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A Village Community Empowerment Model for Waste Management to Enhance Community Entrepreneurial Intention

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Abstract

Waste management in rural areas continues to face several challenges, including low levels of household waste sorting, limited waste-processing facilities, and the underutilization of waste as an economic resource. This study aimed to analyze the improvement in rural community entrepreneurial intention after participating in a waste bank-based empowerment program. A mixed-methods approach with an explanatory sequential design was employed. The quantitative phase used a pre-experimental one-group pretest-posttest design without a control group, while the qualitative phase was conducted through semi-structured interviews. The participants consisted of 10 program participants from Senteluk Village, Batulayar District, West Lombok Regency, and one waste bank manager. The quantitative instrument was an entrepreneurial intention questionnaire based on the Theory of Planned Behavior, covering three dimensions: attitude toward behavior, subjective norms, and perceived behavioral control. Quantitative data were analyzed using descriptive statistics, the Shapiro-Wilk normality test, and a paired sample t-test, while qualitative data were analyzed thematically. The results showed that the mean entrepreneurial intention score increased from 15.30 in the pretest to 51.30 in the posttest, with a mean gain of 36.00. The paired sample t-test indicated a significant difference between pretest and posttest scores, $t(9) = 29.50$; $p < 0.001$. The qualitative findings revealed that the program encouraged a shift in participants' perspectives on waste, strengthened social support, increased participants' self-confidence, and fostered interest in waste-based enterprises, particularly organic fertilizer production. However, limitations related to equipment, capital, and market access still require attention. This study concludes that waste bank-based empowerment is associated with increased entrepreneurial intention among rural communities, although the sustainability of its impact requires further mentoring and the strengthening of the local business ecosystem.

Keywords: Community empowerment; Waste bank; Waste management; Entrepreneurial intention; Environmental entrepreneur

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INTRODUCTION

The increasing volume of household waste in rural areas of Indonesia reflects changes in community consumption patterns influenced by economic growth, urbanization, and shifting lifestyles (Ferdinan et al., 2022). In recent decades, rural communities have experienced significant socio-economic transformation, followed by a rise in domestic waste generation. According to data from the Provincial Government of West Nusa Tenggara (2022), waste accumulation reached 3.9 million tons, of which approximately 2 million tons remained unmanaged and ended up in final disposal sites (Detikcom, 2022). This situation indicates the weakness of existing waste management systems and the low level of community participation in independently and sustainably managing waste (Fasya et al., 2025; Martianto et al., 2024).

In many villages, waste is still disposed of indiscriminately or burned without prior sorting or processing. Limited supporting facilities, weak local institutional capacity, and insufficient environmental literacy are among the main factors contributing to the suboptimal implementation of rural waste management systems (Sasana et al., 2022). In fact, waste has the potential to be transformed into a productive resource, particularly when communities are able to perceive it as an alternative economic input (Widayat et al., 2025). This condition highlights the importance of implementing village community empowerment strategies based on strengthening residents' participation and capacity in waste management (Syamsiyah et al., 2025).

One relevant model that can be implemented in rural contexts is the village waste bank program. A village waste bank is a community-based approach that encourages residents to sort waste, deposit it, and receive economic returns in the form of savings or other incentives (Kristianto et al., 2023). This approach has been shown to be effective in increasing public awareness while creating micro-enterprise opportunities. It can also foster new habits among community members in managing waste systematically, as it simultaneously integrates educational, economic, and institutional aspects (Fatmawati et al., 2022).

Entrepreneurial intention (EI) is an important factor that indicates an individual's readiness to start a new business (Ajzen, 1991). In the context of waste management, EI refers to the extent to which community members are willing and able to develop waste-based economic activities, such as recycling, compost production, or the creation of handicraft products from inorganic waste (Minh & Cuong, 2025). Community empowerment through technical training, business mentoring, and the strengthening of local institutions is a key factor in shaping and improving the EI of rural communities (Salisu, 2020).

Previous studies have shown that training and capacity-building programs can improve individuals' self-confidence and motivation to start new businesses, particularly in environmentally oriented sectors (Maheshwari et al., 2022). In addition, the strengthening of social networks and support from informal village leaders can further enhance the success of empowerment interventions. However, several challenges continue to hinder program implementation, including limited access to training, the absence of stable markets, and weak cross-sectoral synergy in waste management.

Waste banks should not only be viewed as a means of environmental education but also as a strategic instrument for local economic empowerment. In this context, community-based approaches such as Participatory Rural Appraisal (PRA) and cross-actor collaborative approaches involving government, communities, and the private sector are highly relevant. Empowerment is not merely about transferring knowledge; it also involves building critical awareness and strengthening the collective capacity of communities to manage their own resources (Adiatmika & Nain, 2022).

Furthermore, the implementation of this empowerment model can be modified and adapted to the local context of each village. Such adaptation is important because Indonesian villages differ widely in terms of socio-cultural characteristics, geographical conditions, and local resource potential. For example, Putri and Setiadi (2020) showed that the implementation of a participatory and adaptive management model can improve program sustainability and strengthen social cohesion among residents. This finding is consistent with Abdillah et al. (2024), who emphasized the importance of local leadership and multisectoral collaboration in supporting the success of community-based environmental programs.

Community empowerment in waste management is also closely related to a paradigm shift in how communities perceive waste, from merely disposing of it to managing and utilizing it. This transformation requires not only technical processes but also social and cultural change. Therefore, empowerment programs need to address the affective dimensions of the community by emphasizing values such as mutual cooperation, collective responsibility, and sustainability (Sukoco et al., 2024).

This study specifically proposes a village community empowerment model in waste management as a strategy to enhance entrepreneurial intention. The model integrates technical training, local institutional strengthening, and a waste bank approach within a participatory framework. By actively involving community members in every stage of the program, the model is expected to promote sustainable behavioral change and foster environmental entrepreneurship at the village level. In developing this model, the principles of locality, local wisdom, and collaboration serve as the main foundations, ensuring that the resulting model is not only applicable but also capable of strengthening the economic and social resilience of rural communities (Miftahorrozi et al., 2022; Septiani et al., 2024).

Based on the background described above, this study aims to implement a village community empowerment model for waste management and evaluate its impact on improving community entrepreneurial intention. This model is designed to respond to the real needs of rural communities in addressing waste-related problems while creating opportunities for sustainable local entrepreneurship. Therefore, this study focuses on answering two main research questions: first, how does the implementation of a community empowerment model in waste management affect the improvement of community entrepreneurial intention? Second, what factors influence community entrepreneurial intention during the implementation of the empowerment model in waste management?

This study is expected to contribute to the literature by enriching discussions on the integration of community empowerment models and the strengthening of entrepreneurial intention in village-based waste management. Practically, the findings may serve as a reference for policymakers, local governments, and empowerment institutions in designing interventions that are relevant to local characteristics. The results are also expected to inspire social innovation in waste management and strengthen local economic sustainability through a participatory and measurable approach.

LITERATURE REVIEW

Village Community Empowerment

Village community empowerment is one of the main pillars of sustainable development, particularly in rural areas that often face structural limitations in resource management, access to information, and participation in decision-making processes. Conceptually, empowerment does not only refer to the improvement of economic capacity, but also encompasses social, cultural, and environmental dimensions within a broader framework of comprehensive and sustainable community transformation (Salvador Costa et al., 2022; Scheyvens & van der Watt, 2021). In community development literature, empowerment is understood as a process of strengthening individual and collective capacities so that communities can autonomously determine the direction of their lives through improved access to resources, information, and participation in processes that affect their well-being (Wang et al., 2021). A widely adopted theoretical framework places the strengthening of social capital, the enhancement of community resilience, and community-based initiatives as key elements in achieving self-reliance and sustainability (Sari et al., 2022).

In practice, village community empowerment is generally implemented through participatory approaches that encourage active community involvement in all stages of development intervention, from needs identification and planning to implementation and evaluation. One widely adopted participatory method is Participatory Rural Appraisal (PRA), which enables communities to identify local assets, map priority problems, and formulate strategies reflectively and collectively (Nicli et al., 2020). PRA has proven effective in building collective awareness and strengthening the legitimacy of development processes because it positions community members as active subjects of development. In line with this, the Asset-Based Community Development (ABCD) approach emphasizes the use of internal community potential, such as local skills, cultural values, and social networks, as the foundation for developing initiatives (Geekiyanage et al., 2021). The ABCD approach fosters a sense of

ownership and encourages self-help initiatives because communities are positioned as the main actors in development.

In addition, the Community-Driven Development (CDD) model expands community participation by granting communities greater control over the planning, implementation, and monitoring of development programs. This approach has been shown to improve transparency, accountability, and equitable access to resources (Abebe et al., 2020). However, the effectiveness of these approaches is strongly influenced by the quality of facilitation, the level of trust among actors, and the presence of systems that are inclusive and sensitive to local contexts (Ndwiga et al., 2021). Therefore, the integration of local knowledge and cultural practices into decision-making processes is essential to ensure the relevance and acceptability of development interventions (Samkange et al., 2021).

