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The Relationship between Agricultural Extension Officer (PPL) Activities and Facilities and the Capabilities of Farmer Groups in Kalipuro District, Banyuwangi Regency

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Abstract. *The purpose of extension activities is to change individual or community attitudes, including knowledge, skills, and mental attitudes. Margono Slamet (1978) states that changing attitudes requires extension efforts through information dissemination. With the willingness and ability to improve their practices, farmers are expected to increase agricultural production, achieve better profitability, and improve their quality of life. This study examines the relationship between facilities and the activities of agricultural extension workers (PPL), as well as the relationship between PPL activities and the capacity of farmer groups. The results are expected to enhance the effectiveness of PPL activities and improve farmer group performance. The findings from the Agricultural Extension Center (BPP) in Kalipuro District show that: (1) PPL activities are relatively high; (2) farmer group capacity is also relatively high due to strong farmer responsiveness; and (3) facilities such as library conditions, training infrastructure, and skill development are related to PPL activity levels. Additionally, incentive perceptions and group capacity are associated with PPL activities. Chi-square analysis indicates that all variables (library, infrastructure, skills, perceptions, and group capacity) have significant relationships with PPL activities (X^2 calculated > X^2 table), meaning the null hypothesis is rejected. Thus, there is a significant relationship between facilities and PPL activities on farmer group capacity. It is recommended that PPL intensify extension efforts to further improve farmer productivity and group performance.*

Keywords: *Agricultural Extension Officer (PPL), Extension Facilities, Farmer Group Capacity, Agricultural Extension*

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INTRODUCTION

In the reform era, agricultural development is primarily focused on fostering a spirit and determination of national self-reliance in order to improve the quality of human resources and achieve greater physical and spiritual well-being that is more harmonious, just, and equitable (Mahmud et al., 2025; Sarapirom, 2024; You & Hu, 2026). Secondly, it aims to strengthen the foundation of development for the next stages. This clearly indicates an emphasis on the spirit and determination of independence based on improved human quality (Panzini et al., 2017).

Likewise, in the agricultural sector, agricultural human resources are expected to become more independent, characterized by their ability to make more critical farming decisions, improve efficiency in utilizing development resources, and enhance human resource productivity

(Sharma & Shivandu, 2024; Pandey et al., 2025; Qorri et al., 2024; Turner et al., 2016; Permono & Kurniati, 2024). Thus, the agricultural sector will remain a pillar of economic development through quality improvement (Lin et al., 2024; Bhattarai & Pandit, 2023; Wudil et al., 2022; Loizou et al., 2019). Agricultural development is one of the sectors given top priority in the national economy (Han, 2020; Yu & Wu, 2018). From various perspectives, the agricultural sector is highly dominant, for example in its contribution to national income, its role in providing employment, and its contribution to foreign exchange earnings (Rahman et al., 2017; Adeniran & Tayo-Ladega, 2024; Nwozor et al., 2019; Kołodziejczak, 2020)

As further explained by Affandi et al. (2019) and Kurniawan & Managi (2018), Indonesian people are the dominant factor to be developed as an effective basic capital. In other words, in human resource development, humans as individuals are the main focus because they form the foundation of their own lives (Kuchinke, 2023; Collings et al., 2018; Fleming, 2017; Collins et al., 2015). Success in developing individuals holistically will determine success in other aspects, namely as resilient actors capable of developing themselves and their environment (Wimmer, 2016; Masten, 2016; Hahn & Nykvist, 2017). Knowledge, skills, and other competencies will stand firmly on a foundation of strong moral ethics and good character (Morales-Sánchez & Cabello-Medina, 2015; Vallor, 2015).

Improving living standards and achieving equitable welfare as the goal of development can only be attained through increased economic capacity generated by the development itself (Ayoo, 2022; Van, 2020; Tomislav, 2018; Purnamawati et al., 2023). Therefore, in agricultural development, efforts must be made to improve the agricultural extension system. To this end, the government has developed various institutions aimed at creating a strong foundation for farmers' self-reliance. Kansiime et a. (2018), Norton & Alwang (2020) said that, one such institution is the farmer group, led by a contact farmer who is expected to function as a disseminator of new technologies to other farmers.

