

## Pentahelix Movement Through Ecopreneurship-Based Waste Management

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### Abstract:

*Waste is a major problem in environmental management. This is due to the low level of public awareness and lifestyle toward waste management. This service aims to foster and increase public awareness of waste management and increase community ecopreneurship through training in making Eco-Enzyme in Langenharjo Village, Kendal. To achieve these goals, the UIN Walisongo community service team formed a Pentahelix movement by collaborating with the Kendal Regency Government Environment Office, Bank Sampah Induk (BSI) Kendal, Kendal Family Welfare Development Team (PKK), Kendal Industrial Estate (KIK) and Kendal Regency National Narcotics Agency (BNN). The implementation method uses the Participatory Action Research (PAR) method which includes three stages, preparation, implementation, and evaluation of activities. The number of training participants was 80 participants. The results of the service showed that the socialization and training of eco-enzyme were able to foster and increase public awareness by 80% with 65% from parents and the rest from millennials. This means that this socialization is quite effective and can really impact the surrounding community towards waste reduction. Meanwhile, the ecopreneurship training by turning waste into Eco-Enzyme was able to be followed by all participants, because the manufacturing process was quite easy. Unfortunately, the participation of participants from the millennial generation was still passive when compared to the enthusiasm of participants from the parent group. Nevertheless, this activity can be the first step in fostering the entrepreneurial spirit of the Langenharjo Kendal community through waste ecopreneurship.*

**Keywords:** *Eco-enzyme, ecopreneurship, empowerment, pentahelix, waste*

## **Introduction**

The main problem of society in environmental management that has not been resolved to this day is waste. Waste is the residue of human or business activities that are considered no longer useful, both in the form of organic and inorganic substances as well as those that are decomposed and not decomposed (Pulungan et al., 2022). According to Suyitno (2022) this problem is motivated by the lack of public awareness of waste. Meanwhile, most human activities cannot be separated from waste in their daily lives. (Manyullei et al., 2022) states that the continuous increase in production accompanied by changes in consumption patterns, population growth, and community lifestyles will cause a high accumulation of waste, types, and also diversity in waste characteristics. Trisianti and Arifianti (2022) added that the waste problem does not only lie in the mindset of the community that the accumulation of waste occurs due to technical constraints, including limited facilities and infrastructure such as inadequate waste storage and the unavailability of a waste management budget. More than that, the main aspects that need to be considered are humans and their culture. Therefore, it is not surprising that waste is piling up every day.

Rahmayanti et.al, (2022) explained that the increase in waste accumulation has the potential to pollute the environment, such as unpleasant odors, lack of public comfort, flies, and mosquitoes that are increasingly numerous and cause disease, and ultimately can reduce the aesthetics of the environment. Esmaeili (2019) added that poor waste management results in soil contamination, air pollution, respiratory and other health problems permanently. Seeing these conditions, the waste problem is a serious matter to be resolved (Mubarok & Koidin, 2020). Dai and Pakaya (2019) mentioned that the waste awareness movement by getting used to (culture) disposing of waste according to its place and sorting waste based on its category can be started by the community itself. Thus, it can be recycled, utilized, and has economic value for the community or is known as a

waste bank. Waste management according to Law No. 18 of 2008 is a systematic, comprehensive, and sustainable activity in the form of reducing, handling, and managing waste with the principles of responsibility, sustainability, benefits, justice, awareness, togetherness, safety, security and economic value. Meanwhile, the management objective is to make waste a resource and improve health and environmental quality (Trisianti & Arifianti, 2022).

The waste awareness movement aims to make the general public, both the business world, academics, government, and the wider community try to reduce waste capacity, organize activities by limiting waste generation, recycling, and then reusing waste or better known as Reduce, Reuse and Recycle (3R) through smart, efficient and programmed efforts (Pandey et al., 2018).

