

**THE ROLE OF EXTENSION WORKERS IN INCREASING FARMERS' INCOME
THROUGH THE INTEGRATED CROP-LIVESTOCK-FORESTRY (ICLF) SYSTEM IN
KECAMATAN SASITA MEAN, KABUPATEN MALAKA**
(Peran Penyuluh Pertanian dalam Meningkatkan Pendapatan Petani melalui Sistem Integrasi
Tanaman-Ternak-Kehutanan (ICLF) di Kecamatan Sasita Mean, Kabupaten Malaka)

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ABSTRACT

This study aims to (1) determine the role of agricultural extension workers in the implementation of the Integrated Crop-Livestock-Forestry (ICLF) system, and (2) analyze the level of farmers' income through the implementation of the ICLF system in Sasitamean Subdistrict, Malaka Regency. The ICLF system is an integrated agricultural system that combines crops, livestock, and forestry into a single farming enterprise to improve land efficiency and farmers' income. This study employed a survey method using a quantitative descriptive approach. The study population consisted of all 70 farmers implementing the ICLF system, with a sample of 35 farmers selected using snowball sampling. The data used included primary data obtained through interviews and questionnaires, as well as secondary data from relevant agencies. Data analysis was conducted using descriptive analysis and income analysis. The results of the study indicate that the role of agricultural extension workers in the implementation of the ICLF system is considered good, with an average score of 3.50 or an achievement level of 70.1%. Most respondents (77.14%) stated that the extension workers played a good role. The average total annual income for farmers was Rp 43,162,856, with average annual production costs of Rp 11,247,051, resulting in an average annual income of Rp 31,915,805. Thus, it can be concluded that the role of extension workers is crucial in supporting the implementation of the ICLF system, and this system has proven.

Keywords: Extension Workers, ICLF, Farmer Income, Integrated Farming

INTRODUCTION

Agriculture is a crucial sector in human life because it plays a role in providing food, supporting the economy, preserving culture, and preserving the environment. Over time, agricultural practices in Indonesia have undergone significant transformation, from traditional systems to more modern methods supported by technological advances and innovation. Given the strategic role of this sector in national development, a comprehensive understanding of agricultural science, including the various challenges faced, such as limited land ownership, dependence on a single commodity, fluctuating market prices, and limited access to technology, financing, and broader markets, is crucial. Consequently, farmers' incomes are often unstable and tend to be low, which is crucial as a basis for developing agribusiness and agro-industry that are oriented towards sustainability (Tantawi, A R., et.al, 2024). One supporting factor that can improve the challenges faced by farmers in increasing income is the implementation of Integrated Crop-Livestock-Forestry (ICLF). Integrated Crop-Livestock-Forestry (ICLF) is an integrated agricultural system that integrates food crop farming, livestock farming, and forestry in a single land area.

This approach aims to increase land use efficiency, reduce waste, enhance environmental sustainability, and diversify income sources for farmers. ICLF is one of the agricultural approaches being developed to reduce crop failure and address various challenges in the agricultural world. Integrated Crop-Livestock-Forestry (ICLF) also offers other benefits, including increased land efficiency and productivity, resulting in product diversification, improved soil fertility, improved soil physical properties, and reduced weeds, pests, and diseases (Schroder and Munch, 2008). However, the

success of the ICLF system is largely determined by farmers' ability to access, understand, and adopt relevant agricultural technologies and innovations. In this context, the role of agricultural extension workers is very strategic. Extension workers act as companions, facilitators, and motivators, encouraging farmers to adopt modern and sustainable farming practices.

In agricultural development, the presence of agricultural extension workers is crucial to its success because they are both the driving force and agents of change, interacting directly with farmers. This development can be achieved if the agricultural extension workers possess strong competencies and can position themselves as effective communicators, educators, innovators, facilitators, and motivators for farmers (Marbun, 2019). Agriculture has developed through the implementation of numerous innovations that have successfully improved farmers' living standards. In this regard, agricultural extension workers play a role in accelerating the pace of adoption of these innovations by rural communities. The shorter the timeframe for discovering an agricultural innovation and implementing it in real-world situations, the faster the path to agricultural development. This applies to both individual and group farmers (Putrawan, 2010). Through extension activities, farmers can gain knowledge about integrated cultivation techniques, efficient resource management, and strategies for increasing productivity and income. Extension workers also assist farmers in building solid farmer group institutions, expanding market access, and encouraging farmers to be more adaptive to climate change and dynamic market needs. In the Integrated Crop-Livestock-Forestry (ICLF) system, each component supports the other. For example, livestock waste is used as organic fertilizer for plants, while crop waste can be used as animal feed. Forest trees or plants provide ecological benefits such as water and soil conservation, as well as additional products in the form of wood, fruit, or leaves of economic value. This integration allows farmers to generate income from various sources sustainably. If both are implemented in an integrated manner, they synergize and complement each other (Wibawo, 2015).