Despite the significant role of the agricultural sector in the national economy, it still faces major challenges, particularly poverty (Pawlak & Kołodziejczak, 2020; Christiaensen, L., & Martin, 2018; Ivanic, M., & Martin, 2018; Mukasa et al., 2017). This is due to relatively low income levels in the agricultural sector, even though most of the population works in agriculture. Therefore, to increase the income of rural populations, many of whom are classified as poor, food production must be further improved. To achieve increased agricultural production, efforts such as agricultural extension and education must be carried out, accompanied by improvements and expansion of infrastructure, provision of adequate production facilities, as well as research and selection of appropriate agricultural technologies to be disseminated widely to farming communities.

In order to improve and refine agricultural extension efforts, the government has developed an institutional system aimed at creating a strong foundation for farmer self-reliance (Firmanto et al., 2023; Campbell et al., 2022; Ndlela & Worth, 2021). This system includes farmer groups led by a contact farmer, who is expected to serve as a communicator and disseminator of new technologies to surrounding farmers. Agricultural extension services are designed to reach as many farmers as possible in the most effective way (Kaur& Kaur, 2018; Pan et al., 2018; Antwi-Agyei & Stringer, 2021). One approach used is the group approach, in addition to individual and mass approaches. Farmer groups are expected to function as a medium through which information and other services can be disseminated more effectively. Moreover, farmer groups are also expected to serve as a forum for farmers to meet both group and individual needs. Agricultural development requires dynamic farmer groups so that programs can be well received.

METHODS

Research Design

This study employed a quantitative correlational survey design to examine the associations between agricultural extension worker (PPL) activities, extension facilities, and

farmer group capability in Kalipuro District, Banyuwangi Regency. The study focused on identifying statistically significant relationships among variables rather than establishing causal effects. Therefore, the findings are interpreted as associations between variables.

Research Location

The research was conducted in Kalipuro District, Banyuwangi Regency, East Java, Indonesia. The location was selected purposively because the district has active agricultural extension programs, well-established farmer groups, and intensive extension activities coordinated through the Agricultural Extension Center (BPP). These characteristics make Kalipuro an appropriate setting for examining relationships between extension activities and farmer group capability.

Population and Sampling

The population consisted of members of farmer groups operating within Kalipuro District. Kalipuro comprises nine villages, each treated as a cluster for sampling purposes. Cluster sampling was applied to identify the study area, after which respondents were selected using complete enumeration within the chosen cluster. A total of 30 farmer respondents participated in the study. The unit of analysis was individual farmer group members who had participated in agricultural extension activities. Information regarding extension worker activities, extension facilities, and farmer group capability was obtained from farmers' perceptions and experiences with extension services.

Research Variables and Operational Definitions

The study included the following variables: (1) Library Condition Measured through the availability, accessibility, and adequacy of agricultural reference materials at the extension center. Scores were categorized as complete, moderate, or poor; (2) Training Facilities and Infrastructure Assessed based on the availability of training venues, demonstration equipment, learning media, and transportation support. Scores were classified into complete, moderate, or poor categories; (3) Skills Training Measured by the frequency and adequacy of technical training received by extension workers. Categories included high, moderate, and low; (4) Perception of Incentives Assessed through respondents' perceptions regarding financial and non-financial incentives supporting extension activities. Categories included high, moderate, and low; (5) PPL Activity Level Measured using indicators such as frequency of extension visits, planning activities, farmer meetings, and participation in extension programs. Scores were categorized into high and low activity levels; (6) Farmer Group Capability Measured through indicators including group participation, cooperation, decision-making capacity, problem-solving ability, and adoption of agricultural innovations. Scores were categorized into high, moderate, and low capability levels.

Data Collection

Primary data were collected through structured questionnaires administered directly to farmer respondents. The questionnaire consisted of closed-ended items designed to measure perceptions of extension facilities, extension worker activities, and farmer group capability. Interviews were conducted to ensure clarity and completeness of responses. Secondary data were obtained from institutional documents, including district monographs, reports from the Agricultural Extension Center (BPP), and other relevant agricultural statistics.

Instrument Validation

Prior to data collection, the questionnaire was reviewed by agricultural extension experts to ensure content validity and relevance to the research objectives. A pilot assessment was conducted to confirm the clarity and comprehensibility of questionnaire items before field implementation.

Data Analysis

Descriptive statistics were used to summarize respondent characteristics and variable distributions. To examine associations between extension facilities, PPL activities, and farmer group capability, the Chi-square (χ^2) test of independence was employed. Statistical significance was determined at the 95% confidence level ($\alpha = 0.05$). The null hypothesis stated that no association existed between the variables, while the alternative hypothesis stated that a significant association existed. Decisions were made by comparing the calculated χ^2 value with the critical χ^2 table value.