In general, waste banks are not new. Nowadays, waste banks have been widely implemented in several regions, including Langenharjo Kendal Village under the name Bank Sampah Induk (BSI) Kendal. BSI Kendal is an organization engaged in waste management and environmental maintenance with the principles of reduce, reuse, and recycle or 3R under the guidance of the Kendal Regency government (Dinas Lingkungan Hidup through DLH Decree No. 027/3338/2020). Initially, this waste bank was named Resik Becik Waste Bank which was established on November 29, 2013, at RT 03/VI GPM Kendal Housing, Langenharjo. However, in 2020 the name changed to Bank Sampah Induk (BSI) Kendal. The establishment of BSI was motivated by the amount of waste found in the Kendal area. Sudaryanto, Acting Head of the Kendal Environmental Agency (DLH), explained that Kendal residents have the potential to produce 400,000 cubic meters of waste per year (Masum, 2021). For this reason, the establishment of a waste bank is considered urgent.

The Bank Sampah Induk (BSI) Kendal program does not only target household or community waste but also includes education, business, communities, religious leaders, and government offices. With

this broad scope, BSI Kendal can manage 500-1.5 tons of waste per month which can then be sold or recycled into products with value (such as plastic shopping bags, flowers from plastic bags, fertilizer, and organic animal feed from food waste/organic household waste), resulting in a turnover of Rp 3,000,000- per month.

The implementation of waste management is based on the principles of reuse, reduce, and recycle, or 3R. Reuse can be done by utilizing reusable equipment while reducing means that the community can reduce the volume of waste by emphasizing consumptive behavior, then recycling means reprocessing waste (recycling). Thus, community participation is an important thing to note. According to Kusuma Wardani et al., (2020) community participation can go through four stages, namely the planning, implementation, utilization of results, supervision, and monitoring stages in waste management. This can be seen in the enthusiasm of the community to support the waste management program which is spread across 30 waste bank groups assisted by BSI Kendal.

Although it has been established for a long time, unfortunately, the field practice still encounters many obstacles. According to Nunuk (BSI Manager), among the obstacles to waste bank management are the lack of public awareness and education about waste and waste segregation (organic and inorganic), inadequate waste management infrastructure to increase waste bank income such as organic waste shredding tools and other obstacles such as the absence of a permanent office (still renting), so that waste bank costs cannot be fully used for waste management.

On the other hand, based on a survey, the community service implementation team identified the existence of financial management that looks simple and the lack of education to partners about waste management creativity such as utilizing plastic waste into value-added products. Therefore, this community service becomes urgent considering the vast area of the Kendal Main Waste Bank.

### **Implementation Method**

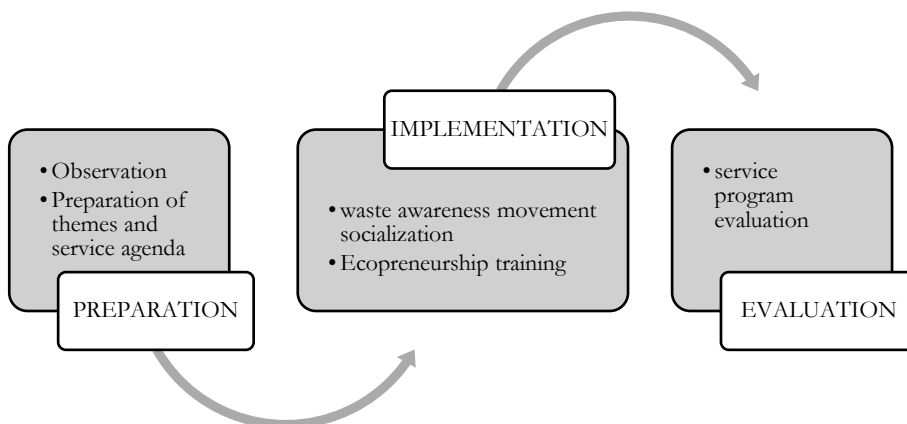
This service activity uses the PAR Participatory Action Research (PAR) method. PAR is a research model that seeks to find something and correlate the process to the process of social change. The social change in question is how the empowerment process can realize three benchmarks, namely the existence of a joint commitment with the community, the existence of local leaders in the community, and the existence of new institutions in the community that is built based on needs (Rahmat & Mirnawati, 2020).

PAR offers methods for changing the nature of the relationships between people and organizations that research and development projects typically pursue. These relationships include how we understand our role as facilitators rather than experts, how we manage relationships with educational institutions and business institutions, and how we work with each other as students, teachers, neighbors, and community members (Rahmat & Mirnawati, 2020). The PAR method facilitates communities to participate in analyzing their needs, problems, and solutions before planning transformative actions.