Sasitamean District is a sub-district in Malaka Regency, East Nusa Tenggara (NTT) Province, which has great potential in the agricultural sector and dryland areas. Most people in this sub-district depend on food crop farming such as corn, dryland rice, and horticultural crops for their livelihoods. In addition, cattle, goat, and pig farms, as well as forest plants, have the potential to become animal feed and become a fairly important source of community income. The potential for agricultural and livestock land in Sasita Mean District is very large, but its utilization is not optimal because many farmers still rely on traditional planting patterns with relatively low yields. Other obstacles faced by farmers in Sasita Mean District are limited productive land, land dependence on the rainy season, and limited access to modern production facilities. These conditions have an impact on low productivity and fluctuations in farmer income. In addition, diversification of farming businesses is still limited, so if a crop failure occurs in one commodity, farmers' income will be significantly affected. In supporting the agricultural potential and constraints faced by farmers in Sasita Mean sub-district, innovation and the role of agricultural extension workers are needed to increase farmers' income. This study aims to (1) determine the role of agricultural extension workers in implementing the Integrated Crop-Livestock-Forestry (ICLF) system, and (2) analyze the amount of farmer income through the implementation of the ICLF system in Sasitamean Sub-district, Malaka Regency. The ICLF system is an integrated agricultural system that integrates crops, livestock, and forestry in one farming unit to increase land efficiency and farmer income.

RESEARCH METHODS

This research was conducted in Sasitamean District, Malaka Regency from November 2025 until completion. The location was determined purposively with the consideration that the area is an area that has implemented the Integrated Crop-Livestock-Forestry (ICLF) system. The research method used is a survey method with a quantitative descriptive approach. The population in this study were all farmers who implemented the ICLF system as many as 70 people, with a sample of 35 people determined using the snowball sampling technique. The types of data used consisted of primary data and secondary data. Primary data were obtained through direct interviews using questionnaires, while secondary data were obtained from related agencies and other relevant sources. Data analysis was carried out using descriptive and quantitative analysis. To determine the role of agricultural extension

workers, a Likert Scale was used with five assessment categories, namely: score 5 (very influential), score 4 (influential), score 3 (quite influential), score 2 (less influential), and score 1 (no influential). The value of each indicator was added up and then the average was calculated to determine the level of the role of extension workers in the implementation of the ICLF system. Furthermore, the average results are classified into categories of role levels, namely very influential, influential, moderately influential, less influential, and no influential. Furthermore, quantitative analysis is used to calculate farmer income, namely the difference between total revenue and total production costs. Total revenue is obtained from production results multiplied by the selling price, while total costs consist of fixed costs and variable costs incurred during the production process.

RESULTS AND DISCUSSION

The Role of Extension Workers

Based on the results of the processing and analysis of research data, it is known that the average value of the cumulative role of agricultural extension workers in the field, which includes the roles as educators, motivators, facilitators, communicators, and innovators, is 3.50. This value is equivalent to the maximum score achieved of 70.1%, so it can be categorized that agricultural extension workers in the field are in the category of playing a role in the respondents' farming activities.

Table 1. Category of the Role Level of Agricultural Extension Workers in the Implementation of the Integrated Crop-Livestock-Forestry (ICLF) System in Sasitamean District, Malaka Regency is presented in

No	Interval Class	Level Role Extension Worker	Frequency (People)	Percentage Respondents (%)
1	≥ 20-36	Very insignificant	0	0
2	>36-52	Does not play a role	0	0
3	>52-68	Less involved	8	22,86
4	>68-84	Playing a role	27	77,14
5	>84-100	Very instrumental	0	0
Total			35	100

Source: Primary Data Analysis Results 2025

Based on the results presented in Table 1, it is known that as many as 27 respondents or 77.14% are included in the category of field agricultural extension workers playing a role in the implementation of the Integrated Crop–Livestock–Forestry (ICLF) system in Sasitamean District, Malaka Regency. Meanwhile, as many as 8 respondents or 22.86% consider that the role of extension workers is in the category of having less of a role. The high proportion of respondents in the role category indicates that in general field agricultural extension workers have carried out their duties and functions quite well in supporting the implementation of the ICLF system, especially in providing guidance and assistance to farmers. However, there are still respondents who consider the role of extension workers to have less of a role, indicating that extension activities have not been running optimally. This is thought to be related to the limited frequency of extension worker visits, the lack of ongoing technical assistance, and the less than optimal delivery of innovations that are in accordance with farmers' needs in the implementation of the ICLF system.

