



Organic Fertilizer Ecosystem Development (Bang Eko Tempur) Program: A Circular Economy-Based Social Innovation for Enhancing Community Welfare in Banggai Regency

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Abstract

Dependence on chemical fertilizers, limited access to subsidized fertilizers, and the underutilization of organic waste remain significant challenges to achieving sustainable agriculture in Banggai Regency, Indonesia. This study aims to examine the implementation of the Bang Eko Tempur Program as a circular economy-based social innovation designed to enhance community welfare through the development of an organic fertilizer ecosystem. The study employs a descriptive qualitative approach involving active community participation. Data were collected through in-depth interviews, field observations, and a review of secondary data obtained from program implementation reports in Moilong District, Banggai Regency. The data were analyzed using qualitative descriptive analysis by categorizing the findings into economic, social, and environmental dimensions. The findings indicate that the Bang Eko Tempur Program successfully converts organic waste generated by the community and non-hazardous organic waste from the company into organic fertilizer through collaboration among the company, village governments, and community groups. The program generates economic benefits by increasing household income, reducing agricultural production costs, and improving crop yields; social benefits by strengthening community capacity, encouraging greater participation, and reinforcing local institutions; and environmental benefits by promoting organic waste utilization and the adoption of more sustainable agricultural practices. The interconnection among these three dimensions demonstrates that the Bang Eko Tempur Program, as a circular economy-based social innovation, contributes to enhancing community welfare while supporting sustainable development.

INTRODUCTION

The agricultural sector plays a crucial role in ensuring food security, reducing poverty, and supporting sustainable economic development (Abdulrahman et al., 2025; Ogbari et al., 2024; Pandey & Pandey, 2023; Rehman et al., 2022; Saleem et al., 2025; Yang & Solangi, 2024; Yusriadi, 2024). In recent years, the sector has also contributed significantly to Gross Regional Domestic Product (GRDP), thereby driving regional economic growth and improving community welfare (Elsani et al., 2024; Gatari et al., 2024). In this context, the adoption of sustainable agricultural practices is essential for achieving the Sustainable Development Goals (SDGs),

particularly Zero Hunger (SDG 2), Responsible Consumption and Production (SDG 12), and Climate Action (SDG 13) (FAO, 2023). Beyond increasing productivity, sustainable agriculture also contributes to environmental conservation through more efficient resource utilization (Pretty et al., 2018).

Indonesia faces various challenges in establishing a sustainable agricultural system. One of the primary challenges is farmers' heavy dependence on synthetic fertilizers and their limited access to subsidized fertilizers. According to Wihardjaka (2021), the continuous and excessive application of synthetic fertilizers without adequate organic matter replenishment can contribute to declining soil organic matter content, potentially reducing soil productivity. Furthermore, FAO (2023) reports that rising global fertilizer prices have increased agricultural production costs, particularly for smallholder farmers. Meanwhile, organic waste generated by agricultural activities, livestock farming, households, and traditional markets remains underutilized, potentially contributing to environmental pollution. However, this organic waste can be processed into organic fertilizer to support sustainable agricultural practices. Similar challenges are evident in Banggai Regency, Central Sulawesi. Based on social mapping conducted by JOB Pertamina–Medco E&P Tomori Sulawesi, communities in the company's assisted areas continue to experience various socioeconomic and agricultural challenges, including low wages among agricultural laborers, limited access to subsidized fertilizers, heavy dependence on synthetic fertilizers, and inadequate utilization of available organic waste. Additionally, the company's operations generate waste materials, including spent hydrogen sulfide (H₂S) scavenger media and scrap iron, which require appropriate management in accordance with their characteristics and applicable waste management regulations.

