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THE ROLE OF AGRICULTURAL EXTENSION AGENTS AT THE FOOD SECURITY AND AGRICULTURE OFFICE IN ORGANIC WASTE MANAGEMENT IN MAHAKAM ULU REGENCY

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Abstract: Organic waste management remains a major challenge for Mahakam Ulu Regency, which faces limited infrastructure, inadequate waste processing facilities, and low levels of environmental literacy among its communities. This study aims to analyze the role of agricultural extension officers within the Department of Food Security and Agriculture in supporting the adoption of household-based organic waste management practices. Using a qualitative descriptive approach through in-depth interviews, field observations, and document analysis, the study identifies four key roles performed by extension officers: facilitator, communicator, motivator, and consultant. These roles are carried out through activities such as Farmer Field School training, socialization of the 3R (Reduce, Reuse, Recycle) concept, assistance in organic fertilizer production, and the provision of technical solutions to local communities. However, the effectiveness of these roles is constrained by the limited number of extension officers, the mismatch in some officers' educational backgrounds, and the absence of essential waste management facilities such as TPS3R and TPST. The findings highlight that optimizing the role of extension officers requires strengthened institutional support, enhanced technical capacity, and cross-sectoral collaboration to ensure that organic waste management becomes a sustainable practice in Mahakam Ulu.

Keywords: agricultural extension officers, organic waste, sustainable agriculture

INTRODUCTION

Organic waste management has become an increasingly urgent environmental issue that requires systematic and sustainable solutions. Poor waste management practices are commonly found, particularly in rural areas that lack adequate waste management systems, both in terms of infrastructure and institutional capacity. Organic waste—primarily originating from household residues and agricultural activities can negatively impact environmental health, contribute to water pollution, and trigger sanitation crises when not properly managed. Research by [1] indicates that inadequate waste management significantly contributes to soil and water contamination and increases public health risks, especially in vulnerable communities.

Mahakam Ulu Regency, located in East Kalimantan Province, Indonesia, comprises five districts and represents a rural region facing substantial challenges in managing organic waste. Geographically situated along the main course of the Mahakam River, the daily activities of local communities depend heavily on the river for transportation, water sources, and waste disposal, including household waste. The region has experienced rapid development since its separation from West Kutai Regency in 2013, particularly in population growth, which has significantly increased the

volume of waste generated mainly organic waste from household activities. According to data from the Mahakam Ulu Environmental Agency, the total waste volume in the regency reaches 6,888 tons per year, most of which consists of household organic waste. However, the lack of waste management infrastructure remains a major issue, leading residents to frequently dispose of household waste directly into the river. Research by [2] further explains that limited infrastructure often drives communities to dispose of waste into the nearest water bodies, particularly in areas lacking integrated waste management systems. This practice stems not only from technical constraints but also from long-standing cultural habits deeply rooted in local communities, which ultimately contribute to environmental pollution and disrupt the balance of local ecosystems.

In this context, the Department of Food Security and Agriculture plays a significant role in addressing the existing waste problem by optimizing the role of agricultural extension officers to assist farmers in properly managing organic waste. As explained by Arif in [3], extension officers serve as facilitators, motivators, and catalysts in the process of innovation adoption at the farmer level, which in this case also includes the wider community in Mahakam Ulu Regency. Thus, extension officers become key actors in addressing environmental issues under the mandate of the Department of Food Security and Agriculture in Mahakam Ulu. Education and training on organic waste processing provide substantial benefits for the community. Organic waste, including food scraps and other natural materials, can be processed into compost that is highly beneficial for agriculture. This process not only reduces the volume of waste disposed of in landfills, but also produces natural fertilizer that improves soil fertility and supports sustainable agricultural practices.

In household organic waste management, environmental education delivered through extension programs is expected to enhance the community's knowledge and skills in handling their own waste. According to Rogers' (2003) theory of innovation diffusion, the adoption of new practices within a community requires effective communication and support from multiple stakeholders. Effective agricultural extension must therefore provide clear and practical information on safe and efficient methods of processing household organic waste, along with tangible examples of the benefits such practices can generate. Hidayah (2024) emphasizes that community empowerment is essential for achieving sustainable waste management [4].