Based on the description above, the PAR method is deemed appropriate to the existing conditions in Langenharjo Kendal Village. So, then the implementation of community service in Langenharjo Kendal Village can be arranged in several stages. These stages include:

**Figure 1.**

*Roadmap of Community Service*



The picture above explains that the initial stage of community service is a preparation that includes two main agendas, namely observation, and preparation of themes and service agendas. Starting this service process, the service team mapped the area to be studied and determined informants. Thus the researcher can find out the general situation of the object of service. The informant in this service is the manager of Bank Sampah Induk (BSI) Kendal, Mrs. Nunuk. After that, researchers made brief observations related to the object of research.

Observations show that some communities are not yet active in waste awareness and waste management programs, especially in recycling waste into economic goods that can be used or resold. Although they have produced valuable products such as shopping bags, plastic flowers, candles, eco-enzymes, fertilizers, ecobrik, etc., these products are still consumed by individuals or groups. However, these products are still consumed by individuals or groups. According to Mrs. Nunuk, this condition is because the waste management members do not know more about good marketing methods. Seeing this condition, there is a need for socialization so that people are aware of the importance of protecting the environment by managing waste

properly and increasing the manufacture of economic value products from waste.

After observation, the next step is to determine the theme and place of service. The service team held a brief discussion regarding the results of the observation to determine the theme of the service, and the time and place for the implementation of the service with the head of the Kendal Main Waste Bank, Mrs. Nunuk. As a result, the theme of the community service is to increase waste literacy in the community and train the community to process waste into high-value products, namely eco-enzymes. The timeline for community service carried out in Langenharjo Village Kendal is as follows:

**Table 1.**

*Time Line of Community Service*

<b>Time</b>	<b>Material</b>	<b>Description</b>
<b>March- April 2022</b>	BSI Observation	The service team of UIN Walisongo
<b>May - June 2022</b>	Waiting for the decision to implement the service program	-
<b>July 2022</b>	<ul style="list-style-type: none"><li>• Socialization of Community Service Program</li><li>• Workshop on Waste Awareness Movement and community empowerment through eco-preneurs based on waste management</li><li>• Evaluation</li></ul>	<ul style="list-style-type: none"><li>• BSI</li><li>• The service team of UIN Walisongo</li><li>• General Public</li></ul>

Source: processed data

Next, is the implementation stage. The implementation stage is part of the core of solving the problems that exist in the object of research related to ecopreneurship based on waste management in Langenharjo Kendal Village. For this reason, researchers took the theme "Pentahelix Movement Through Ecopreneurship-Based Waste Management in Langenharjo Kendal Village" which was carried out from March to July 2022.

## **Result and Discussion**

Hariani et al., (2022) emphasizes that waste is a problem that requires serious attention from various parties and the general public. The largest contributor of waste comes from household activities, which is 70% in the form of organic waste from vegetable and fruit scraps. With such great potential, it is not surprising that the consequences caused are also great, ranging from a decrease in the quality of life, environmental aesthetics, flooding, and a decrease in the quality of health of citizens who live around the waste pollution area. If this condition continues in the long term, it will have an impact on regional attractiveness, marketability, and even investment from outside investors. While in terms of health, it causes adverse health effects such as dysentery, typhoid, smallpox, gastrointestinal tract, etc. Moreover, when mountains of garbage also invite the presence of flies and mosquitoes, the potential for other diseases, such as dengue fever, is also unavoidable. (Disperkimta, 2019).

Seeing the above conditions, the Community Movement on waste sorting awareness is urgent, the goal is to invite the general public to care about waste and the environment. Of course, the success of the waste sorting program does not only come from elements of the community but needs support from several parties, such as elements of government, academics, business entities/business actors, community communities, and mass media. For this reason, in this service, the Pentahelix Movement consists of the Kendal District Government Environmental Service, Kendal Waste Bank Induk (BSI), TP PKK Kendal, KIK, and BNN (Hariani Jateng, 2022). This pentahelix movement then held a workshop with various themes in each activity on July 27, 2022, at RTH Langenharjo Kendal with 80 participants. Meanwhile, the UIN Walisongo service team began the implementation of the service with a "Workshop on Waste Awareness Movement" delivered by Mrs. Muyassarab, MSI.

