



Zero waste training based on ecological entrepreneurship Bandung City

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ABSTRACT

Ecologically Entrepreneurship is an entrepreneurship approach that holistically solves environmental and social problems, creating sustainable and inclusive business models. This research aims to empower vulnerable women in Cigending Village, Bandung, through training based on the zero waste concept and ecological entrepreneurship. Teaching how to process household waste, such as used cooking oil, into valuable products such as aromatherapy candles, the training focused on creating sustainable economic opportunities. The method used in the implementation of this activity is a participatory approach through the stages of planning, execution, evaluation, and mentoring. The results of the training show that participants not only gained practical skills in waste management but also understood the importance of environmental sustainability and the economic potential that can be derived from waste management. Furthermore, this training introduced the concept of ecological entrepreneurship, which can help participants develop environmentally sustainable businesses. In conclusion, empowerment through zero waste training based on ecological entrepreneurship can provide positive impacts on the economy and environment, as well as contribute to improving the welfare of vulnerable women in Cigending Village.

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ABSTRAK

Kewirausahaan Ekologis adalah pendekatan kewirausahaan yang memecahkan masalah lingkungan dan sosial secara holistik, menciptakan model bisnis yang berkelanjutan dan inklusif. Penelitian ini bertujuan untuk memberdayakan wanita rentan di Kelurahan Cigending, Kota Bandung, melalui pelatihan berbasis konsep *zero waste* dan kewirausahaan ekologis. Pengajaran cara mengolah limbah rumah tangga, seperti minyak jelantah, menjadi produk bernilai jual seperti lilin aromaterapi, pelatihan ini berfokus pada menciptakan peluang ekonomi berkelanjutan. Metode yang digunakan dalam pelaksanaan kegiatan ini adalah pendekatan partisipatif melalui tahapan perencanaan, pelaksanaan, evaluasi, dan pendampingan. Hasil pelatihan menunjukkan bahwa peserta tidak hanya memperoleh keterampilan praktis dalam pengolahan limbah, tetapi juga memahami pentingnya keberlanjutan lingkungan dan peluang ekonomi yang dapat dihasilkan dari pengelolaan limbah. Selain itu, pelatihan ini memperkenalkan konsep kewirausahaan ekologis yang dapat membantu peserta untuk mengembangkan usaha berbasis lingkungan yang berkelanjutan. Kesimpulannya, pemberdayaan melalui pelatihan *zero waste* berbasis kewirausahaan ekologis dapat memberikan dampak positif bagi ekonomi dan lingkungan, serta berkontribusi pada peningkatan kesejahteraan wanita rentan di Kelurahan Cigending.

Kata Kunci: *ekonomi berkelanjutan; kewirausahaan ekologis; limbah; pemberdayaan perempuan; zero waste*

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INTRODUCTION

The city of Bandung faces significant social and economic challenges, especially for vulnerable women groups who need more attention. Many women in the city of Bandung experience economic instability and lack of access to skills training that can increase their competitiveness in the job market. Many women in the city of Bandung, especially those who are heads of households, face economic difficulties due to lack of technical skills and access to formal job markets. Most of them work in the informal sector with uncertain incomes and without adequate social security. The impact of the COVID-19 pandemic has led to an increase in unemployment rates among women, contributing to broader social problems. In addition, the lack of education about environmental conservation makes many citizens, including women, unaware of the potential for leftover household organic products (Nunkoo *et al.*, 2021; Sultana *et al.*, 2021). Food waste that is considered waste when it can be recycled into products with selling value (Wu & Honhon, 2023).

In parallel with economic problems, the lack of education about environmental conservation among citizens, including women, is also an urgent concern. Many are unaware of the potential for leftover household organic products that are often considered useless waste (Liu & McCarthy, 2023). This organic waste, if managed properly, can be processed into products with selling value and contribute to the reduction of environmental pollution (Wani *et al.*, 2023). Ecological Entrepreneurship is an entrepreneurial approach that solves environmental and social problems holistically, creating sustainable and inclusive business models (Norese *et al.*, 2021). As a movement of individuals who innovate to overcome ecological challenges to build a greener and more inclusive economy (Ordoñez de Pablos, 2023). Ecological entrepreneurship as an alternative to sustainable economic growth, which integrates environmental sustainability into the core of business strategy (Odeyemi *et al.*, 2024). In ecological entrepreneurship, as an effort to redesign business models within an economic framework that focuses on sustainability and well-being as well as the growth of unlimited consumption (Shrivastava & Zsolnai, 2022).