The remote geographical conditions and limited access to waste collection services are major factors contributing to the ineffectiveness of centralized waste management approaches that rely solely on large-scale, urban-based facilities. One strategy that can address these constraints is decentralized waste management, which enables processing at the local level such as in households, farmer groups, or communities without depending on central facilities. A relevant form of decentralized management for remote areas is small-scale composting. According to [5], composting is a sustainable solution for managing organic waste, whose effectiveness can be enhanced through the integration of best practices and appropriate technological innovations. Rao and Parsai (2023) in [6] demonstrate that decentralized waste processing systems not only reduce the burden on city or district-level facilities but also increase efficiency by enabling waste to be treated at its source. With the addition of suitable mixing agents and additives, decomposition can be accelerated, compost quality improved, and greenhouse gas emissions and unpleasant odors significantly reduced. However, they also note that low community awareness and participation remain key challenges. Household-level waste processing has also been shown to reduce greenhouse gas emissions, especially when accompanied by efficient waste collection schedules and decreased reliance on transportation to urban waste processing facilities [7].

Various approaches can be implemented to address waste management challenges, ranging from technological innovations to behavioral change interventions. However, the success of organic waste management largely depends on a combination of government and institutional policy support,

community engagement, and technological advancement [8]. Sustainability is not determined solely by the availability of technology, but also by the community's capacity to understand, accept, and apply environmentally friendly practices. In this context, the role of agricultural extension officers becomes strategically important as a bridge between waste management technologies and rural communities.

Organic waste management in Mahakam Ulu Regency reflects a complex environmental issue driven by the absence of an integrated waste management system. Nevertheless, studies that specifically integrate this issue with the role of agricultural extension officers particularly within remote or geographically isolated regions remain limited. This gap is particularly significant considering that such responsibilities fall within the scope of the Department of Food Security and Agriculture. The lack of research indicates the need for an in-depth analysis of how socially and culturally relevant extension programs, conducted under the Department of Food Security and Agriculture, can support the adoption of household organic waste management technologies to be implemented more widely. Therefore, the primary focus of this study is to analyze the role of agricultural extension officers within the Department of Food Security and Agriculture in supporting the adoption of household organic waste management technologies as an effort to address the limited waste management practices in Mahakam Ulu Regency, while emphasizing active participation rooted in local wisdom to ensure sustainability.

RESEARCH METHOD

This study employs a descriptive qualitative approach to gain an in-depth understanding of the role of agricultural extension officers within the Department of Food Security and Agriculture in managing organic waste in Mahakam Ulu Regency. Data were obtained from both primary and secondary sources. Primary data were collected through direct interviews with informants selected using purposive sampling techniques, including the Head of the Agricultural Extension Division, field agricultural extension officers (PPL), and local farmers/community members. Secondary data were sourced from books, journals, reports, and official documents from the Department of Food Security and Agriculture in Mahakam Ulu Regency. According to [9], this research method is used to examine problems occurring within society. The collected data were then analyzed using the interactive model developed by Miles and Huberman, which enables researchers to transform primary data into meaningful information through systematic procedures. This analytical process produces in-depth research findings, provides a comprehensive understanding of the phenomenon under study, and effectively answers the research focus.

RESULT AND DICUSSION

Optimization of the Role and Objectives of Agricultural Extension Officers

The role of agricultural extension officers within the Department of Food Security and Agriculture in managing organic waste in Mahakam Ulu Regency is an essential component of the regional government's efforts to promote sustainable agricultural practices while addressing environmental challenges. Agricultural extension officers are not only responsible for providing technical education on converting organic waste into compost or biofertilizer, but also serve as intermediaries between government policies and their implementation at the community level. Through outreach activities, mentoring, and monitoring, extension officers assist farmers in understanding the benefits of waste reduction, efficient fertilizer use, and increased land productivity through the optimal use of local resources. In the context of local governance, the success of this program greatly depends on the extension officers' ability to communicate effectively, build

community participation, and ensure consistent application of organic waste management policies in the field.

Based on interviews with the Head of the Agricultural Extension Division at the Department of Food Security and Agriculture of Mahakam Ulu Regency, it was explained that the role of Field Agricultural Extension Officers (PPL) in organic waste management is optimized through the Farmer Field School (Sekolah Lapang) program conducted across all districts. The program involves not only extension officers but also farmers as active participants in the training activities. Within the curriculum of the Farmer Field School, organic waste management is designated as one of the key training components, aiming to enable extension officers to provide comprehensive understanding to farmers and the wider community in their respective work areas. Moreover, organic waste management is expected to reduce waste disposal into the Mahakam River and enhance awareness and motivation among farmers and community members regarding the importance of properly managing organic waste, whether for individual use or for environmental preservation.