The role of agricultural extension workers in implementing the Integrated Crop–Livestock–Forestry (ICLF) system in Sasitamean District, Malaka Regency can be described as follows:

The Role of Extension Workers as Educators

Educators are individuals who play a role in imparting knowledge to farmers, particularly regarding agricultural innovations, cultivation techniques, and the recommended dosages of fertilizers and pesticides to support increased yields and farm management. In the context of the Integrated Crop–Livestock–Forestry (ICLF) system, this role is crucial because farmers are required to understand the integration of various agricultural subsectors.

Table 2. Distribution of Respondents Based on the Role of Extension Workers as Educators

No	Interval Class	Level Role Extension Worker	Frequency (People)	Percentage Respondents (%)
1	≥ 20-36	Very insignificant	0	0
2	>36-52	Does not play a role	0	0
3	>52-68	Less involved	18	51,42
4	>68-84	Playing a role	17	48,58
5	>84-100	Very instrumental	0	0
Total			35	100

Source: Primary Data Analysis Results 2025

Based on the information presented in Table 2, it is known that the majority of respondents considered the role of agricultural extension workers in the field as educators to be still not optimal. This is indicated by 18 respondents (51.42%) who placed the role of extension workers in the category of having less role. Meanwhile, 17 respondents (48.58%) assessed that extension workers have played a role as educators. On the other hand, there were no respondents who rated the role of extension workers in the categories of very no role, no role, or very role, each with a percentage of 0%. These results indicate that the implementation of the role of agricultural extension workers in the field as educators in the implementation of the Integrated Crop–Livestock–Forestry (ICLF) system in Sasitamean District, Malaka Regency has not been running optimally. This condition is thought to be related to the limited frequency of the presence of extension workers in providing guidance to farmers, especially in the technical aspects of implementing the ICLF system, which includes the planning, implementation, and yield management stages. The lack of continuous mentoring has an impact on the level of understanding and ability of farmers to implement the ICLF system effectively.

The Role of Extension Workers as Motivators

Motivators are parties who play a role in providing encouragement and motivation to farmers so that they are able to develop their potential optimally, so that they can increase agricultural yields while supporting the increase in farmer income. The results of data processing show that the level of role of agricultural extension workers in carrying out their function as motivators in the implementation of the Integrated Crop–Livestock–Forestry (ICLF) system in Sasitamean District, Malaka Regency, obtained an average score of 3.58. This achievement is equivalent to 72.00% of the highest predetermined score, which is obtained by comparing the actual average value with the maximum assessment score. Based on the grouping of assessment criteria, this achievement places the role of agricultural extension workers in the field as motivators in the role category. This indicates that the extension workers have carried out their function quite well in providing encouragement and motivation to farmers. This role contributes to encouraging farmers to develop their agricultural business potential and supports the implementation of the ICLF system in the

Sasitamean District, Malaka Regency.

Table 3. Distribution of Respondents Based on the Role of Extension Workers as Motivators

No	Interval Class	Level Role Extension Worker	Frequency (People)	Percentage Respondents (%)
1	≥ 20-36	Very insignificant	0	0
2	>36-52	Does not play a role	0	0
3	>52-68	Less involved	10	28,58
4	>68-84	Playing a role	25	71,42
5	>84-100	Very instrumental	0	0
Total			35	100

Source: Primary Data Analysis Results 2025

The data processing results in Table 3 show that the majority of respondents, 25 people, equivalent to 71.42%, assessed that field agricultural extension workers have performed their role as motivators well. Meanwhile, 10 respondents, representing 28.58%, believed that this role was still less than optimal. This assessment composition indicates that overall, field agricultural extension workers have functioned adequately as motivators in encouraging farmer activities. This is reflected in the extension workers' efforts to raise enthusiasm, provide encouragement, and motivate farmers to develop their agricultural businesses. However, the presence of respondents who still assessed the role of extension workers as less than effective indicates that the implementation of motivation for farmers is not yet fully equitable. Therefore, it is necessary to increase the frequency of mentoring and the quality of more sustainable interactions so that farmer motivation in adopting innovations and developing agricultural business systems can be maximized.