Addressing these challenges through organic waste management aligns with the principles of the circular economy. According to Kirchherr et al. (2017), the circular economy emphasizes maintaining resources in productive use, recovering value from materials, and minimizing environmental impacts. More recent syntheses continue to emphasize resource loops and waste reduction as core features of circular systems (Kirchherr et al., 2023; Velenturf & Purnell, 2021), and circular economy approaches in agriculture, including the valorization of organic residues, have been increasingly examined (Velasco-Muñoz et al., 2022). Furthermore, Geissdoerfer et al. (2017) explain that implementing circular economy principles can enhance resource efficiency, reduce waste generation, and create new economic opportunities for communities. In the agricultural sector, this approach can be implemented by converting suitable organic waste into organic fertilizer, thereby reducing dependence on synthetic fertilizers, generating added value from waste materials, and supporting the long-term sustainability of agricultural systems.

In addition to adopting circular economy principles, successful organic waste management requires a social innovation approach that promotes active community participation and collaboration among stakeholders. Social innovation not only introduces new solutions to social challenges but also encourages collective action and institutional collaboration to achieve sustainable change. According to Cajaiba-Santana (2014), social innovation can transform patterns of social interaction while strengthening communities' capacity to address development

challenges. Moreover, van der Have and Rubalcaba (2016) emphasize that social innovation contributes to community welfare by generating sustainable social value.

This study offers three potential contributions to the existing literature. First, it examines the Bang Eko Tempur Program as an integrated social innovation initiative based on circular economy principles, particularly through the development of a community-based organic fertilizer ecosystem. Second, it presents empirical findings on the program's economic, social, and environmental outcomes, including changes in community income, agricultural production costs, and organic waste utilization. Third, it adopts a participatory approach that incorporates community perspectives into the research process, providing a contextual understanding of program implementation and its implications for community welfare. By addressing these dimensions, this study seeks to contribute to the theoretical understanding of the relationship between circular economy principles and social innovation while providing practical insights into community empowerment and sustainable agricultural development in Indonesia.

Against this background, this study aims to examine the implementation of the Bang Eko Tempur Program as a circular economy-based social innovation model for enhancing community welfare through the development of an organic fertilizer ecosystem in Banggai Regency.

This study is expected to contribute to both theoretical knowledge and practical applications. Theoretically, it enriches the literature on the circular economy and social innovation by presenting a case study of an integrated community development initiative addressing fertilizer dependence, organic waste management, and socioeconomic welfare. Practically, the findings may provide a potentially replicable framework for companies and local governments seeking to design and implement Corporate Social and Environmental Responsibility (CSER) programs aligned with sustainable development objectives. The findings are also expected to offer valuable insights for companies, village governments, community organizations, farmers, and researchers interested in sustainable agriculture, resource efficiency, and community empowerment.

METHOD

This study employed a descriptive qualitative approach involving active community participation. The research was conducted in Moilong District, Banggai Regency, Central Sulawesi, Indonesia. Primary data were collected through interviews with members of the Pos Bidik Group, partner groups, village government officials, and company representatives. Secondary data were obtained from the 2025 Social Innovation Assessment Report of JOB Pertamina–Medco E&P Tomori Sulawesi and other relevant supporting documents.

Data collection focused on program implementation, community empowerment, institutional capacity building, organic waste utilization, organic fertilizer production, and the program's economic, social, and environmental outcomes. The collected data were analyzed qualitatively through data selection, thematic categorization, presentation of findings, and conclusion drawing (Creswell & Poth, 2018).

The analysis was organized into three dimensions: economic, social, and environmental. The economic dimension focused on changes in production capacity, income-generating opportunities,

and local resource utilization. The social dimension examined community skills, institutional strengthening, stakeholder participation, and opportunities for program replication. The environmental dimension assessed organic waste management and the utilization of non-hazardous waste within the circular economy framework. The findings were synthesized thematically to identify patterns and relationships across data sources and were presented narratively to explain the implementation and outcomes of the Bang Eko Tempur Program.

RESULTS AND DISCUSSION

Implementation of the Bang Eko Tempur Program

The Bang Eko Tempur Program is a Corporate Social and Environmental Responsibility program developed by JOB Pertamina–Medco E&P Tomori Sulawesi to address various problems faced by the community, such as heavy dependence on chemical fertilizers, suboptimal utilization of organic waste, and the low economic value of the waste generated. The program develops an organic fertilizer ecosystem by integrating the use of community waste and the company's non-B3 waste into useful products that also support sustainable agriculture.

