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KOMPAS LESTARI: Sustainable Waste Management in Makartitama Village, Peninjauan District, Ogan Komering Regency, South Sumatra.

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Abstract

Makartitama, located in PT. Pertamina Hulu Energi Ogan Komering's Ring 1 operational area, faces socio-economic challenges, with approximately 32% of its population living in poverty. These conditions have led to limited awareness of Clean and Healthy Living Behavior, resulting in higher disease prevalence and increased risk of stunting in children due to malnutrition. The Kompas Lestari program aims to empower the community and improve their well-being. Through systematic planning, execution, monitoring, and evaluation, the program involves all stakeholders, including local residents, other companies, NGOs, and community leaders. The heart of the initiative is Maggot Cultivation, utilizing the larvae of the Black Soldier Fly, an efficient organic waste decomposer. This practice significantly reduces waste accumulation, lowers pollution, and mitigates carbon emissions. Additionally, maggots offer a high-quality protein source and can be transformed into animal feed, benefiting local poultry and freshwater fish farming.The program has yielded positive results, creating new productive community groups and enhancing economic prospects. By fostering a value chain that includes waste collection, maggot cultivation, organic vegetable farming, and fish farming, the community experiences increased economic activity and improved nutrition. The success of Kompas Lestari has the potential to be replicated in other areas. However, the program requires continuous efforts and improvement to ensure sustainability and growth. Recommendations include strengthening cooperation with local companies for waste supply and exploring the use of oil palm waste as maggot feed. Moreover, improving the Maggot House infrastructure, conducting product analysis, and developing branding and marketing strategies for maggot-derived products are essential steps for expanding the program's impact and effectiveness

Keyword: Kompas Lestari, Clean and Healthy Living Behavior, Maggot Cultivation, Sustainable Waste Management, Stunting

INTRODUCTION

The location of Makartitama Village within Ring 1 of PT. Pertamina Hulu Energi Ogan Komering (PHE OK) operational area makes it one of the prioritized villages in the company's Community Development program. Due to the socio-economic conditions of the community, this village requires special attention, as approximately 32% or 180 families out of a total of 556 households (HH) are classified as underprivileged. Consequently, several issues arise, such as the lack of awareness among the community regarding the importance of Clean and Healthy Living Behavior, leading to a higher incidence of diseases and a higher risk of stunting in infants due to malnutrition.

Stunting refers to growth and developmental impairment in children caused by malnutrition, recurrent infections, and inadequate psychosocial stimulation. Various factors such as the practice of colostrum and exclusive breastfeeding, premature birth, children's consumption patterns, height,

mother's education, infectious diseases, access to food, sanitation, and environmental health are important determinants of child stunting in Indonesia. Children from households with unrepaired latrines and untreated drinking water are also at higher risk. Community factors, particularly poor access to healthcare and residing in rural areas, have been repeatedly linked to child stunting (Beal, Tumilowicz, Sutrisna, Izwardy, and Neufeld, 2018).

The consequences of child stunting, both immediate and long-term, include increased morbidity and mortality, impaired child development and learning ability, elevated risks of infections and non-communicable diseases in adulthood, and reduced productivity and economic capabilities (Stewart, Iannotti, Dewey, Michaelsen, & Onyango, 2013).

Another environmental issue in the area is the accumulation of waste. It is recorded that Peninjauan Sub-district produces approximately 12.97 tons of waste daily, comprising 7.78 tons of organic waste and 5.19 tons of inorganic waste. An indirect impact is the underutilization of the village's pond potential and the lack of activity in the Village-Owned Enterprises (BUMDes).

Recognizing the lack of environmental management as a major issue in Makartitama Village, PHE Ogan Komering Field has initiated a program that involves the community in sustainable waste management, known as the Sustainable Waste Management Group - PHE Ogan Komering Synergy/ Kelompok Pengelolaan Sampah Berkelanjutan Sinergi PHE Ogan Komering (Kompas Lestari).