Meaningful participation in empowerment processes contributes significantly to the long-term sustainability of development programs. Communities that are actively involved tend to have higher levels of commitment and collective responsibility, which ultimately strengthens program success and continuity (Aung et al., 2021). Strong participation also creates space for communities to develop adaptive capacity and ownership of the changes being initiated.

One of the main foundations of village community empowerment is social capital, which includes social networks, mutual trust, collective norms, and shared values that facilitate cooperative action (Wang et al., 2021). Strong social capital supports the rapid dissemination of information, strengthens solidarity, and increases the capacity of communities to organize collective action. In rural contexts, where social relationships tend to be more personal and closely connected, social capital plays a strategic role in promoting effective collaboration and strengthening local social structures (Matos Silva et al., 2022). High social cohesion also serves as a major driver of success for empowerment programs based on community cooperation.

In addition to social aspects, the success of village community empowerment is strongly influenced by responsive local leadership and strong institutions. Informal leaders, such as customary leaders, religious figures, and other influential individuals, often become effective agents of change because they possess moral authority and deep knowledge of local dynamics (Arisanty et al., 2025). Such leadership plays an important role in mediating between communities and external actors, as well as translating development programs into values and language that are more acceptable to local communities. Furthermore, functional local institutional structures are a prerequisite for transparent, accountable, and participatory governance (Gil-Quintana & Osuna-Acedo, 2020).

Inclusive and adaptive village governance plays an important role in strengthening relationships between citizens and public service providers, as well as ensuring fair and targeted resource allocation (Kovács, 2023). When communities feel that their aspirations are heard and valued, their participation in development tends to increase significantly. In this dimension, empowerment also includes a political aspect, namely strengthening community capacity to demand accountability from local authorities and advocate for their collective rights (Kari et al., 2022). Therefore, village community empowerment should be understood as a transformative process that is not only oriented toward skill transfer, but also toward shifting power structures, social values, and institutional systems.

Taken as a whole, village community empowerment is a complex and multidimensional process. Its success is shaped by the synergy between participatory approaches, the strengthening of social capital, effective local leadership, and inclusive institutional governance. This holistic and contextual approach provides the foundation for village development that is not only technically successful but also capable of creating resilient, self-reliant, and empowered communities in the long term.

Village Waste Management System

Waste management in rural Indonesia faces various structural challenges that hinder the creation of a sustainable system. Limited basic infrastructure, insufficient budget allocation from local governments, and low public awareness are among the main factors that worsen waste management conditions (Budiyarto et al., 2025). Unlike urban areas, which generally have relatively established waste management systems, many villages in Indonesia do not have access to regular waste collection services or adequate waste-processing facilities. As a result, practices such as dumping waste in open areas or burning household waste remain common, increasing the risk of environmental pollution and public health problems (Atyadhisti & Sarifudin, 2019; Oni Veriasa et al., 2023).

The fundamental differences between waste management in rural and urban areas do not only lie in the volume or type of waste generated, but also in the institutional and social capacity of communities. In rural areas, lower population density makes waste collection and transportation less efficient, while weak village governance often impedes the implementation of environmental policies (Miftahorrozi et al., 2022). In addition, sociocultural factors, such as the habit of disposing of waste into rivers or burning household waste, reflect a lack of understanding of the long-term impacts of these practices. Limited environmental education and minimal government intervention further reinforce ineffective waste management cycles.

In this context, community-based approaches such as the waste bank model have emerged as innovative solutions that can address the complexity of waste management problems in villages. This model uses an economic incentive system to encourage communities to sort and deposit economically valuable waste at community-managed collection centers. The collected waste, particularly inorganic waste, is sold to collectors or recycled, while organic waste can be composted for local agriculture (Nugroho et al., 2025). This mechanism not only reduces waste volume but also instills a new paradigm that waste is a valuable resource.

The main advantage of the waste bank model lies in its ability to integrate environmental concerns with local economic empowerment. Through intensive training and outreach, communities begin to understand the importance of systematic waste management and develop awareness of ecological responsibility (Ismiraj et al., 2023). In addition, financial compensation from waste sorting provides a direct incentive that encourages broader participation. In many cases, waste banks also become a means of creating new employment opportunities, particularly for women and rural youth involved in recycling, administration, and environmental education activities (Miftahorrozi et al., 2022).

This model also has significant social impacts, particularly in strengthening community cohesion. Waste bank activities based on mutual cooperation strengthen social relations and build solidarity among residents. Several studies have reported that community involvement in waste banks facilitates the formation of new social networks and increases a sense of ownership over environmental cleanliness (Nugroho et al., 2025). At the same time, education conducted through community activities strengthens ecological literacy and creates a new culture in household waste management.

The effectiveness of this model has been demonstrated in recent studies. For instance, Budiyarto et al. (2025) showed that waste banks successfully reduced waste volume by up to 30% in several study areas and increased the income of community members directly involved in their management. Ismiraj et al. (2023) highlighted that behavioral change toward waste occurs more rapidly in communities actively involved in decision-making related to waste bank operations. Meanwhile, Miftahorrozi et al. (2022) noted that program success is highly dependent on the presence of local facilitators and a clear organizational structure.

Nevertheless, not all waste bank implementations run smoothly. Several key challenges remain, including low community participation at the initial stage, dependence on volunteers, limited institutional support from village governments, and inadequate facilities such as storage sites, weighing equipment, and waste transportation vehicles (Nugroho et al., 2025). Therefore,

institutional strengthening strategies, technical capacity building, and integration of the program into village development planning are needed to ensure sustainability. Tong et al. (2024) emphasized that long-term success is strongly determined by factors such as visionary local leadership, sustainable incentives, and regulatory support from local governments.

Community participation is a key determinant of the success of waste bank systems. When residents feel involved in policy formulation, program implementation, and outcome evaluation, their sense of ownership of the program tends to increase (Ananto et al., 2023). This level of involvement is also positively related to community commitment to maintaining the sustainability of the system that has been established. Ismiraj et al. (2023) and Budiyarto et al. (2025) concluded that waste banks managed inclusively and transparently are more likely to survive in the long term than top-down models.

Taken together, the village waste bank model offers a comprehensive and adaptive approach to addressing waste problems in rural areas. By combining education, economic incentives, and community empowerment, this model not only addresses technical problems in waste management but also promotes sustainable social and environmental transformation. To optimize its potential, government support, cross-sectoral policy integration, and local capacity strengthening are essential prerequisites for positioning waste banks as a national strategy for sustainable village development.

Entrepreneurial Intention in Rural Contexts

Entrepreneurial intention (EI) is one of the main indicators used to explain the potential for entrepreneurial behavior, particularly in rural areas. In entrepreneurship literature, EI is regarded as a strong predictor of actual entrepreneurial action and has therefore become a central focus in the formulation of community-based economic development strategies. One of the most widely used theoretical frameworks for understanding EI is the Theory of Planned Behavior (TPB) developed by Ajzen. According to TPB, an individual's intention to perform an action, including starting a business, is influenced by three main factors: attitude toward behavior, subjective norms, and perceived behavioral control (Dejene et al., 2024; Islam et al., 2021). These three components are highly relevant in rural contexts, where social, structural, and psychological factors interact in shaping individuals' readiness to become entrepreneurs.

Attitudes toward entrepreneurship in rural communities are often influenced by perceptions of the economic and social benefits offered by business activities, particularly in contexts where formal employment opportunities are limited. Subjective norms refer to the perceived social pressure or support from the surrounding environment, such as family, customary leaders, and peer groups (Kovács, 2023; Salvador Costa et al., 2022). Meanwhile, perceived behavioral control relates to individuals' beliefs about their personal capabilities and the availability of resources such as capital, skills, and access to information (Lassi et al., 2021). In villages with limited supporting facilities, perceived control becomes a crucial determinant of whether entrepreneurial desire can be translated into concrete action.

Recent studies have shown that, in addition to the three main TPB constructs, several contextual factors can strengthen or weaken EI, including education level, the presence of role models, and access to external support (Agarwal et al., 2020; Bouichou et al., 2021). Higher education tends to improve individuals' ability to evaluate business opportunities and risks. The presence of community figures who have succeeded in entrepreneurship serves as a source of inspiration and social validation for business activities. Meanwhile, external support, such as training, mentoring, and government assistance, has a positive effect on increasing self-confidence and reducing structural barriers (Shi et al., 2020; Yesmin et al., 2024).

EI in rural contexts is also shaped by broader social and institutional factors. Aspects such as entrepreneurial orientation, sustained motivation, and perceptions of environmentally based opportunities are important personal factors. At the social level, community networks, local norms, and informal support can either encourage or inhibit entrepreneurial intention (Samkange et al., 2021). At the institutional level, village government policies, training

programs, and the presence of an entrepreneurial support ecosystem are key to transforming intention into action (Nicli et al., 2020). Thus, strengthening EI requires a holistic approach that simultaneously involves individual, social, and structural levels.

Training and empowerment programs have proven effective in increasing EI, especially in villages with limited access to formal education. Technical and managerial training enables communities to acquire basic skills for running a business. In addition, mentoring programs provide continuous guidance and strengthen individuals' perseverance in facing early business challenges (Ismiraj et al., 2023; Sari et al., 2022). Empowerment programs also play a role in promoting social inclusion and the involvement of vulnerable groups, such as women and youth, who are often marginalized in rural economic development processes.