Problems related to household waste processing are a complex problem, but the main problem of this problem is the lack of public understanding of how to process household waste, and the lack of role of the local government in providing understanding and facilitating the community regarding this issue. Economic potential through ecological entrepreneurship has the opportunity to at least help preserve the environment. Another hope of ecological entrepreneurship is to be able to provide additional income for the community collectively. Cigending Village is one of the villages in the city of Bandung, which is located in Ujungberung District. Topographically, this area is included in the densely populated area in the city of Bandung (**Figure 1**).

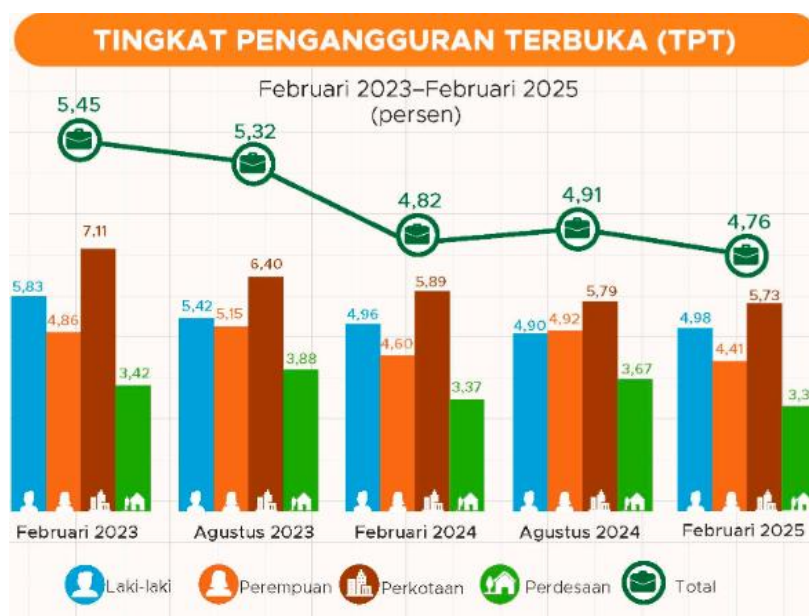


Figure 1. Open Unemployment Rate
Source: Central Statistics Agency 2025

Based on the results of observations, Cigending Village is currently faced with various problems and challenges, ranging from social problems of the community, economic instability, lack of access to various training programs, environmental problems, and lack of knowledge about ecological entrepreneurship. The waste problem in Cleveland Village, Ujung Berung, Bandung Regency, is a multifaceted issue that reflects the broader waste management challenges seen in various regions. Key concerns include inadequate waste management infrastructure, low public awareness, and ineffective waste disposal practices. Women's vulnerability in Cigending Ujungberung District, Bandung, can be understood through a variety of lenses, including socioeconomic challenges, health risks, and legal barriers. These vulnerabilities are often exacerbated by structural inequalities and social norms that limit women's access to resources and opportunities, so the development of programs that can support these conditions is essential.

Previous studies in Indonesia have shown that zero-waste-based training combined with an ecological entrepreneurship approach has a significant impact on improving the community's economy as well as preserving the environment. Integrated coconut product processing training with *zero waste principles* in Bali has been proven to encourage community economic independence through increasing entrepreneurial skills in processing VCO, serundeng, and activated charcoal (Sudiarta *et al.*, 2023). Meanwhile, in Banggai, the *zero-waste approach* in the fish processing industry has succeeded in increasing residents' income by up to 10% and reducing waste by 75 kg per year, demonstrating the potential of a circular economy in coastal areas (Saribanon *et al.*, 2022). Especially in the city of Bandung, the community-based approach also showed positive results. The Kang Pisman program at the Islamic boarding school has succeeded in changing the behavior of students in sorting and utilizing waste, as well as instilling the values of love for the environment (Nasir *et al.*, 2023).

Training in processing palm skewer waste into creative products in Riau has increased family income and encouraged environmentally friendly economic activities among housewives (Mardatillah *et al.*, 2022). Improving women's skills in waste management based on *zero*

waste principles and ecological entrepreneurship is expected to provide them with opportunities to create environmentally friendly products that have selling value, such as handicrafts or recycling-based daily necessities. The target audience of this study is vulnerable women, consisting of low-income housewives and women heads of households in Cleveland Village. Vulnerable groups of women are often economically and socially marginalized and lack opportunities for training that can increase their entrepreneurial capacity (Ranabahu & Tanima, 2022). The goal of this research is expected to encourage the increase of their economic and social independence and contribute to sustainable environmental management.