Maggot Cultivation

Initiated in 2017 through collaboration with community figures in waste bank activities, PHE Ogan Komering Field later introduced the maggot cultivation program in 2022, under the auspices of BUMDes Makartitama, known as Kompas Lestari. This program has brought structured and sustainable waste management to Makartitama Village. Kompas Lestari not only addresses organic waste issues through maggot cultivation but also extends to other target groups and activities, such as transforming village's retention basin into freshwater fish cultivation centers using maggots as fish feed pellets, producing liquid fertilizers from maggot waste, creating compost for organic vegetable planting, and making Complementary Feeding and Supplementary Feeding (MPASI and PMT) from the vegetables produced to support infants, pregnant, and lactating mothers in the village through the Gen Smart Makartitama group.

Maggot, also known as larvae of the Black Soldier Fly (BSF) or Hermetia Illucens in Latin, originates from eggs and undergoes metamorphosis into adult flies. BSF flies are large, black flies with white legs.

As reported on the official website sipsn.menlhk.go.id in 2022, the highest percentage of waste, reaching 30.6%, is generated from food scraps. Maggots are highly effective in decomposing organic waste, including livestock manure. This is because maggots are detritivores, organisms that feed on decaying plant and animal matter. Feeding biowaste to BSFL helps prevent the spread of disease-causing germs like Salmonella spp. This indicates that the risk of disease transmission between animals and between animals and humans can be minimized when this technology is used on farms or when processing animal waste in general (e.g chicken manure or waste from abattoirs) (Suryaneta, Handayani, Fahmi, Putri, Sari, and Saputra, 2022).

Maggots efficiently break down organic waste without emitting foul odors, allowing them to be produced in households or residential areas. As quoted from the official Instagram account of West Java Environmental Agency @dlh_jabar, 1 kg of BSF maggots can decompose 2-5 kg of food waste per day. Additionally, maggots are hygienic and do not carry dangerous disease sources for livestock or humans.

The lifecycle of BSF flies, from egg to larva, varies depending on environmental factors such as temperature, sunlight, the presence of BSF flies in the breeding area, the quality of the parent flies, and food conditions. Upon hatching, the larvae enter the feeding stage, during which their mouth structure changes into a hook-like form and their color turns brown. This mouth structure facilitates

their movement from the food source to a new environment that is dry, shaded, and protected (Dortmans, Egger, Diener, & Zurbrügg, 2017).

Maggots serve as highly nutritious livestock feed, containing essential nutrients for the growth and development of animals, especially poultry and freshwater fish. The nutrients in maggots include protein, fat, essential amino acids, and minerals. Maggots can be processed into maggot flour and used as raw material for making mixed feed. They are an excellent substitute for meat bone meal (MBM) in animal feed, meeting all the criteria required for livestock feed ingredients.

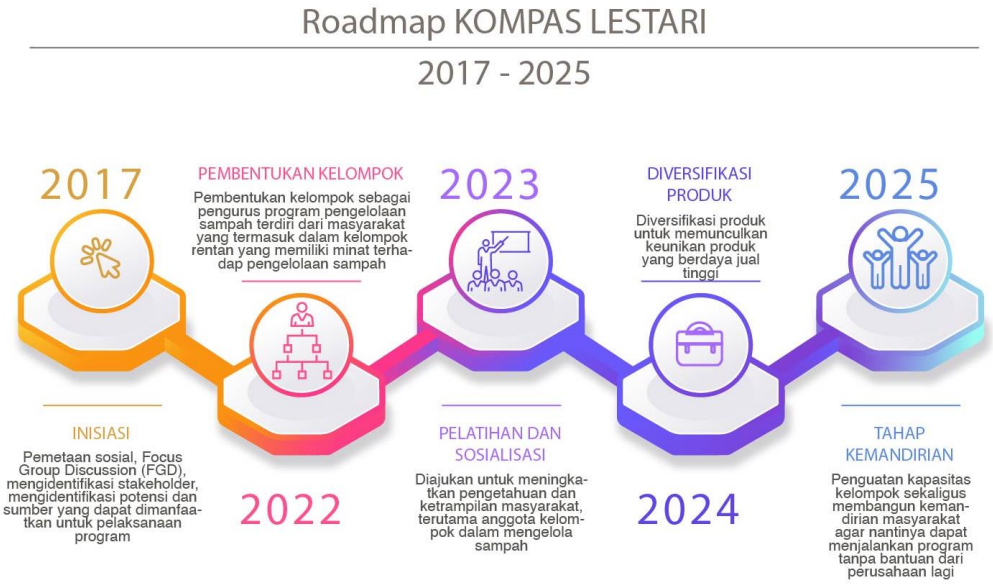
Given the significant potential, maggot cultivation offers a highly profitable venture. Its short cultivation cycle, ease of process, and low cost present opportunities for the community of Makartitama Village to not only improve their well-being but also contribute to environmental preservation.