Inclusive and responsive local leadership is an important element in fostering EI in villages. Leaders who can articulate a shared entrepreneurial vision and create participatory spaces for dialogue and collaboration can increase community confidence in starting new businesses. In addition, communities with strong social capital, characterized by trust, solidarity, and reciprocal norms, are more likely to support community-based entrepreneurial initiatives (Al-Qahtani et al., 2022). Intensive social interaction also facilitates the transfer of knowledge and experience and helps mitigate business risks.

Within the framework of sustainable development, EI in rural areas becomes increasingly relevant when directed toward environmentally based or waste-to-wealth entrepreneurship. Businesses such as processing organic waste into compost, producing biogas, recycling plastic, and creating creative products from waste demonstrate both economic potential and positive environmental impact (Jimenez, 2024; Nicli et al., 2020). For example, initiatives that process agricultural waste into organic fertilizer can increase land productivity while reducing soil pollution. Biogas production from livestock manure or household waste can replace fossil fuels and improve household energy efficiency (Jamaluddin & Zulkeflee, 2023; Sari et al., 2022).

Economic factors and local markets also play an important role in shaping and sustaining EI in green entrepreneurship. Economic incentives, such as microenterprise subsidies, capital assistance, and easier market access, can strongly encourage the emergence of new initiatives. In addition, local value chains that can absorb environmentally friendly products are vital for maintaining business continuity. Collaboration among village governments, the private sector, and local communities in building environmentally based business ecosystems can create conditions that support the development of rural entrepreneurship (Kovács, 2023; Miftahorrozi et al., 2022).

Considering the various factors influencing EI in villages, including psychological, social, and institutional aspects, an integrative approach is essential. Strengthening entrepreneurial intention cannot be carried out partially; it must involve simultaneous interventions that include individual capacity building, social empowerment, and local policy reform. This strategy provides an important foundation for rural economic transformation that is sustainable, inclusive, and adaptive to both global and local challenges.

Conceptual Model of Community Empowerment in Waste Management

The development of a conceptual model in the context of rural waste management is intended to explain the relationship between community empowerment and the improvement of environmentally based entrepreneurial intention. This conceptualization integrates social, economic, environmental, and cultural dimensions into an integrative framework that reflects the dynamics of rural communities. Previous studies have emphasized that structured and locally based empowerment can trigger socio-ecological transformation while strengthening individuals' intention to engage in environmental entrepreneurship (Salvador Costa et al., 2022; Scheyvens & van der Watt, 2021). In this framework, empowerment is not merely understood as a process of knowledge transfer, but as an effort to expand community agency over resources and collective decision-making.

The nested-circle approach proposed by Scheyvens and van der Watt (2021) positions empowerment as the core of strengthening community capabilities in sustainable development. Within this framework, empowerment is a layered process that encompasses economic, social, and political dimensions, all of which mutually support the formation of community readiness to act independently. Salvador Costa et al. (2022) further stated that community involvement in local climate action programs can increase community EI, particularly when community members feel that they have control over and directly benefit from these activities. Similarly, Nicli et al. (2020), in the context of eco-social agriculture, showed that local resource management combined with active participation can create entrepreneurial opportunities that are relevant to community needs.

The conceptual model developed in this study is based on five main components. The first component is community participation, which serves as the foundation of the empowerment process. Meaningful participation not only increases a sense of ownership but also strengthens social relations among residents. When communities are involved in problem mapping, program implementation, and evaluation, the resulting social transformation tends to be more sustainable (Ismiraj et al., 2023). The second component is education and technical training, which aims to improve individual capacity in waste management, environmental entrepreneurship, and microenterprise management. This capacity building strengthens perceived behavioral control, one of the key elements in the formation of EI (Salvador Costa et al., 2022).

The third component is economic incentives, which act as a trigger for continuous community involvement. The waste-to-wealth model, based on transforming waste into sources of economic value, has been shown to increase household income and expand new business opportunities in villages (Budiyarto et al., 2025). Incentives in the form of cash compensation, recycled products, or local market opportunities create an economic rationale that encourages long-term participation. The fourth component is institutional support, which strengthens model implementation. Program success is highly dependent on the role of village governments, community organizations, and development partners in providing infrastructure, funding, and supportive regulations. Without such support, programs are vulnerable to disruption due to resource limitations.

The fifth component is social capital and community networks, which play an important role in maintaining program sustainability. Communities with high levels of trust, solidarity, and effective communication are better able to manage conflict, share knowledge, and maintain collective motivation. In this context, social capital is not merely a social lubricant, but also an informal coordination mechanism that supports long-term program success (Vlachokostas, 2020).

This model is built on the assumption that community-based waste management not only contributes to the technical aspect of waste reduction, but also generates social, environmental, and economic benefits. Effective waste management reduces health risks, improves environmental aesthetics, and enhances community quality of life. More importantly, activities such as waste banks have been shown to facilitate the adoption of sustainability values and create community-based microenterprise structures (Budiyarto et al., 2025).

The local context is a determining factor in the effectiveness of this conceptual model. In Indonesian communities, customary values and local wisdom play a central role in shaping norms, behavior, and decision-making structures. The integration of values such as mutual cooperation, deliberation, and customary leadership into empowerment program design strengthens social legitimacy and increases local adoption (Kania et al., 2021). These values function not only as cultural communication tools but also as social infrastructure that facilitates collaboration and collective responsibility.

Nevertheless, adapting the model to geographical, social, and economic variations is essential. The success of a model in one village cannot necessarily be replicated directly in

another area. Therefore, a context-based approach is the key to model replication and scalability. This includes mapping local potential, identifying needs, and aligning program structures with local social and cultural characteristics (Resolute, 2024; Suryawan & Lee, 2025). Well-adapted programs tend to be more accepted by communities and have a higher likelihood of sustainability.

Strategic partnerships with community leaders, local organizations, and the private sector are also important elements in expanding the reach and effectiveness of interventions. Suryawan and Lee (2025) emphasized that program success depends greatly on the extent to which local actors are involved in the design, implementation, and monitoring processes. Local figures with social influence can serve as bridges between programmatic approaches and community values, thereby strengthening program legitimacy and acceptability.

In sum, this conceptual model emphasizes the importance of participatory, locally grounded, and sustainability-oriented approaches in linking community empowerment with the improvement of entrepreneurial intention. By combining technical and social components within a systemic framework, this model not only provides an analytical tool for understanding community dynamics but also offers practical guidance for designing development programs that are inclusive, contextually relevant, and ecologically transformative.

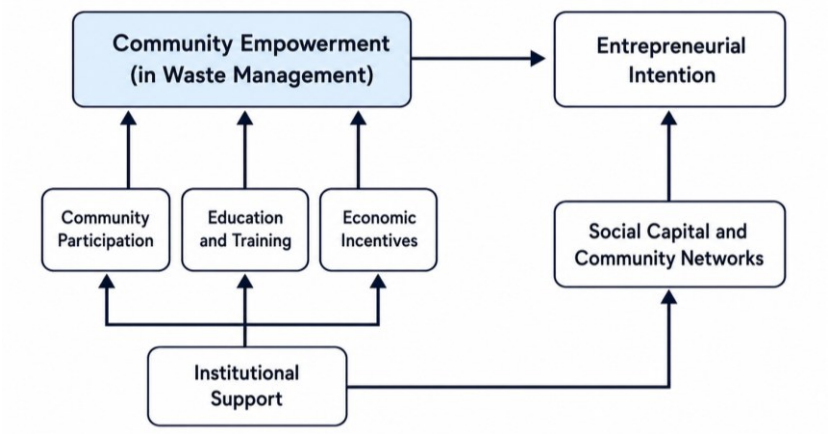

Figure 1. Conceptual Model Framework

METHOD

Research Type and Design

This study employed a mixed-methods approach with an explanatory sequential design. The study began with the collection and analysis of quantitative data, followed by the collection and analysis of qualitative data. The quantitative data were used to measure changes in participants' entrepreneurial intention before and after participating in a waste bank-based community empowerment program. The qualitative data were used to provide a deeper explanation of participants' experiences, social support, supporting factors, barriers, and the implementation context related to changes in entrepreneurial intention.

In the quantitative phase, this study used a pre-experimental method with a one-group pretest-posttest design without a control group. The quantitative experimental design used in this study is presented in Table 1.

Table 1. Quantitative Experimental Design

Group	Pretest	Treatment	Posttest
Participants in the waste bank-based empowerment program	O_1	X	O_2

Notes:
O_1 = Measurement of entrepreneurial intention before the treatment.
X = Implementation of the waste bank-based community empowerment program.
O_2 = Measurement of entrepreneurial intention after the treatment.

This design was used because the study involved a single group of program participants. The same participants completed the initial measurement, received the treatment in the form of a waste bank-based empowerment program, and then completed the final measurement. Entrepreneurial intention was measured twice, namely through a pretest before the program and a posttest after the program.

Table 1 shows that the quantitative design of this study involved only one group of participants without a control group. Therefore, the results were used to identify changes in entrepreneurial intention scores before and after the program, rather than to draw absolute causal conclusions. To strengthen the interpretation of the quantitative findings, qualitative data were collected through semi-structured interviews with program participants and the waste bank manager.