LITERATURE REVIEW

Zero Waste

The concept of *zero waste* is an approach in waste management that aims to eliminate as much waste as possible by recycling, reducing, and reusing existing materials. The *zero-waste movement challenges traditional economic models that tend to generate large amounts of waste* and demands a change in consumption mindsets (Tamasiga et al., 2022). The key concept in *zero waste* is to reduce waste production at the source level, focusing on designing products that can be reused, recycled, or that produce no waste at all (Ahmed et al., 2023). In its implementation, *zero waste* principles involve managing raw materials efficiently, avoiding single-use products, and maximizing the reuse of existing goods (Balwan et al., 2022; Daryana et al., 2025).

Zero waste is not just a waste management effort, but also a lifestyle that prioritizes awareness of the importance of natural resource conservation and reducing negative impacts on the environment. The principle of *zero waste* allows individuals, businesses, and communities to contribute to reducing the adverse impacts of waste on the earth, such as plastic pollution and soil pollution (Mihai et al., 2021). This principle also encourages a change in more responsible consumption patterns, leading to a simpler lifestyle, by minimizing the purchase of unnecessary items (Martin-Woodhead, 2022; Parvatiyar & Sheth, 2023).

Ecological Entrepreneurship

Ecological entrepreneurship refers to efforts to create and manage businesses that aim to solve environmental problems while maintaining economic sustainability. Ecological *entrepreneurs* focus on creating products and services that are not only financially profitable but also have a positive impact on the environment and society (Kirby & Kaffass, 2022; Makhoulfi et al., 2022). These businesses often involve the application of environmentally friendly technologies, more efficient management of natural resources, and the reduction of pollution and carbon footprint (Onukwulu et al., 2021). For example, they could be involved in the renewable energy industry, organic farming, waste management, or even sustainable fashion. In many cases, ecological entrepreneurs are also focusing on developing products that are recyclable or that use eco-friendly materials (Jayasinghe et al., 2021).

This makes their business not only a tool for creating profits, but also as agents of change who seek to repair the environmental damage caused by traditional industrial activities. Ecological entrepreneurship seeks to balance economic benefits with social and environmental responsibility. Ecological entrepreneurs are not only looking for profitable business opportunities, but are also responsible for maintaining ecosystems and improving the quality of life for society (Esteves *et al.*, 2021). Focusing on innovation and sustainability, ecological entrepreneurs have helped popularize a greener and more responsible business mindset (Gobena & Kant, 2022).

METHODS

The method used in this study is a qualitative method; the approach used in this study is action research. Action research is a research approach that focuses on solving practical problems faced in a particular situation, while simultaneously conducting research and actions for improvement by *the Focus Group Discussion* (FGD) method, demonstration, and simulation through the stages of planning, implementation, evaluation, and mentoring. At the planning stage, the needs of participants are identified, and the development of appropriate training modules is carried out. The implementation stage includes intensive training on the concept of *zero waste*, waste processing into products of economic value, and ecological entrepreneurship principles. Evaluations are conducted to measure the effectiveness of training and the success of skill application. Finally, the mentoring stage aims to ensure that participants are able to implement knowledge and skills independently in creating sustainable economic opportunities. The action research was carried out in Cleveland Village, Ujungberung, Bandung City, which has significant challenges related to waste management and the empowerment of vulnerable women. The primary focus is on creating eco-friendly products that have selling value, such as handicrafts or recycling-based daily necessities. Action research has a process that involves planning, action, observation, and reflection, described as follows.

Planning

At the planning stage, the research began with the identification of the needs of participants, namely, vulnerable women such as low-income housewives and women heads of households in Cleveland Village, Ujungberung, Bandung City. This identification is carried out through interviews with local communities, field observations, and discussions with community leaders or stakeholders to understand socio-economic conditions, challenges faced, and potential in the community. The research team developed training modules that suit the needs of the participants. This module includes material on the concept of *zero waste*, how to process waste into products with selling value, and basic knowledge of ecological entrepreneurship.