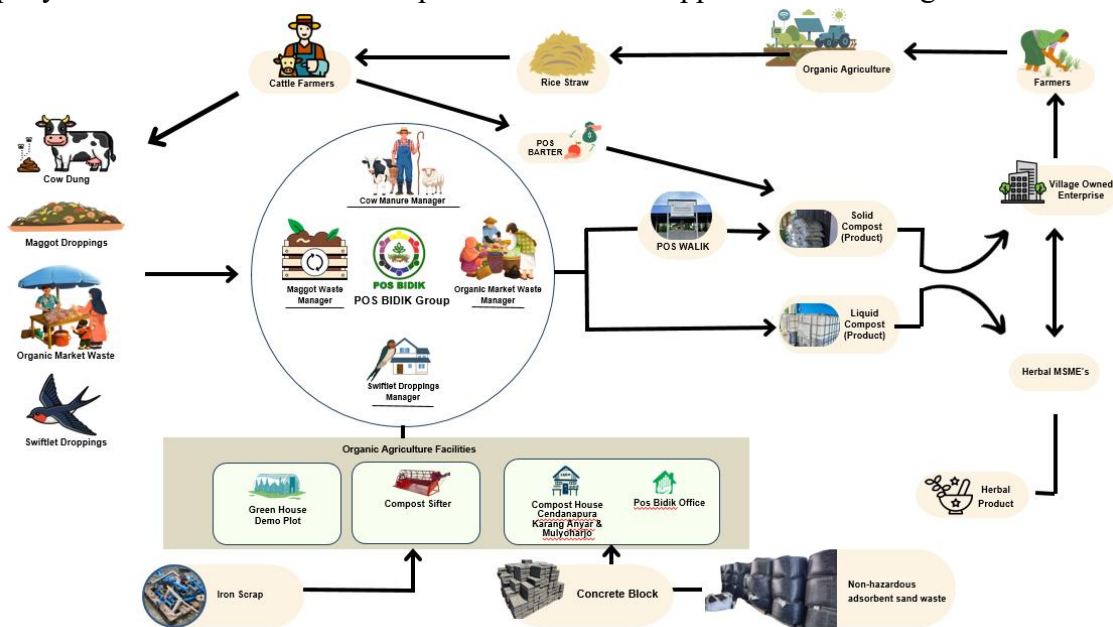


Figure 1. Value Chain of the Bang Eko Tempur Program

As shown in Figure 1, the implementation of the Bang Eko Tempur Program was developed through a value chain that integrates various resources from the community and the company into a single organic fertilizer ecosystem. The program uses the company's non-B3 waste, such as scrap iron and adsorbent sand, as well as organic waste from markets, livestock farms, swiftlet houses, and maggot cultivation as its main raw materials. All of these raw materials are processed through sustainable agriculture facilities and various management units run by the Pos Bidik Group to produce liquid organic fertilizer and solid compost. The resulting products are then used to support organic farming and are marketed through village-owned enterprises (BUMDes) and

micro, small, and medium enterprises (MSMEs), thereby adding value for the community. In addition to producing organic fertilizer, the value chain also strengthens collaboration among actors, from raw material suppliers, management groups, and farmers to local business operators. This integration shows that the Bang Eko Tempur Program does not focus solely on waste management but also builds a community empowerment ecosystem that supports the program's sustainability.

Based on this value chain, the implementation of the Bang Eko Tempur Program does not focus solely on processing waste into organic fertilizer but also builds collaboration among the community, the company, and various stakeholders within a single integrated ecosystem. The processed output is used by farmers, BUMDes, and MSMEs, thereby adding value for the community. This finding shows that the Bang Eko Tempur Program has applied the principles of the circular economy through the reuse of waste, while also reflecting social innovation through collaboration and community empowerment. This is consistent with the circular economy concept proposed by Kirchherr et al. (2017) and with the concept of social innovation, which emphasizes the importance of collaboration in creating sustainable change (van der Have & Rubalcaba, 2016).