Research Location and Time

This study was conducted in Senteluk Village, Batulayar District, West Lombok Regency, West Nusa Tenggara. This location was selected because it has community-based waste management activities through a waste bank and is relevant to the aim of the study, namely to examine village community empowerment in waste management as an effort to improve entrepreneurial intention. The study was conducted during the implementation period of the waste bank-based community empowerment program, from January 2026 to May 2026. This period included the preparation stage, pretest, program implementation, posttest, interviews, and the collection of supporting data.

Research Participants and Sampling Technique

The participants in this study consisted of members of the waste bank-based empowerment program and the waste bank manager. In the quantitative phase, the respondents consisted of 10 program participants. All respondents were from Senteluk Village, Batulayar District, West Lombok Regency. The respondents consisted of 8 men and 2 women, aged between 31 and 45 years. All respondents had completed senior high school education and participated in both the pretest and posttest questionnaire administration. In the qualitative phase, interviews were conducted with program participants and one waste bank manager.

Respondents and informants were selected using purposive sampling. This technique was used because the study required participants who were directly involved in the waste bank-based empowerment program and were able to provide information relevant to the research focus. The criteria for quantitative respondents included participation in the waste bank-based empowerment program, willingness to complete both the pretest and posttest questionnaires, and involvement in waste management activities. The criteria for qualitative informants included having experience in participating in the program or managing the waste bank, understanding the implementation of the program, and being willing to provide information through interviews. The characteristics of the respondents and informants are presented in Table 2.

Table 2. Characteristics of Research Respondents/Participants

Code	Participant Status	Gender	Age	Highest Level of Education
R-01	Program participant	Male	39	Senior high school
R-02	Program participant	Male	35	Senior high school
R-03	Program participant	Male	35	Senior high school
R-04	Program participant	Male	31	Senior high school
R-05	Program participant	Male	45	Senior high school
R-06	Program participant	Female	43	Senior high school
R-07	Program participant	Female	32	Senior high school
R-08	Program participant	Male	45	Senior high school
R-09	Program participant	Male	33	Senior high school
R-10	Program participant	Male	31	Senior high school
PGL-01	Waste bank manager	Male	47	-

Table 2 shows that the quantitative participants in this study consisted of 10 program participants, while the qualitative participants included program participants and one waste bank manager. The fact that all respondents came from one village indicates that this study focused on the local context of Senteluk Village. Therefore, the findings are positioned as a description of changes in entrepreneurial intention among program participants within the research context, rather than as a generalization to all rural communities.

Research Variables

The independent variable in this study was the waste bank-based community empowerment program. This program included activities such as waste management education, training in waste sorting and utilization, introduction to the economic potential of waste, and strengthening community participation in waste bank activities. The program was designed to help the community understand that waste can be managed as a productive resource with economic potential.

The dependent variable in this study was the entrepreneurial intention of the rural community. Entrepreneurial intention was defined as participants' intention or tendency to engage in business activities based on waste management. This variable was measured using three dimensions derived from the Theory of Planned Behavior, namely attitude toward entrepreneurial behavior, subjective norms, and perceived behavioral control. In addition, demographic data such as gender, age, educational background, and participants' involvement in the program were recorded to describe the characteristics of the research participants.

Data Collection Techniques and Procedures

The data were collected through questionnaires, semi-structured interviews, and field observations. The questionnaire was used to obtain quantitative data on participants' entrepreneurial intention. The questionnaire was administered twice, before the program as the pretest and after the program as the posttest. The pretest score was used to determine the initial condition of participants' entrepreneurial intention, while the posttest score was used to determine their entrepreneurial intention after participating in the waste bank-based empowerment program.

Semi-structured interviews were used to obtain qualitative data regarding the experiences of participants and the waste bank manager. Interviews with participants were directed toward exploring their experiences in joining the program, changes in their perspectives on waste, social support, perceived self-efficacy, business intentions or plans, supporting factors, barriers, and suggestions for program development. Interviews with the waste bank manager were directed toward exploring program implementation, community participation, changes in community perspectives on waste, factors that encouraged and hindered entrepreneurial intention, village government support, and recommendations for program development.

The data collection procedure consisted of several stages. The first stage was research preparation, which included coordination with relevant parties, preparation of instruments, and explanation of the research objectives to participants. The second stage was the administration of the entrepreneurial intention pretest to program participants. The third stage was the implementation of the waste bank-based community empowerment program. The fourth stage was the administration of the entrepreneurial intention posttest. The fifth stage was semi-structured interviews with participants and the waste bank manager. The final stage was the processing and analysis of quantitative and qualitative data.

Research Instruments

The research instruments consisted of an entrepreneurial intention questionnaire and semi-structured interview guidelines. The entrepreneurial intention questionnaire was used to measure participants' entrepreneurial intention in the context of waste bank-based waste management. The questionnaire was developed based on the Theory of Planned Behavior,

which includes three main dimensions: attitude toward entrepreneurial behavior, subjective norms, and perceived behavioral control.

Each dimension consisted of four statement items, resulting in a total of 12 questionnaire items. The questionnaire used a five-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral or uncertain, 4 = agree, and 5 = strongly agree. The higher the score obtained, the higher the participant's entrepreneurial intention in waste management-based entrepreneurship. The indicators and items of the entrepreneurial intention questionnaire are presented in Table 3.

Table 3. Indicators and Items of the Entrepreneurial Intention (EI) Questionnaire

Dimension of EI	Number of Items	Item Numbers	Measurement Focus
– Attitude toward entrepreneurial behavior	4 items	A1, A2, A3, A4	Participants' views on the benefits, opportunities, interest, and economic value of waste management-based enterprises.
– Subjective norms	4 items	B1, B2, B3, B4	Support from family, community leaders, village government, the surrounding environment, and the involvement of other residents.
– Perceived behavioral control	4 items	C1, C2, C3, C4	Participants' beliefs in their ability to start, learn, process, sell, and run waste-based enterprises.
– Total	12 items	A1-C4	Entrepreneurial intention of program participants.

Table 3 shows that the entrepreneurial intention instrument covered three main dimensions aligned with the Theory of Planned Behavior. The attitude dimension was used to measure participants' evaluations of waste management-based enterprises. The subjective norm dimension was used to measure the social support perceived by participants. The perceived behavioral control dimension was used to measure participants' confidence in their ability to carry out waste-based business activities.

The semi-structured interview guidelines were used to deepen the quantitative findings. The interview guidelines for participants included questions about their experiences in joining the program, changes in their perspectives on waste, social support, perceived self-efficacy, business intentions or plans, supporting factors, barriers, and suggestions for program improvement. The interview guidelines for the waste bank manager included questions about program implementation, the level of community participation, changes in community perspectives on waste, factors that encouraged and hindered entrepreneurial intention, village government support, and recommendations for program development.

Validity and Reliability of the Instrument

The validity of the entrepreneurial intention questionnaire was established through content validity. Content validity was assessed by examining the alignment of each item with the constructs being measured, namely attitude toward behavior, subjective norms, and perceived behavioral control. This review was conducted to ensure that each statement item was relevant to the research objectives, consistent with the framework of the Theory of Planned Behavior, expressed in language that could be understood by respondents, and appropriate to the context of waste bank-based waste management in rural communities. Based on the content review, all items were considered suitable for use because they represented the dimensions of entrepreneurial intention that were the focus of this study.

In addition to content validity, the instrument was also reviewed for readability to ensure that the questionnaire statements did not lead to multiple interpretations. Readability assessment was important because the respondents came from rural communities with relatively homogeneous educational backgrounds, namely senior high school. Therefore, the

language of the instrument was made simple, direct, and relevant to participants' experiences in waste management. The readability review indicated that the questionnaire items could be understood by the respondents and were suitable for measuring entrepreneurial intention in the context of the waste bank-based empowerment program.

Instrument reliability was tested using Cronbach's Alpha to determine the internal consistency of the questionnaire items. Based on the pretest data, the Cronbach's Alpha value for the overall entrepreneurial intention items was 0.505. Meanwhile, the Cronbach's Alpha value based on the posttest data was 0.151. These values indicate that the internal consistency of the instrument was not strong when assessed using a very limited sample size. Therefore, the reliability results were not used as a basis for broad psychometric generalization.

Considering that the number of respondents was only 10, the assessment of instrument quality in this study placed greater emphasis on content validity, theoretical construct alignment, item readability, and the relevance of the instrument to the field context. The instrument can be considered content-valid and appropriate for describing changes in participants' entrepreneurial intention within the context of this study. However, further reliability testing with a larger sample is still needed in future studies to establish the internal consistency of the instrument more robustly.

The trustworthiness of the qualitative data was strengthened through source and technique triangulation. Source triangulation was conducted by comparing information from program participants and the waste bank manager. Technique triangulation was conducted by comparing questionnaire, interview, and observation data. These steps were taken to enhance the credibility of the findings and to ensure that the interpretation of the results was not based on a single type of data.