The Role of Extension Workers as Facilitators

The role of a facilitator is to provide and provide assistance oriented towards fulfilling the needs of farmers. In addition, the extension worker also functions as a liaison or intermediary in distributing various government assistance to farmers, such as seeds, fertilizers, pesticides and other supporting facilities. The results of data processing show that the average value of the role of field agricultural extension workers in carrying out their function as facilitators is 3.50, with the level of achievement of the maximum score reaching 69.86%. Based on a comparison with the reference category, this value is included in the role category. Therefore, it can be concluded that field agricultural extension workers have carried out their role as facilitators effectively in supporting the respondents' farming activities.

Table 4. Distribution of Respondents Based on the Role of Extension Workers as Facilitators

No	Interval Class	Level Role Extension Worker	Frequency (People)	Percentage Respondents (%)
1	≥ 20-36	Very insignificant	0	0
2	>36-52	Does not play a role	0	0
3	>52-68	Less involved	14	40
4	>68-84	Playing a role	19	54,29
5	>84-100	Very instrumental	2	5,71
Total			35	100

Source: Primary Data Analysis Results 2025

Based on the information presented in Table 4, it is known that 19 respondents, or 54.29%, assessed the role of field agricultural extension workers as facilitators as having a role. Furthermore, 14 respondents, or 40%, stated that the role of extension workers was less influential, while 2 respondents, or 5.71%, assessed the role of extension workers as having a very influential role. On the other hand, no respondents classified the role of extension workers as having no role or very influential role. This finding indicates that overall, the role of field agricultural extension workers as facilitators can be said to have played a role, considering that the majority of respondents felt the benefits of the involvement of extension workers in helping to facilitate farmers' needs. This role is evident through the support of extension workers in channeling farmers' aspirations to the government, so that farmers can obtain various agricultural production inputs, such as seeds, fertilizers, and pesticides.

The role of extension workers as communicators

Communicators are individuals who send information that connects with farmers through communication methods that can be well understood by farmers, so that they can improve farmers' understanding and abilities, so that they can improve farmers' understanding and abilities, so that they have broad knowledge in the businesses they run. Based on the data analysis carried out, it was found that the average score of the role of field agricultural extension workers in the communicator function was 3.56, with the percentage of maximum score achievement reaching 71.29%. When this value was compared with the reference category, the result was in the role category. Therefore, it can be concluded that field agricultural extension workers have a role as communicators in supporting farmers' farming activities.

Table 5. Distribution of Respondents Based on the Role of Extension Workers as Communicators

No	Interval Class	Level Role Extension Worker	Frequency (People)	Percentage Respondents (%)
1	≥ 20-36	Very insignificant	0	0
2	>36-52	Does not play a role	0	0
3	>52-68	Less involved	13	37,14
4	>68-84	Playing a role	20	57,15
5	>84-100	Very instrumental	2	5,71
Total			35	100

Source: Primary Data Analysis Results 2025

Based on the observation results in Table 5, it is known that 20 respondents or 57.15% assessed the role of agricultural extension workers in carrying out their function as communicators as being in the role category. In addition, as many as 13 respondents with a percentage of 37.14% stated that the role of extension workers was in the less role category, while 2 respondents or 5.71% assessed the role as being in the very role category. Based on these findings, it can be concluded that the majority of respondents assessed the role of agricultural extension workers in the field as communicators as having played a role, which is reflected in the existence of communication and interaction between extension workers and farmers in conveying information, providing direction, and assisting farming activities. However, there were still some respondents who considered that the implementation of this role was not fully optimal.

The role of extension workers as innovators

Innovators are individuals who offer ideas, information, new practices, and technologies that are not yet used or unknown by farmers in their activities, with the hope that the innovations presented can change behavior and increase farmer knowledge. The results of data processing show that the role of field agricultural extension workers in carrying out their function as innovators obtained an average score of 3.51, with the level of achievement towards the maximum score reaching 70.14%. Based on the reference category used, this value is included in the role category. Thus, it can be concluded that field agricultural extension workers have played a role as innovators in supporting the implementation of respondents' farming activities so that they are able to manage their farming businesses better.