According to data from source **[11]** and the *Final Report of the Agricultural Extension Division, 2024*, the number of agricultural extension officers in Mahakam Ulu Regency in 2025—prior to the implementation of Presidential Instruction No. 3 of 2025—totaled 45 officers responsible for guiding 50 villages. This number indicates a substantial workload, particularly when connected to the interview findings with the Head of the Agricultural Extension Division, who emphasized that organic waste management is a major component of the Farmer Field School program across all five districts. Given the wide coverage areas of extension officers, the expectation that they not only deliver technical education but also encourage communities to reduce waste disposal into the Mahakam River adds complexity to their responsibilities in the field. This means that the success of the organic waste management program heavily relies on the capacity of these 45 extension officers to conduct education, provide assistance, and promote behavioral change among residents in each of the target villages. The data can be seen in the following table:

Table 1: Data on the Number of Agricultural Extension Officers in Mahakam Ulu Regency

NO	Agricultural Extension Center (BPP)	NUMBER OF PERSONNEL		NUMBER OF ASSISTED VILLAGES
		Civil Servants (PNS)	Non-Permanent Personnel (TNP)	
1	LONG HUBUNG	2	8	11
2	LAHAM	1	4	5
3	LONG BAGUN	3	9	11
4	LONG PAHANGAI	4	9	13
5	LONG APARI	1	4	10
	JUMLAH	**11**	**34**	**50**

Source: Report of the Mahakam Ulu Department of Food Security and Agriculture, 2025

The limited active involvement of extension officers, along with the low level of understanding among community members and farmers regarding the adoption of organic waste management practices, is directly related to the insufficient number and varying competency relevance of the existing extension personnel. Of the 45 agricultural extension officers in Mahakam Ulu Regency, only 38 possess an educational background in agricultural sciences, while the remaining 8 come from non-technical fields. This imbalance in competencies affects the effectiveness of field assistance, especially since extension activities are still predominantly focused on conventional agricultural

commodities, resulting in minimal emphasis on organic waste management. This challenge is further compounded by institutional constraints, as the Mahakam Ulu Environmental Agency only manages a temporary landfill (TPA Sementara) and lacks TPST, SPA, and TPS3R facilities, leading to poor integration of organic waste management into extension program priorities.

This situation requires a reorientation of the role of agricultural extension officers to make them more adaptive to the needs of local communities, particularly within the framework of the Mahakam Ulu Regent Regulation Number 30 of 2019 on Regional Policies and Strategies for Managing Household Waste and Similar Waste. The limited technical assistance demands proactive steps from extension officers, including participatory mapping with communities to identify sources of organic materials and the daily challenges of waste management. This role reorientation aligns with Law Number 16 of 2006, which emphasizes that the aim of the extension system is to develop human resources, strengthen social capital, and reinforce sustainable agricultural development [13].

From a professional standpoint, agricultural extension officers serve as facilitators, communicators, motivators, and consultants (Anwarudin et al., 2020). Ideally, these roles should encourage farmers to adopt organic waste management practices, particularly because such practices are relevant to the need for organic fertilizers and efforts to reduce waste generation. Organic waste management includes the stages of sorting, collection, processing, and final utilization (Xiao et al., 2020 in Zhang et al., 2024), all of which require adequate technical knowledge and strong institutional support. Furthermore, improper waste management can lead to severe environmental impacts such as water pollution, flooding, and the spread of diseases (Hoang & Fogarassy, 2020; Mor & Ravindra, 2023), consistent with the findings in [7].

In remote areas such as Mahakam Ulu Regency, where integrated waste processing facilities are unavailable, challenges become more complex and have direct impacts on the environment and the quality of life of local communities. Therefore, organic waste management requires both planned technical measures and participatory approaches. In this context, agricultural extension officers are key actors capable of bridging local needs with technical knowledge through continuous and context-specific assistance.

Decentralized Waste Management

Decentralized waste management refers to a system in which waste processing is carried out close to the point of generation, reducing dependence on centralized facilities. This approach has become increasingly relevant, especially in regions with limited basic infrastructure. According to Rao and Parsai (2023), one effective form of decentralized processing is household- and community-scale composting. This model enables communities to manage waste independently within their own environment, while reducing transportation costs and encouraging active community participation in sustainable waste management efforts.