METHOD

The Kompas Lestari program was initially initiated in 2017, but it faced a setback due to the Covid-19 pandemic, causing a two-year delay in its implementation. It was subsequently reactivated in 2022. To adapt to these circumstances, the program aims to achieve self-sustainability by the year 2025. The implementation of this series of community empowerment programs is carefully planned and follows a bottom-up approach, involving all stakeholders, including the community, other companies, and relevant stakeholders. The process includes planning, execution, monitoring, evaluation, and final reporting stages.

During the planning phase, social mapping and need assessment were conducted in Peninjauan District. This was followed by Focus Group Discussions (FGD) involving stakeholders to gather information and recommendations for the program's design to meet community needs. Validation and further planning of program execution were carried out through field visits and assessments to ensure effectiveness and efficiency. Subsequently, the program was socialized to beneficiaries and stakeholders, including local government, private sector, Non-Governmental Organizations (NGOs), and community leaders. The aim was to garner support and involvement from all parties in the program.

Following the stakeholder engagement and socialization, the program progressed with the formation of a waste management committee comprising community members interested in waste management. This committee was responsible for establishing the waste bank in 2022.



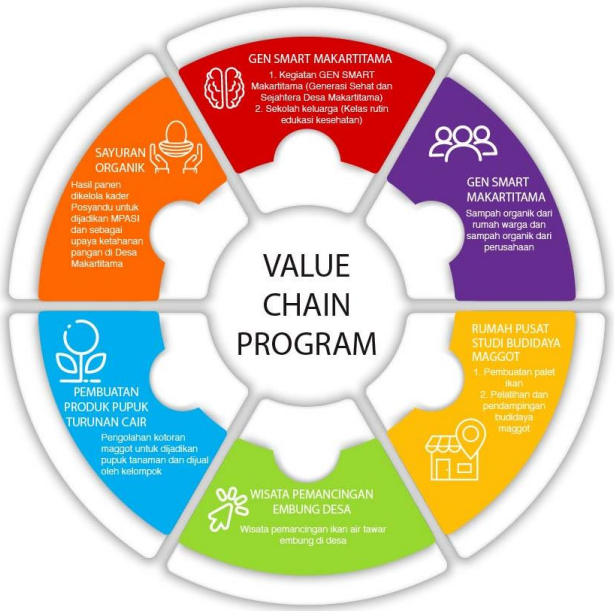
In 2023, in accordance with the Kompas Lestari Roadmap, the program proceeds to the training and socialization phase. The socialization efforts are targeted towards the community and include the following detailed activities:

1. Training on maggot cultivation and freshwater fish farming
   The community will receive comprehensive training on maggot cultivation techniques and freshwater fish farming practices to enhance their knowledge and skills in these areas.
2. Socialization of Clean and Healthy Living Behavior (PHBS), Stunting Prevention, and Making MPASI and PMT
   The program will conduct socialization activities to promote Clean and Healthy Living Behavior (PHBS) practices, raise awareness about stunting prevention, and provide guidance on preparing Complementary Food for Infants (MPASI) and Additional Food for Pregnant and Nursing Women (PMT).
3. Construction of the Maggot Cultivation Study House
   The program will establish a dedicated facility known as the Maggot Cultivation Study House. This facility will serve as a center for learning, research, and further development of maggot cultivation techniques.
4. Renovation of the village's pond (embung)
   The embung in the village will undergo renovation to improve its functionality and capacity for water storage and utilization.
5. Socialization of the program to the broader community and inauguration of the village embung
   The program will be introduced to the wider community through socialization efforts, and the renovated village embung will be officially inaugurated. This step aims to create awareness and garner support from the broader community for the Kompas Lestari program and its initiatives.