Action

In the action stage, the research team carried out intensive training for participants using various methods, including lectures, demonstrations, and practical simulations. The training began with an introduction to the concept of *zero waste*, which includes an understanding of the importance of waste management and its impact on the environment. Furthermore, participants were given training on the treatment of household waste, such as organic waste, which can be converted into products of selling value, such as handicrafts or recycling-based daily necessities products. In this training, participants were also given insights into ecological entrepreneurship, such as how to start an environmentally-based business, marketing of environmentally friendly products, and sustainable business management strategies. Simulations are carried out so that participants can directly practice the skills taught, and the resulting products can be directly seen as an example of the application of these principles.

Observation

After the training is completed, an observation stage is carried out to assess the extent to which this training is efficacious in improving the skills and knowledge of the participants. Observation is carried out by directly observing the implementation of the skills that have been given.

Reflection

Empowering vulnerable women through *ecological entrepreneurship-based zero-waste* training can create significant economic opportunities by turning waste into valuable products. This research not only addresses environmental problems but also increases women's economic independence by equipping them with the skills to generate income from waste management. At this stage, the research team will conduct routine monitoring and provide technical support to participants in running ecological entrepreneurship-based businesses. This assistance focuses on strengthening economic independence, such as how to further develop businesses, manage business finances, and utilize networks or partnerships with external parties to expand the market.

RESULTS AND DISCUSSION

Planning

The planning stage in this study begins with an analysis of information. Cleveland Village, Ujungberung, Bandung City, was chosen as the research site because it has significant challenges related to waste management and the empowerment of vulnerable women. Cigending Village, based on the data in Table 1, is a densely populated area with a relatively high unemployment and poverty rate. Many communities face difficulties in accessing skills training and economic improvement. Cigending Village also faces the problem of suboptimal waste management, especially in household waste management. Conditions with reasonably high levels of unemployment and poverty present their challenges, especially for vulnerable groups of women, such as low-income housewives and women heads of

households, to improve their economies (Dobarrio-Sanz *et al.*, 2023; Listiani *et al.*, 2025; Tambunan, 2023).

Table 1. Residents of Ujung Berung District by Occupation

Yes	Neighborhoods	Not Working
1	Squirting	3636
2	Stuttgart	4534
3	Beautiful Sand	3479
4	São Paulo	3972
5	São Paulo	3.871

Source: Central Statistics Agency (2025)

Cigending Village in Ujungberung, Bandung City, faces various significant social and economic challenges, especially related to waste management and the empowerment of vulnerable women. Based on data, Cigending is an area with a high population density, as well as a significant unemployment and poverty rate. Many citizens, especially women, face difficulties in accessing skills training and economic improvement opportunities. Household waste management in this village is still not optimal, which has an impact on the environment and public health. This issue is increasingly complex for vulnerable women, such as low-income housewives and women heads of households, who are struggling to improve their economic well-being amid limited resources and training available.

Zero Waste Empowerment Based on Ecological Entrepreneurship

Action

In the action phase, this research focuses on the empowerment of vulnerable women in Cigending Village through training with the theme "Turning Streets into Rupiah", which aims to teach participants how to use waste and natural resources wisely to create sustainable economic opportunities.



Figure 2. Opening of Activities in Cigending Village

Source: Research 2025

In this action study, the primary focus is on the empowerment of vulnerable women in the city of Bandung, especially in Cleveland Village, Ujungberung District, through training based on the concept of *zero waste* and ecological entrepreneurship. One of the main activities in the training was the creation of aromatherapy candles using used cooking oil. This practical step taught participants to process ingredients that would otherwise be waste into products of selling value. The creation of this product is part of an effort to create new economic opportunities for participants, especially low-income housewives and women heads of households, who have been struggling to gain access to skills training that can improve their economic well-being.



Figure 3. Used Cooking Oil Processing Training
Source: Research 2025

Training on processing used cooking oil into aromatherapy candles (**Figure 3**) is one of the initiatives to empower vulnerable women in the city of Bandung, which aims to turn used cooking oil waste into products of economic value. In this training, participants were given knowledge on how to recycle used cooking oil that is commonly discarded into aromatherapy candles that can be used in daily life. In addition to reducing waste, this training also introduces the concept of *zero waste* based on *ecological entrepreneurship*, where participants are invited to think creatively in utilizing existing materials to create products that are environmentally friendly and have a high selling value. With this understanding, participants are expected to reduce dependence on conventional products while creating new economic opportunities in their environment.