Data Analysis Techniques

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to calculate total scores, means, categories, and entrepreneurial intention gain scores. The total entrepreneurial intention score was obtained by summing all items from A1 to C4. The attitude dimension score was obtained by summing items A1 to A4, the subjective norm dimension score was obtained by summing items B1 to B4, and the perceived behavioral control dimension score was obtained by summing items C1 to C4. The mean score was obtained by dividing the total score by the number of items.

The categories of entrepreneurial intention were determined based on the following mean score ranges: 1.00 to 1.80 = very low; 1.81 to 2.60 = low; 2.61 to 3.40 = moderate; 3.41 to 4.20 = high; and 4.21 to 5.00 = very high. The gain score was calculated by subtracting the total pretest score from the total posttest score.

Before conducting the difference test, the data were tested for normality using the Shapiro-Wilk test because the number of respondents was fewer than 50. The normality test was conducted on the pretest scores, posttest scores, and gain scores. To examine differences in entrepreneurial intention before and after the program, a paired sample t-test was used if the score differences were normally distributed. This test was selected because the data came from the same group of respondents measured at two different times, namely before and after the program. If the score differences were not normally distributed, the Wilcoxon signed-rank test could be used as an alternative analysis.

Qualitative data were analyzed using thematic analysis. The analysis was conducted through several stages: reading the interview results, identifying initial codes, grouping codes into themes, interpreting the themes, and connecting the themes with the quantitative findings. The themes analyzed included experiences in joining the program, changes in perspectives on waste, social support, perceived self-efficacy, business intention, supporting factors, barriers, and suggestions for program development. The qualitative analysis results were used to explain the quantitative findings, particularly the reasons for the increase in participants' entrepreneurial intention after participating in the program.

Research Ethics

This study adhered to the ethical principles of social research. Before participating in the study, respondents were informed about the research objectives, data collection procedures, benefits of the study, and their rights as participants. Participation was voluntary, both in completing the questionnaire and in taking part in interviews. Respondents had the right to refuse to answer certain questions or withdraw from the study without any consequences.

The confidentiality of respondents' identities was maintained by using participant codes, such as R-01 to R-10 for program participants and PGL-01 for the waste bank manager. The data obtained were used only for academic purposes and were reported in aggregate form to avoid causing harm to participants. In presenting interview findings, participant quotations were used in a limited manner while maintaining the confidentiality of personal identities.

RESULTS

Pretest Results of Participants' Entrepreneurial Intention

The initial measurement of entrepreneurial intention was conducted before participants joined the waste bank-based community empowerment program. This measurement covered three main dimensions, namely attitude toward entrepreneurial behavior, subjective norms, and perceived behavioral control. Each dimension consisted of four statement items using a Likert scale ranging from 1 to 5, resulting in a total entrepreneurial intention score ranging from 12 to 60. The pretest scores of participants' entrepreneurial intention are presented in Table 4.

Table 4. Pretest Scores of Participants' Entrepreneurial Intention

Code	Attitude	Subjective Norms	Behavioral Control	Total	Mean	Category
R-01	5	6	4	15	1.25	Very low
R-02	7	6	7	20	1.67	Very low
R-03	5	4	5	14	1.17	Very low
R-04	6	4	4	14	1.17	Very low
R-05	5	4	6	15	1.25	Very low
R-06	5	6	5	16	1.33	Very low
R-07	4	5	4	13	1.08	Very low
R-08	4	4	5	13	1.08	Very low
R-09	6	5	7	18	1.50	Very low
R-10	5	6	4	15	1.25	Very low
Mean	**5.20**	**5.00**	**5.10**	**15.30**	**1.28**	**Very low**

The results in Table 4 show that participants' entrepreneurial intention before the program was in the very low category. All respondents obtained mean scores below 1.80. The total pretest scores ranged from 13 to 20, with an overall mean score of 15.30 out of a maximum score of 60. When converted into the mean score per item, the initial entrepreneurial intention score of participants was 1.28. This finding indicates that, before the program, participants did not yet have a strong tendency to view waste management as a business opportunity, did not perceive strong practical social support, and did not have sufficient confidence to develop waste-based enterprises.

When examined by dimension, the lowest initial score was found in the subjective norm dimension, with a mean total score of 5.00. The perceived behavioral control dimension obtained a mean score of 5.10, while the attitude toward behavior dimension obtained a mean score of 5.20. The differences among dimensions at the pretest stage were not substantial, indicating that the low level of participants' entrepreneurial intention occurred relatively evenly across all measured dimensions.

Posttest Results of Participants' Entrepreneurial Intention

The posttest measurement was conducted after participants joined the waste bank-based community empowerment program. The posttest results were used to determine the condition of participants' entrepreneurial intention after receiving program experience, training, and

mentoring in waste management. The posttest scores of participants' entrepreneurial intention are presented in Table 5.

Table 5. Posttest Scores of Participants' Entrepreneurial Intention

Code	Attitude	Subjective Norms	Behavioral Control	Total	Mean	Category
R-01	17	18	16	51	4.25	Very high
R-02	17	17	13	47	3.92	High
R-03	18	17	18	53	4.42	Very high
R-04	17	17	15	49	4.08	High
R-05	18	17	18	53	4.42	Very high
R-06	16	18	17	51	4.25	Very high
R-07	17	18	17	52	4.33	Very high
R-08	17	18	18	53	4.42	Very high
R-09	18	16	17	51	4.25	Very high
R-10	17	19	17	53	4.42	Very high
Mean	**17.20**	**17.50**	**16.60**	**51.30**	**4.28**	**Very high**

The results in Table 5 show that entrepreneurial intention scores increased among all respondents in the posttest. The total posttest scores ranged from 47 to 53 out of a maximum score of 60. The overall mean posttest score reached 51.30, with a per-item mean of 4.28. Based on the mean score interpretation category, this value falls within the very high category. Eight respondents were in the very high category, while two respondents were in the high category.

Based on the dimensions, subjective norms obtained the highest posttest mean score, namely 17.50. This indicates that, after the program, participants perceived stronger social support from family, the community, local figures, and the village government for waste management activities. The attitude toward behavior dimension also increased substantially, with a mean score of 17.20, indicating that participants began to view waste management-based enterprises as useful and economically valuable activities. The perceived behavioral control dimension obtained a mean score of 16.60. Although this dimension increased sharply, it was still the lowest among the three dimensions at the posttest stage. This finding suggests that participants' confidence in their abilities still needs to be strengthened through technical support, equipment, capital, and market access.

Changes in Entrepreneurial Intention Scores Before and After the Program

Changes in entrepreneurial intention scores were analyzed by comparing the pretest and posttest total scores of the same respondents. The change was calculated using the gain score, namely the difference between the total posttest and pretest scores. The changes in entrepreneurial intention scores before and after the program are presented in Table 6.

Table 6. Changes in Pretest-Posttest Entrepreneurial Intention Scores

Respondent Code	Pretest Total	Pretest Mean	Pretest Category	Posttest Total	Posttest Mean	Posttest Category	Gain
R-01	15	1.25	Very low	51	4.25	Very high	36
R-02	20	1.67	Very low	47	3.92	High	27
R-03	14	1.17	Very low	53	4.42	Very high	39
R-04	14	1.17	Very low	49	4.08	High	35
R-05	15	1.25	Very low	53	4.42	Very high	38
R-06	16	1.33	Very low	51	4.25	Very high	35
R-07	13	1.08	Very low	52	4.33	Very high	39
R-08	13	1.08	Very low	53	4.42	Very high	40
R-09	18	1.50	Very low	51	4.25	Very high	33
R-10	15	1.25	Very low	53	4.42	Very high	38
Mean	**15.30**	**1.28**	**Very low**	**51.30**	**4.28**	**Very high**	**36.00**

The results in Table 6 show that all respondents experienced an increase in entrepreneurial intention scores after joining the program. The total gain scores ranged from 27 to 40. The highest gain was obtained by R-08, with an increase of 40 points, while the lowest gain was obtained by R-02, with an increase of 27 points. The mean gain score for all respondents was 36.00 points. A clear categorical change was also observed. At the pretest stage, all respondents were in the very low category. After the program, eight respondents were in the very high category and two respondents were in the high category.

In addition to changes in total scores, analysis was also conducted based on the three dimensions of entrepreneurial intention. The changes in entrepreneurial intention scores by dimension are presented in Table 7.

Table 7. Changes in Entrepreneurial Intention Scores by Dimension

EI Dimension	Pretest Mean	Pretest Per-Item Mean	Pretest Category	Posttest Mean	Posttest Per-Item Mean	Posttest Category	Gain Score
– Attitude	5.20	1.30	Very low	17.20	4.30	Very high	12.00
– Subjective norms	5.00	1.25	Very low	17.50	4.38	Very high	12.50
– Behavioral control	5.10	1.28	Very low	16.60	4.15	High	11.50
Total EI	**15.30**	**1.28**	**Very low**	**51.30**	**4.28**	**Very high**	**36.00**

The results in Table 7 show that all dimensions of entrepreneurial intention increased. The subjective norm dimension experienced the highest increase in mean total score, namely 12.50 points. The attitude toward behavior dimension increased by 12.00 points, while the perceived behavioral control dimension increased by 11.50 points. Thus, the greatest increase occurred in the social support perceived by participants, while the smallest increase was found in participants' confidence in their ability to run waste-based enterprises.