Through these activities, the Kompas Lestari program aims to empower the community with valuable skills, promote healthy living practices, prevent stunting in children, and improve water management through the renovation of the village embung. The socialization efforts and inauguration of the embung also play a vital role in fostering community engagement and participation in the sustainable development initiatives.

The Kompas Lestari program was initiated by PT PHE Ogan Komering and the community of Makartitama Village, led by Mr. Muhibat, the Village Head. The program's implementation is managed by Mr. Arifani, an employee of BUMDes, and Mr. Didik, the Chairman of Kompas Lestari. The various activities within the program are then integrated and coordinated with the following workflow:

1. Collection of Organic Waste from households and PT. PHE Ogan Komering, carried out by waste management personnel.
2. The Maggot Cultivation Study House, utilizing organic waste as maggot feed. The harvested maggots are then processed into fish pellets and roasted maggots as animal feed.
3. The Village Fishing Tourism, utilizing maggots as fish bait and pellets for freshwater fish farming.
4. Production of Liquid Derivative Fertilizer from fish pond water.
5. Utilization of the liquid derivative fertilizer for Organic Vegetable Cultivation, producing nutritious vegetables as Complementary Food for Infants (MPASI) and Additional Food for Toddlers (PMT).
6. Gen Smart, utilizing organic vegetables for Complementary Food for Infants (MPASI).



This integrated approach in the Kompas Lestari program aims to optimize the use of organic waste for various purposes, such as maggot cultivation, fish farming, and organic vegetable cultivation. By creating a sustainable cycle of activities, the program promotes efficient resource management while addressing the needs of the community, including providing nutritious food for infants and toddlers.

The desired outcomes of the Kompas Lestari program for its beneficiaries include the integrated improvement of community well-being, ranging from enhanced clean and healthy living behavior, economic empowerment, food security, and a reduction in the prevalence of stunting in Makartitama Village.

The expected products from the Kompas Lestari program are as follows:

1. Fish pellets, marketed to the public and available for purchase at the village fishing tourism site.
2. The Maggot Cultivation Study House, utilized for training and workshops.
3. Village fishing tourism, attracting visitors to the area.
4. Cultivated fish from the village pond, sold either as raw produce or processed into ready-to-eat products.
5. Liquid fertilizer, available for public purchase and use in organic plant cultivation.
6. Organic plants, processed into Complementary Food for Infants (MPASI).
7. MPASI distributed to the community.

By achieving these objectives and producing the specified products, the Kompas Lestari program aims to bring sustainable improvements to the livelihoods of the community members in Makartitama Village. The integrated approach addresses multiple aspects of well-being, from economic empowerment through the sale of products to improved health and nutrition through the distribution of MPASI.

RESULT

The implementation of the Kompas Lestari program until 2023 has resulted in the establishment of new productive community groups that have contributed to the increased well-being of the society. The impacts felt due to the formation of these groups are as follows:

1. Maggot Cultivation Group:
   The community members of Makartitama Village have undergone training conducted by PHE Ogan Komering on maggot cultivation. This training was initiated to utilize organic waste and

reduce carbon emissions. As a direct outcome, the community has gained new skills in processing and utilizing organic waste through innovative methods, leading to sustainable maggot cultivation practices.

2. Village Fishing Tourism and Freshwater Fish Farming Group:
   Previously, many members of the community in Makartitama Village had freshwater fish ponds for cultivation, but they faced challenges in obtaining affordable fish feed. With the introduction of maggot cultivation, the worries about costly fish feed have diminished as maggot serves as a viable alternative. The community has also acquired skills in processing the cultivated fish into consumable products. The fish farming areas have been transformed into fishing tourism spots, creating new job opportunities for the community and increasing their monthly income by up to Rp 500,000.00.
3. Organic Vegetable Cultivation Group:
   Utilizing the liquid fertilizer derived from the waste of maggot cultivation, the community can produce various healthy and nutritious organic vegetables, which ultimately contribute to improving the overall health of the society.
4. GEN SMART (Healthy and Smart Generation) Makartitama Group:
   The community, which previously did not pay much attention to the nutritional content of their children's meals, has become more mindful of providing balanced nutrition. Particularly for infants and toddlers, the organic vegetables resulting from maggot cultivation are processed into Complementary Foods (MPASI) and Supplementary Foods (PMT) to address stunting issues.