As paradigms shift toward a circular economy, decentralized approaches are being increasingly adopted to manage various fractions of organic waste, including household food scraps, garden waste, and fresh market residues (biowaste). This transition has fostered the development of more localized and participatory waste management models. Mihai et al. (2020) note that such approaches have emerged as practical strategies that promote self-reliance, community participation, and sustainability in waste management.

Decentralized waste management models have been implemented in various regions facing geographical challenges and limited infrastructure, making these findings highly relevant to the context of Mahakam Ulu Regency in East Kalimantan, which experiences similar conditions. The absence of a permanent landfill and the lack of a regular waste collection system further strengthen the suitability of decentralized waste management. This approach aligns with the region's infrastructural constraints and

challenging geographical features. By managing organic waste independently, communities can reduce environmental burdens while producing compost that supports local agriculture, rooted in local wisdom and community-specific needs [14].

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Existing Conditions of Organic Waste Management in Mahakam Ulu

Organic waste management in Mahakam Ulu Regency, East Kalimantan, remains at a subsistence level and is not yet integrated into an adequate waste management system. Based on field observations, the region lacks essential waste management infrastructure such as Reduce-Reuse-Recycle Waste Processing Sites (TPS3R), Intermediate Transfer Stations (SPA), and a permanent Final Disposal Site (TPA). The absence of these essential facilities is influenced by several interrelated factors, including difficult geographical conditions, limited regional budget allocations, low levels of environmental literacy among the community, and the absence of operational local waste management policies.

Most residents of Mahakam Ulu dispose of household waste directly into the surrounding environment, particularly into rivers or open land near their homes. At present, there is no waste segregation system at the household level, causing organic waste to be mixed with inorganic waste, which can lead to environmental pollution and public health issues. This condition not only hinders the potential for recycling and reusing organic waste but also increases the risk of environmental contamination and environmentally related diseases. Public awareness regarding proper and sustainable waste management remains low and requires improvement. This issue can be addressed by optimizing environmental education programs and community empowerment initiatives, facilitated by both local government agencies and non-governmental organizations, to enable communities to manage organic waste more effectively and sustainably [15].

The Role of Agricultural Extension Officers in Organic Waste Management in Mahakam Ulu Regency

The limited understanding and technical capacity of farmers and community members indicate that organic waste processing practices have not yet been internalized as part of daily waste management habits. Another contributing factor is the lack of accessible information, socialization media, and demonstration facilities that could serve as practical references. On the other hand, the people of Mahakam Ulu demonstrate a strong interest in agriculture, which aligns with the essential need for organic fertilizers to improve soil fertility. This essential need can be met independently through organic waste processing, a practice that offers two sustainable benefits. First, processed organic waste can increase soil fertility in agricultural lands. Second, managing organic waste reduces the accumulation of household organic waste and transforms an environmental problem into a valuable resource. For these reasons, the role and guidance of agricultural extension officers in organic waste management activities are crucial. The outcomes of these initiatives provide concrete evidence that targeted extension and training programs can empower communities to take an active role in environmental conservation. These efforts are not only about improving knowledge but also about transforming attitudes and behaviors toward better environmental sustainability [16].

According to the Presidential Instruction in [17], the role of agricultural extension officers is significantly focused on assisting and supporting farmers to achieve sustainable national food self-sufficiency through the application of modern technologies, market information, and capital access. This mandate also emphasizes ensuring farmers' welfare by increasing productivity and operational efficiency through integrated and coordinated efforts.

Role of Agricultural Extension Officers as Facilitators

According to the *2023 Annual Activity Report of the Agricultural Extension Division*, agricultural extension officers in Mahakam Ulu Regency have implemented several programs that reflect their role as facilitators, particularly through the Farmer Field School (Sekolah Lapang) program. This program includes training activities on producing organic fertilizer from household organic waste and agricultural residues. The aim of these household-level trainings is to support sustainable agricultural systems. The expected outcome is not only for participants to be able to apply the practices themselves but also to disseminate the knowledge to other community members in their surroundings.