The socialization of the waste awareness movement showed the enthusiasm of the workshop participants. Especially the 30 Kendal



District Environmental Cadres, the majority of whom are millennials. Millennials are an active generation that is technology-savvy. Thus, facilitating understanding of the material presented.

**Figure 2**

*Socialization of Waste Awareness Movement*



The waste awareness movement is intended to raise public awareness of the existence of waste, which in the end this community movement can become one of the pillars of community empowerment. One of the things that can be done by becoming an ecopreneur. An ecopreneur is an entrepreneur who creates and sells environmentally friendly products or services based on environmental and ecological economic principles (Kisworo et al., 2022). So, an ecopreneur is an entrepreneur who has a profit orientation. The difference is that ecopreneurs prioritize environmental aspects and are careful about the impact of their business operations. In addition, the long-term goal of ecopreneurship is also to establish a business with minimal waste that is sustainable for a long time.

Furthermore, the ecopreneurship training at this workshop was training on making Eco-enzyme guided by Mrs. Rina from the BSI

Kendal Waste Recycling Community. Previously, Mrs. Rina first explained the concept of EE or Eco-Enzyme the Eco-Enzyme (EE) formula was discovered in 2003 and initiated by Dr. Rosukon Poompanvong, an organic farming activist in Thailand. This discovery was motivated by Dr. Rosukon's anxiety over the piles of garbage collected in landfills, most of which was organic waste, such as food scraps, fruits, and vegetables and the rest were inorganic (Yanti et al., 2021). Meanwhile, organic waste when it decomposes will cause environmental problems and contribute to the formation of Methane gas, a greenhouse gas that causes global warming effects. Thus, the manufacture of eco-enzyme is expected to reduce the burden on landfills.

In general, Eco-enzyme is a liquid from the fermentation of leftover fruits and vegetables with a substrate of brown sugar or molasses (Setyawati et al., 2022). In line with this, (Ahmad Rifandi et al., 2022) mentioned Eco-Enzyme is fermented organic waste such as pulp, peels, vegetables, glucose (Java sugar, palm sugar, cane sugar), and water. The process of making eco-enzyme is similar to composting. However, in eco-enzyme, water is added as a growth medium so that the final product obtained is a light brown to dark brown liquid and has a strong sour/fresh aroma (As'ar et al., 2022). This multipurpose liquid can be used in households (such as cleaners and disinfectants), agriculture, and livestock.

The stages of making eco-enzyme are 1) preparing organic waste in the form of fruit or vegetable waste, but what is used in this practice is fruit waste, 2) cleaning the place that will be used for making eco-enzyme, 3) putting clean water in the container as much as 60% of the volume of the container, 4) mix molasses as much as 10% of the weight of water, 5) put the remaining fruit by 30% of the weight of water, then stir until smooth, 6) Close tightly and label the date of manufacture and harvest date, 7) for the first 1 week, open the lid of the container to remove gas, 8) stir on the 7th day, 30th day, and 90th day, 9) the fermentation process will last 3 months. Month 1 will

produce alcohol, month 2 will produce vinegar, and month 3 will produce an enzyme that can be harvested by filtering using an old cloth or other cloth.

**Figure 3**

*Ecopreneurship Training with Eco-Enzyme Making*



**Figure 4**

*Eco-Enzyme Product*



**Figure 5**

*Group photo with participants*



After the training is completed, the final stage is evaluation. The goal is to find out the results of community service, in the form of how far the community understands the material about waste management awareness and how to turn waste into economically valuable goods. The BSI Kendal team said that the literacy training was 80% successful. This can be seen in the enthusiasm of the participants before the workshop, where participants were required to bring used plastic bottles to be exchanged for snacks. not only that, but during the activity, participants listened and paid attention and were able to practice immediately. When the event was over, the location around the event was clean without garbage. Because each participant disposes of garbage according to the place that has been provided and has been sorted according to its type. Furthermore, ecopreneurship can also be said to be successful because the steps are quite easy to do. However, when looking at the participation of participants, more activeness was shown by mothers, compared to the younger generation who were there.