Statistical Test Results of Differences Between Pretest and Posttest

Before conducting the difference test, the data were tested for normality using the Shapiro-Wilk test. Since the number of respondents was 10, the Shapiro-Wilk test was used to examine the distribution of pretest, posttest, and gain scores. The normality test results are presented in Table 8.

Table 8. Results of the Shapiro-Wilk Normality Test

Variable	Shapiro-Wilk Statistic	Sig.	Interpretation
Pretest score	0.875	0.115	Normal
Posttest score	0.830	0.033	Not normal
Gain score	0.860	0.077	Normal

The results in Table 8 show that the pretest scores were normally distributed, as indicated by a significance value of 0.115, whereas the posttest scores were not normally distributed, as indicated by a significance value of 0.033. However, the gain score, or the difference between posttest and pretest scores, had a significance value of 0.077, indicating a normal distribution. In a paired sample t-test, the main normality assumption that needs to be considered is the normality of the distribution of score differences. Therefore, the paired sample t-test could be used to examine differences in entrepreneurial intention scores before and after the program.

The results of the paired sample t-test on participants' entrepreneurial intention scores are presented in Table 9.

Table 9. Results of the Paired Sample t-test on Entrepreneurial Intention Scores

Variable	N	SD	SE	95% CI Lower	95% CI Upper	t	df	p-value	Cohen's dz
Entrepreneurial intention	10	3.86	1.22	33.24	38.76	29.50	9	<0.001	9.33

The results in Table 9 show a significant difference between entrepreneurial intention scores before and after the program, $t(9) = 29.50$; $p < 0.001$. The mean score increased from 15.30 in the pretest to 51.30 in the posttest, with a mean difference of 36.00 points. The 95% confidence interval for the mean difference ranged from 33.24 to 38.76, indicating that the increase in scores did not cross zero. The Cohen's dz value of 9.33 indicates a very large change within the group of participants studied.

Although the statistical results indicate a significant increase, these findings need to be interpreted proportionally because the study employed a one-group pretest-posttest design without a control group. Thus, the findings indicate an increase in entrepreneurial intention scores after the program, but they cannot fully rule out the possible influence of other factors outside the program, such as participants' social interactions, support from community leaders, or the dynamics of village activities during the research process.

Interview Findings from Program Participants

Qualitative data from participant interviews were used to explain the changes in entrepreneurial intention found in the quantitative results. The interview findings are presented by theme so that the relationship between participants' experiences and the dimensions of entrepreneurial intention can be seen more clearly. A summary of the interview findings from program participants is presented in Table 10.

Table 10. Summary of Interview Findings from Program Participants

Theme	Summary of Findings	Representative Quote	Link to EI
– Experience in joining the program	Participants viewed the program as useful because it provided practical knowledge on waste utilization, particularly in the production of organic fertilizer.	"This training has been very beneficial. We are now able to utilize waste more optimally, especially in producing organic fertilizer."	Intervention context that encouraged changes in attitude and behavioral control.
– Change in perspective on waste	Participants began to view waste as a problem that needs to be addressed immediately to prevent environmental pollution. This perspective became the initial basis for viewing waste as a resource that can be utilized.	"Waste must be managed properly so that it does not pollute the surrounding environment. Waste should be handled as early as possible."	Attitude toward waste management-based entrepreneurial behavior.
– Social support	Participants perceived support from various parties, including the community and village government, in waste management activities.	"In relation to waste management, all groups are very supportive so that waste can be handled more quickly."	Subjective norms.
– Perceived self-efficacy	Participants stated that they were able to process waste, but this ability was still limited by the availability of equipment that was not yet standardized.	"In terms of the ability to process waste, we are very capable. However, the main obstacle is that the equipment has not been properly standardized."	Perceived behavioral control.
– Business intention and plans	Participants showed interest in developing waste-processing enterprises, particularly in improving	"I am very interested in waste-processing businesses, especially in increasing capacity related	Entrepreneurial intention.

Theme	Summary of Findings	Representative Quote	Link to EI
	the quality of organic fertilizer and utilizing other types of waste with economic value.	to the quality of organic fertilizer and other types of waste that have economic value."	
– Supporting factors	Participants considered that waste raw materials were abundant and that waste management did not always require large amounts of capital to begin.	"The raw materials are abundant and do not require too much capital."	Reinforcement of entrepreneurial intention.
– Business barriers	The main obstacles perceived by participants were related to equipment that had not been standardized and markets that were not yet optimal.	"The equipment has not been properly standardized, and the market is not yet optimal."	Barriers to behavioral control and the realization of business intention.
– Suggestions for program development	Participants suggested broader follow-up training, especially on processing waste that is difficult to decompose and strengthening market access.	"In the future, broader training is needed on processing waste that is difficult to decompose, as well as clearer and more directed market opportunities for sales."	Improvement of the empowerment model.

The results in Table 10 show that the increase in entrepreneurial intention did not occur merely because participants received training materials, but also because they began to see the connection between waste management, environmental benefits, economic opportunities, and social support. Participants began to understand that waste is not only a source of pollution but can also be used as an economic raw material, particularly in the form of organic fertilizer and other products with market value.

Nevertheless, the interview data also indicate that increased intention is not fully identical to readiness to run an enterprise independently. Several barriers remained, particularly non-standardized equipment, limited capital, and unclear markets. Therefore, the qualitative findings strengthen the quantitative results while also indicating that although participants' entrepreneurial intention increased, further support is still needed for it to develop into sustainable business activity.

Interview Findings from the Waste Bank Manager

The interview with the waste bank manager provided additional information about program implementation, the level of community participation, economic opportunities, institutional support, and the challenges faced in developing waste-based enterprises. A summary of the interview findings from the waste bank manager is presented in Table 11.

Table 11. Summary of Interview Findings from the Waste Bank Manager

Question Focus	Summary of the Manager's Response	Theme	Analytical Note
– Implementation of the waste bank program	Waste bank processing at the northern regional UPT TPST once included the production of compost and liquid organic fertilizer, but it had not been implemented optimally.	Program implementation	The program had been initiated, but advanced processing had not yet been optimized.

Question Focus	Summary of the Manager's Response	Theme	Analytical Note
– Level of community participation	The community was considered highly participatory because residents had begun sorting waste from home, although the sorting process was not yet fully adequate.	Community participation	Social participation had begun to develop, but the quality of sorting still needed to be strengthened.
– Changes in community perspectives	The community showed a significant change in perspective, particularly because waste packaged into certain products could have selling value.	Waste as an economic opportunity	Changes in perception supported more positive attitudes toward waste-based enterprises.
– Factors encouraging entrepreneurial intention	Organic fertilizer production had begun to be sold, although still on a limited scale, such as for flower plants and similar needs.	Supporting factors for EI	Initial economic activities had emerged, but their scale remained limited.
– Barriers to starting waste-based enterprises	The main barriers were non-standardized equipment and limited community capital.	Barriers to EI	Technical and economic barriers continued to limit the transformation of intention into enterprise.
– Support from the village government or other parties	The government had provided support in the form of equipment procurement, but the equipment was still limited to waste sorting and pressing and had not yet focused on equipment for producing liquid organic fertilizer and compost.	Institutional support	Institutional support existed, but it was not yet fully aligned with production needs.
– Suggestions for program development	Training needs to be continuously developed so that more community members become involved, at least in waste sorting from home.	Program recommendation	Follow-up programs need to emphasize training, expanded participation, and strengthened household-level waste sorting.

The results in Table 11 show that the waste bank program had been implemented and had received institutional support, but its implementation had not yet been optimal in terms of advanced processing. The manager stated that compost and liquid organic fertilizer production had been conducted, but it had not yet been implemented optimally. Equipment support was also still limited to waste sorting and pressing and had not yet been directed toward equipment for producing liquid organic fertilizer and compost.

The findings from the waste bank manager support the interview findings from program participants. Community participation had begun to develop through household-level waste sorting, although it was not yet fully optimal. This finding is important because household-level sorting is the foundation for the sustainability of waste banks. If sorting is not yet strong,

advanced processing and the development of waste-based enterprises will face constraints related to the quality of raw materials.

Integration of Quantitative and Qualitative Findings

The integration of quantitative and qualitative findings was conducted to examine the relationship between the increase in entrepreneurial intention scores and participants' experiences during the program. The integration of findings based on the dimensions of entrepreneurial intention is presented in Table 12.

Table 12. Integration of Quantitative and Qualitative Findings

EI Dimension	Quantitative Results	Supporting Qualitative Findings	Brief Interpretation
– Attitude toward behavior	The per-item mean increased from 1.30 to 4.30.	Participants stated that the training helped them utilize waste, particularly in producing organic fertilizer. Participants also began to view waste as an environmental problem that needs to be addressed.	The program was associated with a change in participants' perspectives on waste, from waste as residue to waste as a usable resource.
– Subjective norms	The per-item mean increased from 1.25 to 4.38.	Participants stated that family, the community, local figures, and the village government supported waste management. The waste bank manager also stated that the community had begun participating through household-level sorting.	Social and institutional support became factors that strengthened participants' intention to engage in waste management.
– Perceived behavioral control	The per-item mean increased from 1.28 to 4.15.	Participants stated that they were able to process waste, but were still constrained by non-standardized equipment. The manager also emphasized that equipment and capital remained limited.	Participants' confidence increased, but business readiness still required technical support, equipment, capital, and market access.
– Overall entrepreneurial intention	The total mean increased from 15.30 to 51.30, with a mean gain of 36.00.	Participants showed interest in waste-processing enterprises, particularly organic fertilizer and other types of waste with economic value.	Entrepreneurial intention increased after the program, but the development of actual enterprises still required further mentoring.