The Bang Eko Tempur Program as a Social Innovation

The Bang Eko Tempur Program can be categorized as a social innovation because it not only produces organic fertilizer but also offers a new way of addressing various problems faced by the community, particularly in the social, economic, and environmental aspects. The OECD (2024) explains that social innovation is an effort to create new solutions to social and environmental problems that can improve people's quality of life. Social innovation can also encourage cooperation among parties and enhance communities' ability to solve problems in their own environments. Based on this definition, the Bang Eko Tempur Program has the characteristics of a social innovation because it combines waste management, fertilizer provision, community capacity building, and the development of economic activities in a single program that involves the community and various parties.

The novelty of the Bang Eko Tempur Program is evident not only in the processing of waste into organic fertilizer but also in the shift of its production system to communal organic fertilizer processing. Before the program, fertilizer was processed individually, with a capacity of about 3–4 tons per production run. Through this program, processing was developed collectively through Pos Bidik, the Compost House (Rumah Kompos), and UPPO Tani Makmur, with a capacity of up to about 400 tons per production run.

This communal system is further reinforced by the local government's recognition that this production system is the first of its kind in Banggai Regency, as evidenced by Statement Letter No. 500.6.7.1/1192/TPHP/2025 from the Department of Food Crops, Horticulture, and Plantations (Dinas TPHP). In addition, the system connects the community as raw material suppliers, the management group as processors, and farmers as fertilizer users. Thus, the novelty of the Bang Eko Tempur Program lies in implementing a communal organic fertilizer production system that integrates waste management, the fulfillment of fertilizer needs, and community

economic activities within a single ecosystem.

In addition to its novelty, the Bang Eko Tempur Program was also designed to address several problems faced by the community. Before the program, the community faced limited access to fertilizer, high agricultural production costs, low incomes among some residents, and suboptimal organic waste management. Organic waste and animal manure that are not properly managed can also cause odors, make the environment unpleasant, and increase the risk of public health problems. Through Bang Eko Tempur, waste that was previously regarded as a problem is used as raw material for fertilizer with both use value and economic value. In this way, the program not only solves the waste problem but also helps meet fertilizer needs and supports community economic activities.

The Bang Eko Tempur Program also demonstrates direct community involvement. Community members are not merely beneficiaries but take part in the program's various activities. Livestock farmers and market traders supply waste as raw material, community members are involved in the processing, and farmers use the resulting fertilizer in their farming. These activities are also supported by various groups and institutions such as Pos Bidik, Rumah Kompos, BUMDes, and MSMEs. Besides the community, the program also involves village governments, farmer groups, and other parties. Decision-making within the management group is conducted openly and involves various parties. This shows that the community has a role in running the program rather than merely receiving its benefits.

This community involvement also provides empowerment value through improved knowledge and skills. The program provides training and mentoring for community members on how to make organic fertilizer. According to the program report, 31 farmers are now able to independently make organic fertilizer and liquid organic fertilizer. Some training participants have also gone on to share their knowledge with other farmers. Community empowerment is also evident in the change in production activities. Before the program, fertilizer was produced individually with a capacity of about 4 tons per production run. After the program, production is carried out communally with a capacity of about 400 tons per cycle. This change shows that the community not only receives assistance but also gains knowledge, skills, and opportunities to take part in activities that support its self-reliance.

In the Bang Eko Tempur Program, social value comes not only from the organic fertilizer produced but also from the cooperation formed among the community, the management group, farmers, BUMDes, MSMEs, village governments, and the company. This cooperation has changed how the community manages waste, obtains fertilizer, carries out production, and uses the resources available in its environment. Thus, the program's benefits are felt not only in the form of economic outcomes but also through the community's improved capabilities and the cooperation formed among groups.

Based on the above, the Bang Eko Tempur Program can be described as a circular economy-based social innovation because it is novel, addresses social and environmental problems, actively involves the community, and improves the community's capabilities and self-reliance. The program has also brought about changes in community behavior: from individual

to communal production, from monetary fertilizer transactions to an exchange system through the Barter Post (Pos Barter), and from limited institutions to more active institutions that cooperate through several partners. Thus, the innovation of Bang Eko Tempur lies not only in converting waste into organic fertilizer but also in the creation of a system that links the social, economic, and environmental aspects and strengthens the community's ability to manage resources sustainably.