## **Conclusions and Suggestions**

Based on the results of the service above, it can be concluded that the socialization of waste and community empowerment workshop activities through ecopreneurship based on waste management in Langenharjo Kendal Village were able to foster and increase public awareness of waste by 80%, consisting of 65% of parents and 15% of millennials. This means that this socialization is quite effective and can have a real impact on the surrounding community towards waste reduction. On the other hand, ecopreneurship training activities by turning waste into Eco-Enzyme were able to be followed by all participants, because the manufacturing process was quite easy. Unfortunately, the participation of participants from the millennial generation was still passive when compared to the enthusiasm of participants from the parent group. Nevertheless, this activity can be the first step in fostering the entrepreneurial spirit of the Langenharjo Kendal community through waste ecopreneurship.

Looking at the challenges faced by BSI Langenharjo Kendal Village, according to the author, alternative strategies that can be applied include:

1. Waste bank members should be joined by tech-savvy generations. This will facilitate the performance of the waste bank and other activities.
2. Further education is not only related to waste segregation awareness, but also to how to process waste into economically valuable goods. The goal is also to help the community empowerment program. Thus, waste can be turned into blessings.

## **References**

Ahmad Rifandi, R., Sri Haksasi, B., & Marliyah, L. (2022). Pelatihan Pembuatan Eco Enzym dengan Memanfaatkan Sampah Organik pada Kelompok Masyarakat Desa Samirono Kecamatan Getasan Kabupaten Semarang. *Manggali*, 2(2), 193–200.

<https://doi.org/10.31331/MANGGALI.V2I2.2196>

- As'ar, H., Yusepri, O., Mutiara Adita, R., Azzahra Ramadhani, M., Akbar Perdana, M., Stephany Manurung, S., Rohani Gultom, P., Marlia Sari, W., Tarigan, I., Agustin Hutasoit, H., & Tamrin, L. (2022). Eco-Enzym: Pemanfaatan Sampah Organik Menjadi Produk Serbaguna di Kelurahan Kampung Baru. *Diklat Review : Jurnal Manajemen Pendidikan Dan Pelatihan*, 6(2), 187–192. <https://doi.org/10.35446/DIKLATREVIEW.V6I2.1112>
- Dai, S. I. S., & Pakaya, S. I. (2019). Pemberdayaan Masyarakat Melalui Pengelolaan Sampah Menjadi Nilai Ekonomis dan Pembentukan Bank Sampah di Desa Pentadu Timur Kecamatan Tilmuta Kabupaten Boalemo. *Jurnal Ilmiah Pangabdhi*, 5(2), 110–118. <https://doi.org/10.21107/PANGABDHI.V5I2.6113>
- Disperkimta. (2019). *Dampak Lingkungan Kotor dan Polusi Sampah | Dinas Perumahan, Kawasan Permukiman dan Pertanahan*. Disperkimta.Bulelengkab.Go.Id.
- Esmaeili, H. K. (2019). Waste Management for the Better Environment: A Case of Municipality in Iran. In *Green Behavior and Corporate Social Responsibility in Asia* (pp. 103–111). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-78756-683-520191012>
- Harian Jateng. (2022). *Peringati HPSN 2022, Kendal Adakan Gerakan Pentabelix Pilah dan Olah Sampah dari Rumah | Harian Jateng*. Harian Jateng.
- Hariani, N., Kusuma, R., Samsurianto, S., Patang, F., Oktavianingsih, L., & Rukmi, D. S. (2022). Pemberdayaan Masyarakat Suwandi, Samarinda Ulu: Sampah Organik Dapur untuk Bumi dengan Eco Enzym. *GLOBAL ABDIMAS: Jurnal Pengabdian Masyarakat*, 2(1), 36–44. <https://doi.org/10.51577/GLOBALABDIMAS.V2I1.230>
- Kisworo, W., Dewi, M. A. K., & Putri, N. R. A. (2022). Mengenal Konsep Ecopreneurship Dalam Menghadapi Greenwashing. *Jurnal Ilmiah Penalaran Dan Penelitian Mahasiswa*, 6(1), 1–9.