The results in Table 12 show that the increase in participants' entrepreneurial intention was consistent across quantitative and qualitative data. The quantitative data showed a significant increase in scores, while the qualitative data explained that the increase was related to the benefits of training, changes in perspectives on waste, social support, and the emergence of interest in waste management-based enterprises.

However, the qualitative findings also indicate that increased intention alone is not sufficient to ensure the formation of sustainable waste-based enterprises. Barriers related to equipment, capital, production quality, and market access remain important factors that need to be addressed. Therefore, the results of this study indicate that the waste bank-based empowerment program is associated with increased entrepreneurial intention among participants, but the sustainability of its impact depends strongly on the strengthening of production facilities, business mentoring, and clearer market access.

DISCUSSION

Improvement in Entrepreneurial Intention after the Empowerment Program

The findings of this study show that participants' entrepreneurial intention increased substantially after they participated in the waste bank-based community empowerment program. The mean total entrepreneurial intention score increased from 15.30 in the pretest to 51.30 in the posttest, with a mean gain of 36.00 points. This increase was also supported by the paired sample t-test results, which indicated a significant difference between scores before and after the program. Descriptively, all participants who were initially in the very low category increased to the high and very high categories after the program. These findings indicate that the waste management-based empowerment program was associated with changes in participants' intention to view, consider, and develop waste-based entrepreneurial activities.

This improvement can be understood because the empowerment program did not merely provide information about waste management, but also offered direct experiences that connected environmental problems with economic opportunities. Before the program, participants tended not to have a strong orientation toward utilizing waste as a productive resource. After the program, they began to understand that waste could be processed into valuable products, particularly organic fertilizer and other forms of utilization relevant to local needs. This finding is consistent with the view that waste banks can function as instruments of community-based empowerment because they integrate environmental education, economic incentives, participation strengthening, and the formation of new habits in waste management (Fatmawati et al., 2022; Kristianto et al., 2023; Miftahorrozi et al., 2022).

Although the results show a significant increase, the findings need to be interpreted proportionally. The study used a one-group pretest-posttest design without a control group. With this design, the increase in scores after the program indicates a change in participants' entrepreneurial intention, but it is not sufficient to conclude that the program was the sole cause of the increase. Other factors, such as the influence of community leaders, interactions among participants, social experiences during the program, or the collective atmosphere of village activities, may also have contributed to changes in participants' intention. Therefore, these findings are more appropriately interpreted as evidence that the waste bank-based empowerment program was associated with the strengthening of entrepreneurial intention, rather than as an absolute causal claim.

Changes in Participants' Attitudes toward Waste Management-Based Enterprises

The increase in the attitude toward behavior dimension indicates that participants began to view waste management as a useful activity with economic value. The per-item mean score for this dimension increased from 1.30 in the pretest to 4.30 in the posttest. This change suggests a shift in participants' perspectives, from viewing waste as residue that should be discarded to seeing it as a resource that can be managed and utilized. The interview data support this finding, as participants stated that the training provided practical benefits, particularly in understanding how to utilize waste for organic fertilizer production.

Within the framework of the Theory of Planned Behavior, attitude toward behavior is one of the main determinants of an individual's intention to perform a particular action. A positive attitude is formed when individuals perceive an action as beneficial, valuable, or associated with favorable consequences (Ajzen, 1991). In this study, participants' positive attitudes toward waste-based enterprises were formed because they began to recognize the connection between waste management, environmental cleanliness, economic opportunity, and potential income generation. This means that attitude strengthening did not only occur at the level of knowledge, but also in the way participants evaluated the practical benefits of waste management activities.

This finding is consistent with studies on waste banks and the circular economy, which show that community-based waste management can change public perceptions of waste. Waste is no longer understood solely as an environmental burden, but as an alternative economic raw

material that can be processed, sold, or developed into local products (Budiyarto et al., 2025; Ismiraj et al., 2023; Nugroho et al., 2025). In rural contexts, this change in attitude is important because communities often face limited waste management facilities and limited access to formal waste collection systems. When waste begins to be understood as something valuable, communities have stronger reasons to sort, collect, and process it in a more organized manner.

However, a positive change in attitude does not automatically mean that participants are ready to run businesses independently. Attitude is an initial foundation in the formation of intention, but to become entrepreneurial action, it still requires skills, facilities, capital, and market access. Therefore, the improvement in participants' attitudes should be viewed as an important initial achievement, but not as sufficient evidence to ensure the sustainability of waste-based business activities. Follow-up programs need to ensure that these positive attitudes are translated into consistent productive practices.

Social Support and the Strengthening of Subjective Norms in the Village Context

The subjective norm dimension showed the highest increase compared with the other dimensions. The per-item mean score increased from 1.25 in the pretest to 4.38 in the posttest. This finding indicates that, after the program, participants perceived stronger social support for involvement in waste management and waste-based business activities. Participant interviews showed that support came from various parties, including family members, the community, local figures, and the village government. The waste bank manager also stated that community members had begun to participate by sorting waste from home, although the quality of sorting was not yet fully optimal.

In the Theory of Planned Behavior, subjective norms refer to individuals' perceptions of support, expectations, or social pressure from people who are considered important in their environment (Ajzen, 1991). In rural communities, subjective norms have a particularly important position because individual decisions are often influenced by social relationships, collective values, and the legitimacy of local figures. When families, neighbors, community leaders, and village governments support waste bank activities, participants are more likely to feel that involvement in waste management is accepted, valued, and worth undertaking.

This finding is in line with the literature on village community empowerment, which emphasizes the importance of social capital, local leadership, and community participation in the success of community-based programs. Social capital, which includes trust, social networks, collective norms, and solidarity, plays a role in strengthening collective action and facilitating the spread of information at the community level (Matos Silva et al., 2022; Wang et al., 2021). In the context of waste bank programs, social support can reduce participants' psychological barriers because they do not feel that they are acting alone. Waste management becomes a shared agenda, rather than merely an individual action.

Local leadership is also an important factor in strengthening subjective norms. Community leaders and village governments have influence in shaping residents' acceptance of new programs. When they support waste bank activities, the social legitimacy of the program increases. This is consistent with the view that local leaders can function as agents of change who bridge empowerment programs with the values, needs, and social language of local communities (Arisanty et al., 2025; Kovács, 2023). In this study, social and institutional support appeared to be important reinforcing factors in the growth of participants' intention to engage in waste-based economic activities.

However, social support also needs to be interpreted critically. Strong support at the initial stage of a program does not necessarily guarantee the sustainability of participation if it is not followed by a clear system, perceived economic benefits, and institutions capable of managing the program continuously. Data from the waste bank manager indicated that the community had begun sorting waste from home, but this practice was not yet fully adequate. This means that social support already existed, but it still needed to be translated into collective discipline, incentive mechanisms, and more stable governance.

Perceived Behavioral Control: Between Self-Confidence and Structural Barriers

The perceived behavioral control dimension also increased, from a per-item mean score of 1.28 in the pretest to 4.15 in the posttest. This increase indicates that participants began to feel more capable of engaging in waste management and developing it into a simple business activity. However, compared with attitude and subjective norms, this dimension had the lowest posttest score. This suggests that participants' self-confidence increased, but it was not yet fully strong because it was still constrained by technical and structural barriers.

The interview data support this interpretation. Participants stated that they felt capable of processing waste, but were constrained by equipment that had not been standardized. Other participants mentioned that the market was not yet optimal. The waste bank manager also stated that government support existed, but it was still limited to waste sorting and pressing equipment and had not yet included equipment for producing liquid organic fertilizer and compost. In addition, community capital was also considered limited. These findings show that perceived behavioral control is not only related to personal confidence, but also to the availability of supporting resources.

In the Theory of Planned Behavior, perceived behavioral control refers to individuals' beliefs in their ability to perform an action, including their perceptions of the ease or difficulty of carrying out that action (Ajzen, 1991). In the context of entrepreneurship, behavioral control is strongly influenced by skills, experience, access to capital, information, networks, and technical support. Studies on entrepreneurial intention also show that training, mentoring, external support, and access to resources play important roles in strengthening individuals' confidence to start a business (Agarwal et al., 2020; Bouichou et al., 2021; Maheshwari et al., 2022; Salisu, 2020).

The findings of this study indicate that the empowerment program was able to improve participants' perceived capability, but it had not fully addressed structural barriers. In other words, participants already had initial intention and confidence, but readiness to run waste-based enterprises still required further intervention. Barriers related to equipment, capital, and markets show that strengthening entrepreneurial intention must go beyond basic training. Programs need to include production mentoring, product quality standardization, packaging, business recordkeeping, access to microfinance, and market connections.