Economic Impact on the Community

The Bang Eko Tempur Program has brought noticeable changes to the community's economic conditions. Before the program, farmers had difficulty obtaining fertilizer at affordable prices, which raised production costs. Besides farmers, community groups such as farm laborers also had limited access to additional work and income. After the program began, the community started to gain new sources of income from the production and sale of organic fertilizer. The group's income from sales of fertilizer and its derivative products reached IDR 53,000,000 per month. In addition, farm laborers' income increased from IDR 70,000 to IDR 110,000 per day. This shows that the program benefits not only the group that produces the fertilizer but also opens economic opportunities for community members involved in the program's activities.

Economic benefits are also evident in cost savings. Farmers can save IDR 3,425,000 in production costs by using organic fertilizer, while operational costs in the fertilizer production process can be cut by up to 50%. This means the program's benefits are felt on two fronts: additional income and reduced expenses for the community. In addition, the use of organic fertilizer has been accompanied by higher harvest yields. Rice production increased from 100 sacks per hectare in 2023 to 110 sacks in 2024 and 120 sacks in 2025. Accordingly, the harvest yield increased by 20% compared with 2023. This shows that the program's benefits come not only from fertilizer sales but are also felt through improved agricultural yields.

These changes show that the Bang Eko Tempur Program delivers economic benefits through higher incomes, lower production costs, and improved agricultural yields. This indicates that the waste processing activities carried out in the program can simultaneously serve as economic activities that benefit the community.

Social Impact and Community Involvement

The Bang Eko Tempur Program provides benefits not only in the economic sphere but also increases community involvement. The program involves 666 beneficiaries, consisting of farmers, cattle farmers, swiftlet house workers, market traders and laborers, women, farm laborers, and unemployed youth. The large number of groups involved shows that the program's benefits are felt not by a single community group but by various groups engaged in waste management and agricultural activities.

Table 1. List of Beneficiaries

No	Beneficiary Category	Number of Beneficiaries
1	Farmers Vulnerable to Fertilizer Shortages	41
2	Cattle Farmers	90
3	Swiftlet House Workers	51
4	Market Traders and Laborers	300
5	Women	78
6	Male Farm Laborers	61
7	Unemployed Youth	45
	Total	666

The involvement of these various groups also gives community members different roles in running the program. Livestock farmers and market traders supply organic waste as raw material, community members process the waste into fertilizer, and farmers use the fertilizer in their farming. Thus, the program forms relationships among several community groups that previously had their own separate problems. In addition, the program has encouraged the formation of several groups and institutions such as Pos Bidik, Rumah Kompos, BUMDes, and MSMEs. The existence of these institutions is important because the program's activities no longer depend solely on assistance from the company but have begun to be run by the community and local institutions. The program has also been replicated in two other villages and has received support from the village governments.

These conditions show that the social change that has occurred goes beyond an increase in the number of beneficiaries. The community has also begun to play a role in managing the program's activities, from collecting raw materials and production to distributing fertilizer. This indicates greater community involvement and a growing ability to utilize the resources available in its environment.

Environmental Impact and Waste Utilization

The involvement of these various groups also gives community members different roles in running the program. Livestock farmers and market traders supply organic waste as raw material, community members process the waste into fertilizer, and farmers use the fertilizer in their farming. Thus, the program forms relationships among several community groups that previously had their own separate problems. In addition, the program has encouraged the formation of several groups and institutions such as Pos Bidik, Rumah Kompos, BUMDes, and MSMEs. The existence of these institutions is important because the program's activities no longer depend solely on assistance from the company but have begun to be run by the community and local institutions. The program has also been replicated in two other villages and has received support from the village governments.