- Kusuma Wardany, B., Permata Sari, R., & Mariana, E. (2020). Sosialisasi Pendirian “Bank Sampah” Bagi Peningkatan Pendapatan Dan Pemberdayaan Perempuan Di Margasari. *Dinamisia: Jurnal Pengabdian Kepada Masyarakat*, 4(2), 364–372. <https://doi.org/10.31849/DINAMISIA.V4I2.4348>
- Manyullei, S., Muhammad Saleh, L., Indazil Arsyi, N., Putri Azzima, A., & Fadhillah, N. (2022). Penyuluhan Pengelolaan Sampah dan PHBS di Sekolah Dasar 82 Barangmamas Kecamatan Galesong Selatan Kab. Takalar. *Jurnal Altifani Penelitian Dan Pengabdian Kepada Masyarakat*, 2(2), 169–175. <https://doi.org/10.25008/ALTIFANI.V2I2.210>
- Masum, S. (2021, September). *Sampah Masyarakat Kendal Capai 400.000 Kubik Per Tahun, DLH: Kami Baru Bisa Proses 30 Persennya - Tribun-pantura.com*. Pantura.Tribunnews.Com.
- Mubarok, Z., & Koidin, M. (2020). Ibadah Mengolah Sampah Di Desa Grobog Wetan Kecamatan Pangkah Kabupaten Tegal. *Dimas: Jurnal Pemikiran Agama Untuk Pemberdayaan*, 20(1), 1–22. <https://doi.org/10.21580/dms.2020.201.4806>
- Pandey, R. U., Surjan, A., & Kapshe, M. (2018). Exploring linkages between sustainable consumption and prevailing green practices in reuse and recycling of household waste: Case of Bhopal city in India. *Journal of Cleaner Production*, 173, 49–59. <https://doi.org/10.1016/j.jclepro.2017.03.227>
- Pulungan, D., Zia Aznur, T., Arfianti Saragih, D., Ucha Pradifta, I., Astuti, R., Firza Alpi, M., Ardila, I., Christiana, I., Febriaty, H., & Tanjung, H. (2022). EE (Eco Enzyme)" Sampah Berkah Uang Bertambah Bagi Ibu Rumah Tangga. *ABDI SABHA (Jurnal Pengabdian Kepada Masyarakat)*, 3(2), 266–274. <https://doi.org/10.53695/JAS.V3I2.703>
- Rahmat, A., & Mirnawati, M. (2020). Model Participation Action Research Dalam Pemberdayaan Masyarakat. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, 6(1), 62–71. <https://doi.org/10.37905/AKSARA.6.1.62-71.2020>

- Rahmayanti, A., Hamidah, L. N., & Zakariyah, M. A. (2022). Studi Pengelolaan Bank Sampah Desa Randegan Kec. Tanggulangin Kab. Sidoarjo | Rahmayanti | ENVITATS (Environmental Engineering Journal ITATS). *Environmental Engineering Journal ITATS*, 2(1).
- Setyawati, R. K., Rustanta, A., Jaya, A. S., & Graciella, M. (2022). Pemberdayaan Masyarakat Melalui Budidaya Eco-Enzym di Bekasi Selatan. *JMM (Jurnal Masyarakat Mandiri)*, 6(4), 3360–3369. <https://doi.org/10.31764/JMM.V6I4.9776>
- Suyitno. (2022). Program Bank Sampah Sebagai Pengelolaan Sampah dan Ekonomi Masyarakat di Desa Wangurejo Kecamatan Banyuurip Kabupaten Purworejo. *Jurnal Perkolasi*, 3(1).
- Trisianti, & Arifianti, A. E. (2022). Pemberdayaan Masyarakat Melalui Program Bank Sampah Di Dukuh Kragilan Gantiwarno Klaten | Trisianti | Journal of Millennial Community. *Journal of Millennial Community*, 4(1).
- Yanti, R. N., Lestari, I., & Ikhsani, H. (2021). IbM Membuat Eco Enzym dengan Memanfaatkan Limbah Organik Rumah Tangga di Bank Sampah Berkah Abadi Kelurahan Limbungan Kecamatan Rumbai Timur. *SNPKM: Seminar Nasional Pengabdian Kepada Masyarakat*, 3, 8–13.