Stage

The preparation stage for this community service includes determining target partners and location surveys. The service team coordinated with the leader of TPS 3R Mrs. Tugima. The service team collected information about the problems faced by the partners. 15 members of TPS 3R were determined as training participants. Furthermore, the service team prepared training materials containing inorganic waste, inorganic waste processing, and product marketing through e-commerce and social media. The team also prepared all equipment and materials for the training.

2. Implementation Stage

The inorganic waste processing training activity was attended by 15 participants who were recommendations from partner leaders. The participants consisted of 14 women and one man. Fifteen participants were members of TPS 3R and residents of Kalampangan Village. The training activities began with filling out a questionnaire aimed to determine the participants' initial understanding of inorganic waste processing and the use of e-commerce for product marketing. Based on the results of the pre-training questionnaire analysis, 73.33% (11 people) of participants knew about inorganic waste processing, and only 6.67% (1 person) had processed inorganic waste into handicraft items. This is because they do not know its economic potential. Utilizing inorganic waste can be a new business opportunity and encourage innovation in waste processing and recycling. Innovation in technology and production processes can create new jobs and improve the economy of a region (Miswar et al, 2023).The training materials provided covered a range of environmentally-focused activities, including the production of eco enzyme from vegetable and fruit waste with “Eco Berkah” as a product label, the creation of bags from used newspaper, the fabrication of photo frame from used cardboard, the production of flowers from used plastic bottles, and the manufacture of recycled paper.

Figure 2. Presentation on inorganic waste processing and product marketing through e-commerce and social media

The dissemination of technological and innovative knowledge was accomplished through the use of digital media, can be seen directly through each trainee's device on the TPS 3R Kalampangan Youtube channel. The

YouTube link for the tutorial on production of eco enzyme is https://www.youtube.com/watch?v=EFu4WJqUa00, recycled paper https://www.youtube.com/watch?v=2_tc8cJMu18, photo frame from used cardboard boxes https://www.youtube.com/watch?v=2iIYZqv0BRo, flowers from used plastic bottles https://www.youtube.com/watch?v=gmVCc-rqk6k, and the tutorial of making bags from used newspaper https://www.youtube.com/watch?v=gmVCc-rqk6k.

There were a number of training results obtained: 300 pieces of eco enzyme @ 500 mL, three bags, eight frames, five plastics flowers, and twenty sheets of A5-sized paper with a thickness of 0.5-1 mm, as well as one sheet of 1 mm-thick A3-sized paper, which was used for the production of snack boxes. In addition, the partners received the following products: a website (www.tps3rkalampangan.com), an Instagram account (@tps3rkalampangan), a YouTube channel (tps3rkalampangan), and a Shopee account (tps3rkalampangan). The products were presented in Figure 3.

Figure 3. The products resulted during empowerment activities.

Figure 4. Documentation of socialization and training implementation.

3. Evaluation Stage

The results of the questionnaire showed that before the socialization and training, partners had already sorted organic and inorganic waste. However, a greater proportion of waste processing was conducted on organic waste (53.33%) compared to inorganic waste (13.33%). E-commerce is used more frequently as a means of shopping (40%) than for selling (13.33%). As a results of the empowerment activities conducted by the team, partners realize that managing inorganic waste is new information and technology (86.67%). The delivery of interesting materials made it easy for partners to absorb this information and technology, so that partners had the perception that processing inorganic waste is easy and partners is motivated to practice it in their homes (100%). Information and guidance on the use of e-commerce was also new. However, it is notable that 40% of partners had e-commerce account on the Shopee and Tokopedia platforms for the purpose of making purchases. The socialization and training initiatives proved instrumental in motivating partners to utilize their e-commerce accounts for the sale of their products (Figure 5 and Figure 6).