Table 6. Distribution of Respondents Based on the Role of Extension Workers as Innovators

No	Interval Class	Level Role Extension Worker	Frequency (People)	Percentage Respondents (%)
1	$\geq 20-36$	Very insignificant	0	0
2	$>36-52$	Does not play a role	0	0
3	$>52-68$	Less involved	16	45,71
4	$>68-84$	Playing a role	17	48,58
5	$>84-100$	Very instrumental	2	5,71
Total			35	100

Source: Results of Primary Data Analysis 2025

Based on the information presented in Table 6, it is known that 16 respondents, or 45.71%, assessed the role of agricultural extension workers in carrying out their function as communicators as being less influential. Meanwhile, 17 respondents, or 48.58%, stated that the role of extension workers was in the influential category. In addition, there were 2 respondents, or 5.71%, who assessed the role of extension workers as being in the very influential category. On the other hand, there were no respondents who classified the role of extension workers as having no role or very influential. Based on these findings, it can be concluded that in general, respondents assessed the role of agricultural extension workers in the field as communicators as having played an important role, although some respondents still considered the role to be less than optimal. This condition indicates that the communication process between extension workers and farmers in conveying information and directions for farming activities has been going quite well, but still needs to be improved so that the information conveyed can be received more evenly by all farmers.

Income

The income obtained from the implementation of the Integrated Crop–Livestock–Forestry (ICLF) system is the difference between the average total income derived from crop, livestock, and forestry businesses and the total costs incurred during the production process. The amount of income received by farmers is influenced by the level of production, selling price, and the farmer's ability to

manage and reduce costs in each type of business. The average income of farmers who implement the ICLF system in Sasitamean District, Malaka Regency is presented in Table 7.

Table 7. Average Farmer Income through the Integrated Crop–Livestock–Forestry (ICLF) System in Sasitamean District, Malaka Regency

Description	Total (Rp/Kg)
Total Average Receipt from the ICLF system	43.162.856
Total Average Production Cost of the ICLF System	11.247.051
Average Income from the ICLF system	31.915.805

Source: Primary Data Analysis Results 2025

Based on Table 7, it is known that the average farmer income per hectare of land in the implementation of the Integrated Crop–Livestock–Forestry (ICLF) system in Sasitamean District, Malaka Regency is IDR 31,915,805 per year, with an average total income of IDR 43,162,856 and a total production cost of IDR 11,247,051. The amount of income shows that the implementation of the ICLF system provides quite good benefits for farmers. The income obtained is not only used to meet household economic needs, but can also be used as capital to support production activities in the next period.

CONCLUSION AND RECOMMENDATION

Conclusion

There is a strong relationship between the role of agricultural extension workers and increasing farmer income through the implementation of the Integrated Crop–Livestock–Forestry (ICLF) system in Sasitamean District, Malaka Regency. The analysis results show that the role of extension workers is in the instrumental category, as indicated by an average score of 3.50 with a maximum score of 70.1%. Thus, it can be said that the role of agricultural extension workers has a significant influence on the success of the ICLF system implementation by farmers. This is supported by the majority of respondents (77.14%) who assessed that extension workers play a good role in farming activities. These results indicate that the relationship between the role of extension workers and farmer income is unidirectional, where the better the role of extension workers, the more optimal the implementation of the ICLF system, which has an impact on increasing farmer income. This is reflected in the average farmer income of Rp 43,162,856 and total production costs of Rp 11,247,051, resulting in an average income of Rp 31,915,805. Therefore, it can be concluded that the role of agricultural extension workers and the implementation of the ICLF system are interrelated and cannot be separated in efforts to increase the income and welfare of farmers in the research area.

Recommendation

Agricultural extension workers need to further increase the intensity and quality of their support for farmers, as their role has been proven to contribute to the successful implementation of the Integrated Crop–Livestock–Forestry (ICLF) system, which in turn increases farmers' income. Therefore, extension activities, such as education, technological innovation, and technical guidance, must be carried out continuously to further develop farmers' abilities and skills. Furthermore, farmers are expected to be more active in participating in extension activities and optimally implementing the ICLF system, as the integration of crop, livestock, and forestry businesses has been shown to increase cost efficiency and farm income. Therefore, better resource utilization will provide greater economic benefits for farmers. Local governments and relevant agencies need to continue strengthening support for the implementation of agricultural extension through the provision of facilities and infrastructure, improving the competence of extension workers, and policies that support the development of the ICLF system, as the success of this system is greatly influenced by the synergy between extension workers, farmers, and the government. For further research, it is recommended to add other variables that influence farmer income, expand the research area, and use more in-depth analysis methods to obtain more comprehensive results regarding the relationship between the role of extension workers

and increasing farmer income through the ICLF system.

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