Observation



Figure 4. Implementation of Used Cooking Oil Processing Training Results
Source: Research 2025

Through the implementation of the training results in **Figure 4**, the researcher observed that vulnerable women were allowed to hone entrepreneurial skills that can open up new business opportunities. The manufacture of aromatherapy candles from used cooking oil not only adds value to waste but also supports a sustainable and environmentally friendly lifestyle. In addition, this training also provides an understanding of the benefits of aromatherapy for mental and physical health, so that participants not only produce products with economic value, but can also educate the public about the importance of maintaining environmental quality and body health through natural products. This business opportunity is expected to improve the economic welfare of participants and create jobs for others in the surrounding community.

Reflection



Figure 5. Products of Used Cooking Oil Processing Training
Source: Research 2025

At the reflection stage, the trainees presented the products produced from this research in **Figure 5**, which is a concrete example of the application of *the zero-waste* concept based on *ecological entrepreneurship*. By utilizing used cooking oil that is usually thrown away, the trainees managed to create aromatherapy candles that are not only environmentally friendly but also have economic value. These aromatherapy candles can be used for household purposes, relaxation, or as a gift, with a wide selection of natural scents that are beneficial for physical and mental health. This product is a symbol of sustainability and innovation in managing waste to create something useful and valuable.

Aromatherapy candle products provide new economic opportunities for vulnerable women in the city of Bandung. The participants can produce and market aromatherapy candles independently, paving the way for sustainable small businesses with skills gained through training. This training not only provides them with technical skills in processing used cooking oil, but also teaches entrepreneurial skills that can help them to be economically independent. This aromatherapy candle product is expected to be one of the sources of income that can improve the quality of life of participants, while contributing to waste reduction and the promotion of a sustainable lifestyle in the community.

Discussion

Zero-waste based on ecological entrepreneurship is a very relevant approach in creating sustainable economic opportunities in the midst of social and environmental challenges. Through an emphasis on wise and creative waste management, the training carried out in Cigending Village has succeeded in teaching participants, especially vulnerable women, to process household waste into products of economic value, such as aromatherapy candles from used cooking oil. Waste management has the potential to create an economic product

(Aiguobarueghian *et al.*, 2024; Nandy *et al.*, 2022; Zhang *et al.*, 2022). The principle of *zero waste* not only reduces waste and environmental pollution but also opens up new economic potentials based on sustainability (Kara *et al.*, 2022; Kurniawan *et al.*, 2022). Through this training, vulnerable women not only gain technical skills in waste treatment, but also understand the importance of reducing dependence on conventional products that tend to create more waste. The concept of *Zero waste*, based on ecological entrepreneurship, teaches them to think innovatively, process waste into environmentally friendly products, and have a high selling value, which in turn can improve their economic well-being (Shahid *et al.*, 2023).

Ecological entrepreneurship provides an excellent opportunity to create a business model that is not only financially profitable but also has a positive impact on the environment and society. Through this training, participants are empowered to start small businesses based on sustainable waste management. Product innovations such as aromatherapy candles, which are produced from used cooking oil, are one concrete example of the application of ecological entrepreneurship. This product not only has a selling point but also has the benefit of supporting a sustainable lifestyle that is now increasingly sought after by consumers. Vulnerable women in Cigending Village can open up new economic opportunities that are sustainable and environmentally friendly by increasing ecological entrepreneurship capacity, as well as becoming agents of change in efforts to preserve the environment around them.

CONCLUSION

Empowering vulnerable women in Cigending Village through training in processing used cooking oil into aromatherapy candles can be an effective solution in creating sustainable economic opportunities. This training provides practical skills that enable women to process household waste into high-value products with a *zero waste* approach. This not only helps improve their economic well-being, but also has a positive impact on the environment through the reduction of the waste generated. In addition, the introduction of ecological entrepreneurship provides a solid foundation for women to start and manage sustainability-based businesses. The success of this action research shows that training based on waste management and green entrepreneurship principles can address the social and economic challenges faced by vulnerable women. Therefore, it is important to continue and expand similar programs in other regions, to accelerate social change, increase economic inclusion, and contribute to environmental conservation. It is hoped that more women will be able to acquire new skills, create sustainable businesses, and ultimately improve their quality of life and the surrounding environment.

AUTHOR'S NOTE

The author declares that there is no conflict of interest related to the publication of this article. The author emphasizes that the data and content of the article are free from plagiarism.

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