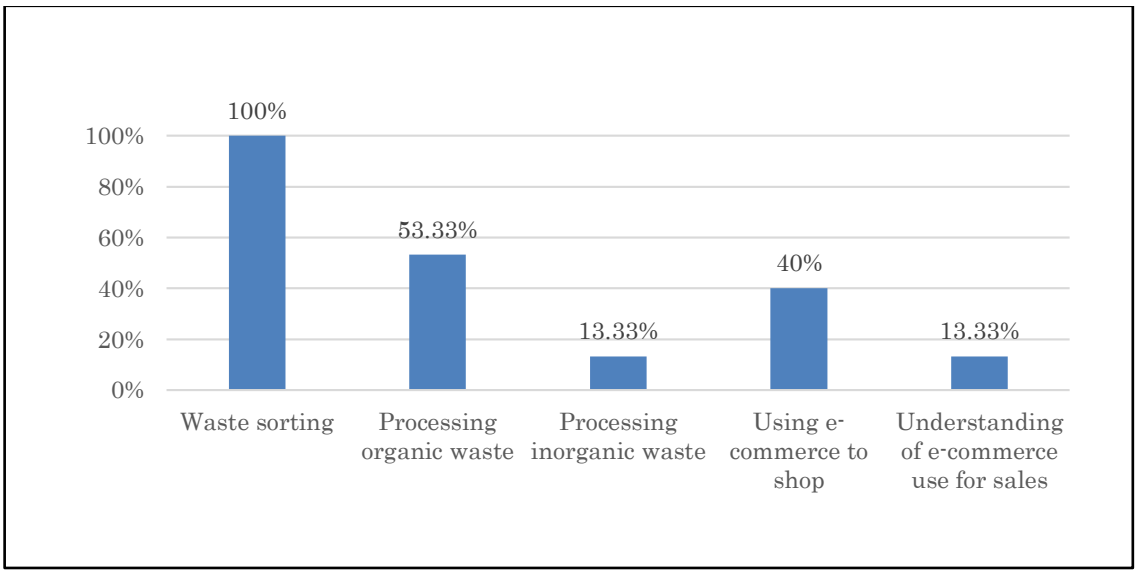

Figure 5. Pre-training questioner results

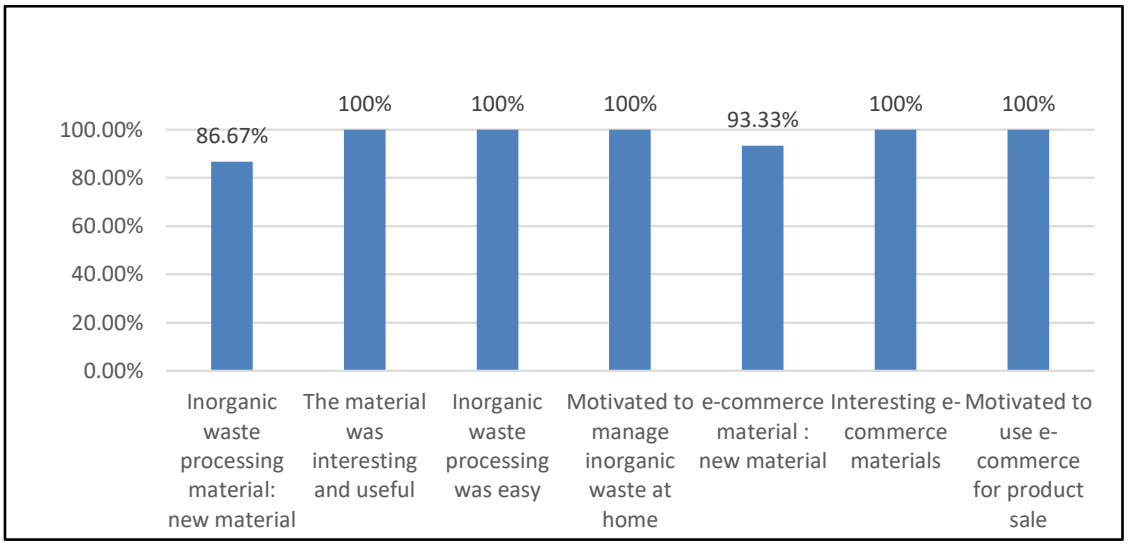

Figure 6. Post-training questioner results

The implementation of technology and innovation in waste management at the community level is very relevant and important undertaking for a number of reasons, including the enhancement of waste management efficiency, the reduction of environmental impacts, and the empowerment and improvement of community welfare, with the ultimate goal of fostering the development of a circular economy (Aziz et al., 2020; Hidayat & Faizal, 2020; Islami, 2022; Kadang & Sinaga, 2020; Komarudin et al., 2023; Ni Wayan Sri Suliartini et al., 2022; Sanusi & Istanti, 2020). The production of eco enzyme is highly effective in Kalampangan, because the area is a center of vegetable production for Palangka Raya and surrounding area (Aziz et al., 2024). However, the knowledge and practices related to organic waste processing among local partners remain relatively limited, with only 53.33% of partners engaged in such activities (fig.5). The diversification of inorganic waste-based products in accordance with partners demand, was also a new knowledge for the majority of partners (86.67%), so it is expected that technology will motivate partners (100%) (Fig.6) to develop inorganic waste-based products and establish them as a source of income for TPS 3R Kalampangan. With this training, 100% of participants knew the diversification of inorganic canoe processing and product packaging, the percentage of indicator achievement as shown in Table 1.

Table 1. Percentage achievement of activity indicators

Achievement Indicators	Percentages	
	Before	After
Partners' knowledge and skills in diversifying inorganic waste processing products	6,67%	100%
Partners' knowledge and skills in online marketing	13,33%	100%

The significant benefit of this training activity is that partners have knowledge and skills in processing organic and inorganic waste into value added and marketable products. This will facilitate their enterprises, which can consequently enhance community income. The concept of circular economy can be seen from various products produced by partners in the form of eco enzyme, bags from used newspapers, frames from used carboard, flowers from used plastic bottles, and recycled paper. Waste is processed into new products, with resources continuously rotating in the cycle of production and consumption, instead of being thrown away. This will contribute to the reduction of the exploitation of natural resources. According to Purwanti, (2021) the circular economy model is one that reprocesses goods that have been consumed, employing a strategy of reduction, reuse, recycling, replacement, and repair. This presents an opportunity for small and medium-sized enterprises to enhance community income. Communities with the requisite training can produce and sell recycled products, thereby stimulating the local economy and creating new employment opportunities.