Table 2. Sustainable Compass of the Bang Eko Tempur Program

Sustainable Compass	Achievements	Achievement Strategies	SDGs
Nature (Environment)	400 tons of organic market waste are utilized in each production run 140 kg of swiftlet waste utilized per swiftlet house every 3 months 40% water savings through the use of an organic farming system 85 ha of agricultural land using organic fertilizer - Reduction of emissions from accumulated cattle manure by 27,026.03 tons CO₂eq and from accumulated rice husks by 2.73 tons CO₂eq in 2025	- Building a partnership model that uses the local supply chain of livestock farmers, maggot groups, swiftlet house workers, and market traders as suppliers of organic raw materials. In addition, partnering with farmers as rice husk suppliers - Collaborating with agricultural extension officers (PPL) and BUMDes to provide affordable organic fertilizer for farmers	 
	- Group income reaches IDR 53,000,000/month from sales - Farmers' savings on agricultural production costs of IDR 3,425,000 - Generating total income of IDR 460,000,000/year in 2025	- Creating a communal fertilizer-making ecosystem with farmer groups and compost house partners by setting quality standards - Using organic waste from animal manure, BSF residue, swiftlet droppings, market waste, and scavenger waste as affordable raw materials for production	
Wellbeing (Welfare)	Community Satisfaction Index for the implementation of the Bang Eko Tempur Program of 3.44 (converted index value of 85.92%), in the “very good” category 120 farmers received education on making organic fertilizer 61 farm laborers are able to meet their families' basic needs	- Pos Bidik provides coaching/mentoring to farmers on making organic fertilizer, using the Ruang Seni Tani (Farming Arts Space) as a learning and education center - Empowering farm laborers as workers in the organic fertilizer production process, paid a wage of IDR 110,000/day	
Social (Society)	- Pos Bidik partners with 176 farming and livestock partners in Moilong District. - Two market waste management groups were formed in Karanganyar and Mulyoharjo Villages.	Building a partnership network based on mutual benefit (win-win) through the Barter Post (Pos Barter) with livestock farmers/farmers, and profit sharing with BUMDes	 

Sustainable Compass	Achievements	Achievement Strategies	SDGs
	• Two replications of the Pos Bidik compost house were established in Karanganyar and Mulyoharjo Villages. • 300 traders are involved in efforts to keep the market clean. • Changes in community behavior in organic waste management	• Establishing shared value in partnerships based on the principles of fairness, cooperation, and sustainability	

These conditions can be linked to the Triple Bottom Line concept, particularly the People aspect. The People aspect relates to community involvement, capacity building, and the social benefits the community obtains. In the Bang Eko Tempur Program, the community is not merely a beneficiary but is involved in supplying raw materials, processing waste, producing fertilizer, and using it in farming. The formation of local groups and institutions such as Pos Bidik, Rumah Kompos, BUMDes, and MSMEs also shows increased community capacity and cooperation. Thus, the People aspect is reflected in the community's growing involvement, knowledge, skills, and opportunities to carry out economic activities together.

In the Planet aspect, the Bang Eko Tempur Program demonstrates efforts to address environmental problems through waste utilization. Waste from the agricultural, livestock, household, and market sectors, as well as the company's non-B3 waste, is used as raw material for organic fertilizer. In a single production run, about 400 tons of organic market waste can be utilized. In addition, organic fertilizer has been applied to about 85 hectares of agricultural land and is reported to save up to 40% of water use. This shows that the program not only reduces waste but also turns waste into a resource with use value. Waste that was previously regarded as a problem can be processed into fertilizer and reused in farming. This accords with the principles of the circular economy because resources are reused, thereby reducing waste and extending their useful life (Kirchherr et al., 2017).

Furthermore, the Profit aspect is evident in the economic value generated through waste utilization. Waste that was previously unused can be processed into organic fertilizer that can be either used or sold. These activities open economic opportunities for the community through fertilizer production and sales, while also benefiting farmers through the use of organic fertilizer. Thus, the Profit aspect of the program does not stand alone but is linked to the People and Planet aspects. The community gains opportunities for economic activity through waste processing, while environmental problems are addressed through the reuse of waste as a resource.

The interconnection among People, Profit, and Planet ultimately contributes to community welfare. The economic benefits are evident in the income generated from fertilizer production and sales and in the production cost savings for farmers. Meanwhile, the community's involvement in waste collection, raw material processing, fertilizer production, and farming activities gives community members opportunities to engage in productive activities. Through these activities, the community gains not only economic benefits but also opportunities to improve its knowledge, skills, and ability to manage the resources available in its environment.