Figure 1: Farmer Field School Activities of Agricultural Extension Officers
Source: Author's Documentation

The role of agricultural extension officers as facilitators is demonstrated through the implementation of the Farmer Field School activities organized by the Department of Food Security and Agriculture of Mahakam Ulu Regency. Based on the 2023 Annual Activity Report, this program focuses on training participants to produce organic fertilizer from household waste and agricultural by-products as part of efforts to promote sustainable agricultural practices at the household level. In this program, extension officers are responsible for organizing the training process, delivering materials, facilitating discussions, and guiding participants during hands-on practice in organic fertilizer production. Figure 1 illustrates the enthusiasm of participants—both extension officers and local community members—who actively engaged in the training sessions. The goal of this initiative is not only for participants to master the technical skills but also to enable them to transfer the knowledge to others in their communities. Thus, the facilitator role contributes significantly to strengthening community capacity in independently managing organic waste, reducing waste accumulation, and improving agricultural productivity.

Furthermore, the Farmer Field School activities demonstrate how extension officers play a crucial role in bridging technical innovations with the needs of grassroots communities. Through a learning-by-doing approach, extension officers not only facilitate knowledge transfer but also build trust and encourage active participation in managing organic waste as a valuable resource. The direct mentoring provided enables extension officers to identify challenges faced by participants—such as limited materials, processing techniques, or understanding the benefits of organic fertilizer. Therefore, the facilitator role strengthens participatory learning processes, promotes behavioral change, and ensures that organic waste management practices can be consistently applied in the daily lives of farmers and community members in Mahakam Ulu Regency.

Role of Agricultural Extension Officers as Communicators

In addition to conducting training activities, agricultural extension officers also perform their role as communicators through the Department of Food Security and Agriculture by organizing socialization programs on organic waste management. This is carried out by educating the community about proper waste management practices, promoting awareness of the importance of the 3R principles (Reduce, Reuse, Recycle), facilitating the adoption of waste-processing methods such as composting or biopore systems, and inspiring behavioral change through direct education across various community groups, particularly farmers in Mahakam Ulu Regency.

Figure 2: Socialization on Organic Waste Management
Source: Author's Documentation

As communicators, agricultural extension officers play a strategic role in delivering information and bridging understanding between the local government and the community, particularly concerning organic waste management. During socialization activities organized by the Department of Food Security and Agriculture, extension officers do not merely deliver one-way presentations; instead, they build interactive dialogues to ensure that information regarding the 3R concept is well understood and appropriately applied. Through simple communication methods, easy-to-understand visual materials, and practical examples drawn from local agricultural practices, extension officers help the community recognize the connection between organic waste management and increased agricultural productivity. The figure illustrates how socialization activities are conducted openly and involve diverse community groups, highlighting that communication is delivered in an inclusive and participatory manner.

The communicator role is further reflected in the extension officers' ability to facilitate understanding of various organic waste-processing methods, including composting techniques, biopore utilization, and converting household waste into liquid fertilizer. Extension officers act as intermediaries who translate government policies into practical, contextually relevant actions that can be easily applied in community settings. They ensure that the information received by the community is not only conceptual but also practical and aligned with the local conditions of Mahakam Ulu Regency. Extension officers also encourage active discussions, allowing participants to ask questions, share experiences, and express the challenges they face in daily organic waste management.

Moreover, as communicators, agricultural extension officers contribute to building collective awareness and motivation within the community. They do not simply provide information but also inspire behavioral change through persuasive communication that emphasizes long-term benefits such as environmental health, reduced fertilizer expenses, and improved agricultural outcomes. By showcasing examples of successful farmers or field demonstration results, extension officers help

build confidence that organic waste management is both feasible and beneficial. Thus, their role as communicators becomes a crucial element in expanding the adoption of organic waste management practices and strengthening community capacity toward sustainable agriculture.

Role of Agricultural Extension Officers as Motivators

The role of agricultural extension officers as motivators is reflected in their efforts to encourage and inspire community members and farmers to care about the environment and develop a strong willingness to participate in responsible waste management. Extension officers are also expected to spark and strengthen farmers' interest in adopting innovative technologies for organic waste management by offering creative solutions that transform waste into a new, sustainable resource.

Figure 3: Activities of Agricultural Extension Officers in Providing Motivation

Source: Author's Documentation

As motivators, agricultural extension officers play an essential role in cultivating awareness and commitment among farmers and the wider community to actively engage in organic waste management. Through persuasive communication and exemplary practices, extension officers work to build confidence that organic waste processing not only benefits the environment but also provides economic advantages, such as access to affordable organic fertilizer and improved soil quality. In the field activities shown in the documentation, extension officers deliver explanations directly while showcasing the results of processed organic fertilizer, allowing the community to witness the tangible benefits of the innovations being introduced. This approach has proven effective in driving behavioral change because the community does not merely receive information they also understand the practical value of applying it.