This point is important because empowerment programs often stop at improving knowledge and motivation. In entrepreneurship contexts, however, strong intention can weaken if participants do not find concrete support to start or sustain a business. Therefore, perceived behavioral control must be strengthened through the provision of tangible enabling conditions. Without such support, the increase in entrepreneurial intention may remain at the level of intention without developing into actual entrepreneurial behavior.

Integration of Findings within the Theory of Planned Behavior Framework

Conceptually, the results of this study can be explained through the Theory of Planned Behavior. The three main dimensions of TPB, namely attitude toward behavior, subjective norms, and perceived behavioral control, all increased after the program. This indicates that the waste bank-based empowerment program touched the three main aspects that shape entrepreneurial intention. Participants not only became more positive in evaluating waste-based enterprises, but also felt greater social support and began to develop confidence in managing waste as a productive activity.

The increase in attitude indicates a change in participants' evaluation of waste management. The increase in subjective norms indicates stronger social support from the surrounding environment. The increase in perceived behavioral control indicates improved confidence in personal ability, although technical barriers remained. These three changes help explain why participants' entrepreneurial intention increased significantly after the program. This finding is consistent with studies on entrepreneurial intention that position TPB as an important framework for understanding entrepreneurial intention, including in the context of

communities and environmentally based business development (Ajzen, 1991; Dejene et al., 2024; Islam et al., 2021; Shi et al., 2020).

However, the TPB framework also helps clarify the limits of interpretation. TPB explains the formation of intention, not an automatic guarantee of actual entrepreneurial behavior. Participants with high intention may not immediately run a business if barriers related to equipment, capital, production, and markets remain unresolved. Therefore, the increase in entrepreneurial intention in this study should be positioned as an indicator of initial psychological and social readiness, not as evidence that waste-based entrepreneurship has been fully established.

In the village context, the integration of TPB also needs to be read contextually. Community entrepreneurial intention is not only influenced by individual factors, but also by local social and institutional structures. Support from community leaders, the village government, waste bank managers, and the involvement of other residents affects how participants evaluate opportunities and risks. This makes the waste bank-based empowerment model relevant because the program does not operate only at the individual level, but also at the community level. The program shapes a supportive social environment, introduces waste management practices, and creates space for the emergence of entrepreneurial orientation based on local resources.

Implications of the Waste Bank-Based Empowerment Model

The findings of this study imply that waste banks can be positioned as an empowerment model that is not only oriented toward waste reduction, but also toward strengthening the local economy. Waste bank programs provide space for communities to learn how to sort, process, save, sell, and develop waste-based products. If managed consistently, waste banks can become centers of environmental entrepreneurship learning at the village level. This is consistent with the view that the waste bank approach integrates education, economic aspects, institutional mechanisms, and community participation within a single empowerment mechanism (Fatmawati et al., 2022; Ismiraj et al., 2023; Miftahorrozi et al., 2022).

However, the results also show that the waste bank model is not sufficient if it relies only on initial socialization and training. Limitations related to equipment, capital, production quality, and market access remain important barriers. The waste bank manager stated that the available equipment was still limited to sorting and pressing waste and did not yet support the optimal production of liquid organic fertilizer and compost. This condition indicates that transforming waste banks into a basis for entrepreneurship requires a more complete support chain, ranging from raw material processing, production, and quality standardization to packaging, marketing, and partnerships with buyers.

The practical implication of this finding is the need to develop a more operational empowerment model. Follow-up programs should not merely provide knowledge about the importance of waste management. Participants need to be trained to produce goods with stable quality, understand market needs, calculate production costs, set prices, and build sales networks. In the context of organic fertilizer, for example, training should include production techniques, quality testing, packaging, distribution permits when required, and local marketing strategies. Without these aspects, high entrepreneurial intention may be difficult to develop into sustainable business activity.

The findings also indicate that village governments and waste bank managers need to act as ecosystem facilitators, rather than merely as providers of basic facilities. Institutional support needs to be directed toward the provision of production facilities, local regulations, market partnerships, and incentive systems for residents who actively sort and process waste. Studies on community empowerment show that the success of community-based programs is strongly influenced by institutional quality, citizen participation, and the sustainability of social and technical support (Salvador Costa et al., 2022; Sari et al., 2022; Scheyvens & van der Watt,

2021). Therefore, the waste bank-based empowerment model should be designed as a long-term process rather than a temporary activity.

Relationship between the Findings and Previous Studies

The results of this study support previous findings stating that waste bank programs can strengthen environmental awareness, community participation, and local economic opportunities. Studies by Budiyarto et al. (2025) and Nugroho et al. (2025) show that waste banks can reduce waste volume while creating income opportunities for community members who are directly involved. This study extends that understanding by showing that waste banks are also associated with increased entrepreneurial intention, especially when participants gain training experience, social support, and an understanding of the economic value of waste.

This finding is also consistent with Ismiraj et al. (2023), who emphasized that community involvement in the operationalization of waste banks can accelerate behavioral change and strengthen acceptance of community-based waste management. In this study, such change was reflected in participants' increasingly positive attitudes toward waste-based enterprises and the emergence of confidence that waste could be developed into economically valuable products. However, as also found in studies on waste bank implementation, program sustainability remains strongly influenced by the availability of facilities, organizational structure, institutional support, and market access (Miftahorrozi et al., 2022; Nugroho et al., 2025).

From the entrepreneurship perspective, the results of this study support the view that training and empowerment can improve entrepreneurial intention. Maheshwari et al. (2022) showed that education, training, environmental support, and perceived self-efficacy influence entrepreneurial intention. In this study, the increase in EI occurred after participants gained program experience that provided a new understanding of waste-based business opportunities. However, the identified barriers related to equipment, capital, and markets indicate that increased intention must be followed by the strengthening of the business ecosystem so that participants do not stop at the level of motivation.

Therefore, the main contribution of this study lies in its confirmation that waste bank-based community empowerment programs can serve as an initial medium for fostering entrepreneurial intention among rural communities. The program works through changes in attitude, stronger social support, and increased perceived capability. However, this study also shows that strengthening intention is not sufficient without adequate structural support. The sustainability of the model depends greatly on institutional readiness, production facilities, capital, business mentoring, and clear market access. These findings provide a basis for developing a more directed community empowerment model, namely a model that not only addresses waste problems but also encourages the emergence of environmental entrepreneurship based on local village potential.

CONCLUSION

The results of this study indicate that the waste bank-based community empowerment program was associated with an increase in participants' entrepreneurial intention. Entrepreneurial intention scores increased from the very low category in the pretest to the very high category in the posttest. This increase was observed among all respondents and was supported by the paired sample t-test results, which showed a significant difference between scores before and after the program. These findings indicate that participation in the program, waste management training, and the introduction of economic opportunities from waste can encourage the development of entrepreneurial intention among rural communities.

The increase in entrepreneurial intention occurred across the three main dimensions, namely attitude toward behavior, subjective norms, and perceived behavioral control. The subjective norm dimension showed the highest increase, indicating that social support from family, the community, local figures, and the village government played an important role in strengthening participants' intention to engage in economically valuable waste management

activities. The attitude dimension also increased, as participants began to view waste as a productive resource. Meanwhile, the perceived behavioral control dimension indicated that participants had begun to feel capable of processing waste into simple business activities.

The qualitative findings strengthened the quantitative results by showing that participants benefited from the training, began to view waste as an economic opportunity, and expressed interest in developing waste-processing enterprises, particularly organic fertilizer production. However, this increase in intention cannot yet be fully interpreted as mature business readiness because several barriers remain, including equipment limitations, capital constraints, production quality issues, and limited market access. Therefore, the waste bank-based empowerment model can serve as an initial strategy for fostering entrepreneurial intention among rural communities, but its sustainability requires stronger mentoring and institutional support.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. The study used a one-group pretest-posttest design without a control group, meaning that the increase in entrepreneurial intention after the program cannot be claimed entirely as the sole effect of the intervention. The number of respondents was also limited to 10 participants from one village, so the findings cannot be broadly generalized to all rural communities with different characteristics. In addition, this study measured entrepreneurial intention rather than actual entrepreneurial behavior. Therefore, it cannot yet confirm whether participants' intention will develop into sustainable waste management-based enterprises.

RECOMMENDATIONS

Waste bank-based empowerment programs should be continued through more operational mentoring, particularly in strengthening production skills, standardizing equipment, improving the quality of organic fertilizer or other waste-based products, packaging, business recordkeeping, and market access. Village governments, waste bank managers, and relevant partners need to build more targeted institutional support, not only for waste sorting and collection, but also for advanced processing and the development of waste-based microenterprises. Future studies are recommended to involve a larger number of respondents, include a control group, expand the research location, and measure the impact of the program on actual entrepreneurial behavior and participants' economic sustainability.

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AUTHOR CONTRIBUTIONS STATEMENT

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Burhanuddin	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Saiful Prayogi	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓	
Nova Kurnia	✓	✓			✓	✓		✓	✓		✓			
Muhali			✓	✓			✓	✓		✓	✓		✓	
Ika Nurani Dewi		✓	✓			✓	✓		✓	✓		✓		

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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