Community welfare is also supported by the environmental benefits the program generates. Organic waste utilization helps reduce waste that was previously left unused, while the use of organic fertilizer supports more sustainable farming. A better-managed environment and more efficient use of resources can support the long-term continuity of the community's farming activities. Thus, the welfare generated by the Bang Eko Tempur Program relates not only to economic benefits but also encompasses improvements in community capabilities, expanded economic opportunities, and the creation of environmental conditions that support the sustainability of community livelihoods.

Based on the above, the Bang Eko Tempur Program demonstrates the interconnection among People, Profit, and Planet in creating broader benefits for the community. The People aspect is evident in increased community involvement and capacity, the Profit aspect in the economic benefits arising from the production and use of organic fertilizer, and the Planet aspect in waste utilization and the adoption of more sustainable agriculture. These three aspects reinforce one another, so that the program's benefits are not only economic but also have social and environmental impacts that contribute to community welfare. Therefore, the Bang Eko Tempur Program can be regarded as a circular economy-based social innovation that focuses not only on waste management but also contributes to improving community welfare in a more comprehensive way.

Impact of the Bang Eko Tempur Program on Community Welfare

Viewed as a whole, the changes that have occurred under the Bang Eko Tempur Program go beyond increased production volumes or community income; they also include changes in how the community manages fertilizer, waste, and the resources available in the village. These changes show that the program produces not only direct benefits but also encourages the formation of a more integrated and sustainable system in community life.

Before the program, fertilizer was produced individually with a capacity of about 4 tons. After the program, production is carried out collectively through Pos Bidik together with compost processing partners, with a capacity of about 400 tons per cycle. This change shows a shift from an individual production system to a collective one with greater capacity and a more organized process. Change is also evident in the fulfillment of fertilizer needs. Previously, farmers had difficulty obtaining fertilizer at affordable prices. After the program, organic fertilizer is available locally at IDR 85,000 per sack. In addition, the barter system allows community members to exchange waste for fertilizer, giving them an alternative way to obtain fertilizer while also assigning economic value to waste that was previously unused.

These changes benefit not only the production system but also relate to the community's welfare conditions. Statistics Indonesia (Badan Pusat Statistik, BPS) views community welfare through various aspects of life, including health, education, employment, consumption levels and patterns, housing and environment, poverty, and other social aspects (Badan Pusat Statistik, 2024). In the context of the Bang Eko Tempur Program, several of these aspects are reflected in increased income, expanded employment opportunities, reduced production cost burdens, and improved environmental conditions in the community. Thus, welfare in this program is viewed

not only in terms of increased income but also in terms of the changes in economic and social conditions that support the community's ability to meet its living needs.

In terms of the economy and employment, the program gives the community opportunities to earn income through organic fertilizer processing and other supporting activities. According to the Social Innovation Assessment Report of JOB Pertamina–Medco E&P Tomori Sulawesi (2025), farm laborers' income rises when they work on compost production, from IDR 70,000 to IDR 110,000 per day. This increase is equivalent to a rise of IDR 40,000 per day, or about 57.14%. In addition, the program opens job opportunities for community groups, including women and farm laborers, who previously had limited access to employment and additional sources of income. This shows a positive change in the community's economic conditions as one form of the program's benefit to the welfare of its beneficiaries.

Improved welfare is also supported by the reduced production cost burden on farmers. Before the program, limited subsidized fertilizer and high fertilizer prices forced farmers to bear higher production costs. With locally available organic fertilizer, farmers gain an alternative that is easier to access and more affordable. The program report shows that the use of organic fertilizer can reduce production costs by up to IDR 3,425,000. This cost reduction can help strengthen farmers' economic condition because spending on production inputs becomes lower.

Besides the economic aspect, changes in environmental conditions are also part of the program's benefits for community welfare. Organic waste that was previously unused and caused environmental problems has begun to be processed into raw material for organic fertilizer. This management has resulted in a cleaner environment, reduced odor and standing water, and a lower risk of public health problems. Thus, the benefits of the Bang Eko Tempur Program are felt not only through higher incomes and lower production costs but also through a healthier and more comfortable environment for the community.