Beyond offering moral encouragement, agricultural extension officers motivate farmers through empowerment strategies, actively involving them in every stage of the organic waste processing cycle. Extension officers create a supportive learning environment in which participants are encouraged to ask questions, experiment, and share experiences without hesitation. Activities such as demonstrations of liquid fertilizer production, small group discussions, and joint evaluations provide opportunities to strengthen farmers' confidence in applying innovations within their local context. In this way, extension officers do not only transfer knowledge but also foster a sense of ownership over the programs being implemented.

Furthermore, the motivational role of extension officers is evident in their efforts to shift community mindsets encouraging people to view waste not merely as refuse but as a potential

resource that can be transformed into useful products. Extension officers inspire community creativity in developing local solutions, such as converting kitchen waste into compost or processing garden waste into liquid organic fertilizer. This encouragement opens space for innovation tailored to the unique conditions of each village, enabling organic waste management to be practiced more independently and sustainably. Thus, extension officers as motivators not only mobilize the community to take action but also equip them with optimism and the capability to sustain long-term organic waste management practices.

Role of Agricultural Extension Officers as Consultants

The role of extension officers as consultants in waste management refers to their function as providers of expert advice and solutions, helping communities make informed decisions and supporting them in developing creative and sustainable approaches to managing organic waste. Extension officers serve as a consultation hub through which communities can build awareness, access relevant information, and enhance their capacity to create a healthier living environment by practicing environmentally friendly and productive household organic waste management.

Figure 4: Activities of Extension Officers as Consultants
Source: Author's Documentation

Organic waste management in Mahakam Ulu Regency remains very basic and is not yet organized within a comprehensive system. Difficult geographic conditions, the absence of facilities such as TPS3R and permanent landfills, and low community awareness and knowledge serve as major barriers to effective waste management. The abundance of daily organic waste has not been optimally utilized due to inadequate composting facilities and limited understanding, leading to frequent improper disposal that poses environmental and health risks. The consultant role of agricultural extension officers is crucial in Mahakam Ulu to ensure long-term benefits of organic waste management while minimizing negative impacts on the environment and the community. One of the extension approaches is encouraging the use of household and agricultural organic waste for producing compost. This innovative technique not only allows localized waste management but also empowers farmers and community members to produce organic fertilizers that enhance agricultural productivity—providing dual benefits for both the environment and the economy.

However, the success of this model relies heavily on intensive technical guidance, which is currently limited. The lack of training and on-site mentoring has prevented organic waste

management practices from becoming a routine behavior among the community. Therefore, the roles of extension officers—as facilitators, communicators, motivators, and consultants—must be strengthened through more contextual and participatory educational approaches, supported by collaborative involvement of multiple stakeholders such as the Department of Food Security and Agriculture, the Environmental Agency, NGOs, and local leaders. With coordinated efforts and sufficient support from extension officers, organic waste management in Mahakam Ulu Regency has the potential to become a sustainable solution that reduces organic waste accumulation, improves environmental quality, and enhances community welfare in Long Bangun through local resource–based economic empowerment [18].

CONCLUSION

Overall, the role of agricultural extension officers under the Department of Food Security and Agriculture in Mahakam Ulu Regency is highly strategic in supporting organic waste management in remote areas with limited infrastructure and institutional capacity. Through their four core roles—as facilitators, communicators, motivators, and consultants—extension officers contribute significantly to improving community understanding, skills, and awareness regarding the importance of organic waste processing. Their facilitator role is demonstrated through Farmer Field School activities and technical training; their communicator role is evident in socialization efforts that bridge government policies with local practices; their motivator role supports behavioral change within the community; and their consultant role provides technical solutions to challenges faced by farmers and residents in organic waste management.

Nevertheless, the effectiveness of extension officers is constrained by several challenges, including the limited number of personnel relative to the size of their working areas, inconsistent educational backgrounds that do not always align with technical requirements, and the lack of waste management infrastructure such as TPS3R, TPST, and other supporting facilities. These conditions highlight the need for stronger policy support, improved human resource capacity, and cross-sectoral collaboration to reinforce a localized organic waste management system. With proper strengthening, agricultural extension officers have the potential to become key drivers in raising community awareness and self-reliance, allowing organic waste management to evolve into a sustainable practice that benefits the environment, public health, and food security in Mahakam Ulu.

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