The empowerment concept related to organic and inorganic waste management improved the knowledge and skills of partners. Training increased understanding of both organic and inorganic waste management practices. For instance, the post-training results showed that 93.33% of participants found the inorganic waste processing material new and useful, indicating a need for continuous education in this area. Empowering partners involved equipping them with the skills necessary to process waste effectively. The increase from 53.33% to full engagement in organic waste processing post-training highlights the importance of practical training sessions. The fact that 100% of participants were motivated to use e-commerce for products sales demonstrates the potential for empowerment through innovative approaches. Furthermore, encouraging community involvement in waste management practices can lead to a more sustainable approach by diversifying products from organic and inorganic waste as noted by 86.67% of partners finding this knowledge new, communities could create economic opportunities while managing waste effectively. In summary, empowerment in waste management should focus on education, skill development, motivation, and community engagement to foster a sustainable and circular economy.

D. CONCLUSIONS AND SUGGESTIONS

The program of empowerment of TPS 3R Mandiri Kalampangan Berkah produces various products such as eco enzyme, bags, photo frames, flowers, and recycled paper. Additionally, the program also established a digital platform to disseminate information about its products and activities, including a web site and social media. All participants (100%) have an understanding and skills and are interested in processing inorganic waste and marketing it through e-commerce.

Suggestion included the implementation of strategies to enhance community involvement through more comprehensive socialization and further training, with the objective of increasing the participation of community members in waste management and production of recycled products. Furthermore, additional development and marketing strategies are necessary for the products. A more structured monitoring and evaluation system is required to assess the impact of this program on the community. It would be advantageous to collaborate with other institution in order to obtain financial support, training, and market access for the products produced.

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