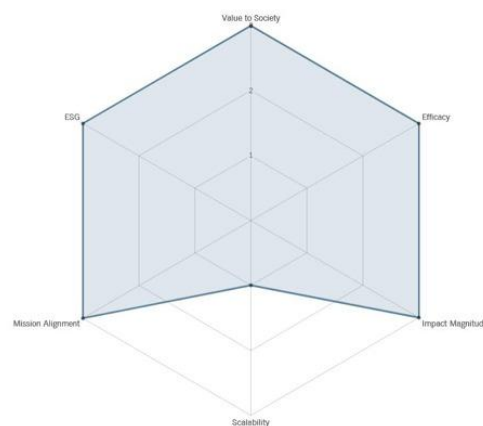


Figure 2. Impact Compass of the Bang Eko Tempur Program

Based on the Impact Compass, the Bang Eko Tempur Program obtained a score of 243 and falls into the Truly Transformational Impact category. This result is consistent with the various changes found in the program's implementation, such as increased production capacity, cost savings, higher incomes, a growing number of beneficiaries, and the use of waste as an economic

resource. These changes show that the program's success can be seen not only in the amount of fertilizer produced but also in changes in how the community works together, uses resources, obtains production inputs, and carries out economic activities.

Thus, the Bang Eko Tempur Program not only solves fertilizer and waste problems but also creates linkages among the economic, social, and environmental aspects. Waste that was previously unused can be processed into fertilizer raw material, the fertilizer is used to support farming, and the management process creates income and job opportunities for the community. This series of changes shows that the program has had a broader impact on the community's living conditions and contributes to improving community welfare on a sustainable basis.

CONCLUSION

Based on the analysis of the Bang Eko Tempur Program, the study concluded that the program had successfully established an organic fertilizer ecosystem by transforming community-generated organic waste and suitable non-hazardous waste from company operations into valuable resources. The program involved collaboration among the company, village governments, community organizations, farmer groups, village-owned enterprises (Badan Usaha Milik Desa, BUMDes), micro, small, and medium-sized enterprises (MSMEs), and other relevant stakeholders. This collaborative approach reflected the principles of social innovation by establishing partnerships to address fertilizer accessibility and waste management challenges at the community level. Furthermore, the collaboration strengthened local institutions, enhanced community capacity, and promoted greater community autonomy in resource management and economic activities.

Regarding community welfare, the Bang Eko Tempur Program generated economic and environmental benefits through increased income, expanded employment opportunities, reduced agricultural production costs, and improved environmental conditions. Farm laborers' daily wages increased from IDR 70,000 to IDR 110,000 during production activities, indicating improved earning opportunities for program beneficiaries. Additionally, the use of organic fertilizer reduced farmers' production costs by up to IDR 3,425,000. Beyond these economic benefits, the program promoted more effective organic waste management, contributing to cleaner surroundings and improved environmental quality. These findings demonstrated the program's contribution to community welfare through enhanced economic opportunities, reduced agricultural expenses, and more sustainable environmental management.

Overall, the Bang Eko Tempur Program generated interconnected economic, social, and environmental benefits. Converting organic waste into fertilizer created economic value from previously underutilized resources, while community participation in program management strengthened local institutional capacity and collective engagement. These outcomes indicated that the program not only improved organic fertilizer production but also fostered more sustainable practices in stakeholder collaboration, resource utilization, and community-based economic activities.

This study contributed to the understanding of circular economy-based social innovation by demonstrating how the Bang Eko Tempur Program integrated waste management, community empowerment, economic welfare improvement, and local institutional strengthening within a community-based organic fertilizer ecosystem. The findings provided practical insights for companies and local governments seeking to design and implement Corporate Social and Environmental Responsibility (CSER) programs aligned with sustainable development objectives. The program also offered a potentially replicable model for integrating circular economy principles into community development initiatives, provided that local resource availability, institutional capacity, and stakeholder participation were adequately considered.

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