Through the Kompas Lestari program, the community of Makartitama Village has achieved positive changes in their lifestyle, economy, and health, promoting sustainable development and well-being.

DISCUSSION

Program Kompas Lestari has given birth to new groups that have positively impacted various aspects, such as novelty and uniqueness, environment, social, economic, linkages with the improvement of Life Cycle Assessment (LCA) and Creating Shared Value (CSV) for the company, as well as sustainability and replication, acting as motivators for other villages.

- **Novelty and Uniqueness of the Program:**
  The waste management, which previously only involved collection, weighing, selling, and processing into compost and handicrafts, has now been transformed based on the principles of sustainability, with the introduction of maggot cultivation. The value chain of waste management that reaches three target sectors simultaneously (general community, infants, pregnant women, and breastfeeding mothers, and the company) is a novelty and uniqueness of the program.
- **Environmental Impact of the Program:**
  The environmental impact of the program is the reduction of organic waste in the Peninjauan Sub-district, thanks to the organic waste processing in Makartitama Village. Additionally, the waste that used to be dumped in residential yards, causing odors, has been addressed, resulting in cleaner yards.
- **Social Impact of the Program:**
  The social impact felt by the community at large is a change in their lifestyle, with increased focus on maintaining cleanliness. Another change is the requirement for local civil servants who are due for promotion to open a savings account at Bank Sampah Kompas Lestari.
- **Economic Impact of the Program:**
  The program has led to increased income from selling fish feed pellets, roasted maggots, entry fees to the embung tourism area, and trading fish cultivated in the embung.
- **Linkages with the Improvement of LCA and CSV for the Company:**

The Kompas Lestari program has successfully contributed to Creating Shared Value (CSV) by reducing Hazardous and Toxic Waste (B3) in the form of organic waste generated by company employees through waste collection and processing for maggot cultivation.

- **Sustainability and Replication of the Program:**
  The bank sampah (waste bank) program has become a good example for other villages, especially in waste management. The program has already achieved recognition, such as the Proklim award from the Environmental Agency. The well-organized waste bank system, along with the high commercial value of both organic and inorganic waste, has inspired other villages to follow the successful track record of the program. As stated by the CD Officer, efforts are currently underway for replication in Betung Barat Village, Pali Regency.

CONCLUSION

Kompas Lestari has successfully improved the welfare of the community in Desa Makartitama, in terms of economy, social, and environmental aspects.

1. Through maggot cultivation that utilizes organic waste as maggot feed, the community was able to reduce the accumulation of organic waste, leading to a decrease in environmental pollution and carbon emissions in the village.
2. The maggot produced from cultivation can be used as fish pellet feed in the embung and as liquid fertilizer for organic vegetable cultivation, resulting in increased income for the community due to reduced production costs for agriculture and fish farming.
3. Additionally, Kompas Lestari indirectly created job opportunities for the population that was previously categorized as underprivileged, which amounted to 32%.
4. The utilization of organic vegetables and activities carried out by the Gen Smart Makartitama group aims to improve the health of the community, particularly by reducing stunting among toddlers.

Based on the monitoring results of the Kompas Lestari program (Kelompok Pengelola Sampah Berkelanjutan Sinergi PHE Ogan Komering), the following recommendations and improvement suggestions are obtained:

1. Collaboration efforts with local companies to source maggot feed, which is organic waste generated by surrounding companies.
2. The presence of numerous palm oil plantations around Desa Makartitama offers potential options for maggot feed by using palm oil waste.
3. Development is needed in the Maggot House, such as additional roofing as a filter to reduce heat entering the maggot house and expanding the maggot house area to increase maggot production.
4. The need for analytical laboratory tests on the products produced.
5. The produced pellets have great marketing potential. A business model should be created to give the pellets a branding identity for marketing purposes.
6. A systematic development of integrated agricultural programs is required to maximize the benefits of the maggot house.
7. Sustainable synergy and business development are essential for the Wisata Pemancingan dan Kolam Budidaya Ikan Air Tawar (Fishing Tourism and Freshwater Fish Cultivation Pond) in Embung Desa Makartitama to become economically viable for the group.

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