RESULTS AND DISCUSSION

BPP Work Mechanism

Extension services are a means to change farmers' behavior toward more rational and efficient farming practices. Through extension, farmers and fishermen are assisted in identifying, analyzing, and solving problems related to their agribusiness activities, leading to more professional outcomes. The system or working mechanism of agricultural extension is based on the principle of involving all elements of agricultural development within an integrated institutional network, enabling the system to operate systematically.

In Banyuwangi Regency, agricultural extension is carried out by relevant government agencies whose working areas cover the entire administrative region. The Agricultural Extension Center (BPP), as a district-level extension unit, is responsible for implementing extension functions and technical agricultural services in its area. Agricultural extension workers at BPP implement agricultural development programs as part of a Professional Extension Team while considering farmers' aspirations.

To conduct extension activities, there are 15 functions that must be implemented through coordination and cooperation with related institutions, including: preparing extension programs, guiding work plans, providing and disseminating agricultural information, managing BPP operations, coordinating extension activities at the district level, monitoring and evaluation, strengthening farmer institutions, organizing training, developing farmer organizations, guiding farm input use, conducting demonstrations, managing libraries, applying agricultural technology, providing technical services, and handling administrative tasks.

Given the increasing complexity of agriculture, multiple disciplines must be integrated to address different regional characteristics. Farmers and their families, as key actors, have diverse characteristics. Therefore, the specialization of extension workers must align with regional needs. These include Field Agricultural Extension Workers (PPL), Program Extension Officers (PPUP), and Specialist Extension Workers (PPS), who provide technical expertise and support in solving operational agricultural problems.

Training and Visits

PPL serve as the frontline in delivering information to farmers and must possess broad agricultural knowledge. Training is conducted at BPP to enhance their knowledge, skills, and attitudes. PPL are expected to be responsive to emerging agricultural issues, innovative, capable of encouraging farmer creativity, skilled in farm management, able to develop farmer leadership, and capable of collaborating with relevant institutions. Field visits are crucial for the success of extension programs, involving direct communication with individuals, groups, or larger audiences. These visits aim to build empathy, exchange ideas, identify problems, teach skills, and share information.

Development of Contact Farmers and Farmer Groups

Development activities are essential as they ensure continuity after training and visits. Contact farmers and farmer groups must be intensively guided to support extension workers in their duties. The goal is to achieve effective farming, optimal agricultural practices, and improved

farmer welfare. Farmer groups are developed to share common perspectives and interests, with activities based on awareness and cooperation (Anonymous, 1990).

Relationship Between Agricultural Extension Facilities and Extension Worker Activities

The delivery of messages from extension workers (PPL) to farmers is a communication process known as extension. This process becomes more effective when supported by adequate facilities. Key facilities influencing extension worker activity include libraries, training infrastructure, skill development, promotions, official vehicles, and incentive perceptions. Meanwhile, the level of activity is measured by the frequency of planning and participation in extension activities.

Library

The library plays an important role in improving extension workers' knowledge, serving as a reference for both technical and non-technical field issues. Based on scoring, library conditions are categorized into complete, moderate, and incomplete. The relationship between library conditions and extension worker activity levels is analyzed using the Chi-square (X^2) test, as presented in Table 1.

Table 1. Results of the Chi-Square Test (X2) of the Relationship between Library Conditions and the Level of PPL Activity in Agricultural Extension Activities

PPL Activity	Library Condition			Total
	Complete	Moderate	Poor	
High	18 (12.0)	0 (1.8)	0 (4.2)	18
Low	8 (8.0)	3 (1.2)	7 (2.8)	12
Total	20 (20.0)	3 (3.0)	7 (7.0)	30

Source: Primary Data Analysis, 2007

From Appendix 2, the Chi-Square (X^2) statistical test above shows that the calculated X^2 value is 22.500, which is greater than the table X^2 of 5.99 at a 95% confidence level. This demonstrates a relationship between training facilities and infrastructure and the level of PPL activity in agricultural extension activities. It is clear that a well-stocked library with a high level of PPL activity is associated with 18 people, while a well-stocked library with a low level of PPL activity is associated with 8 people. This indicates that the availability of libraries in agricultural extension activities is high. Therefore, a well-stocked library is a crucial element in supporting PPL activities in agricultural extension activities.

Training Facilities and Infrastructure

In the research conducted, training facilities and infrastructure were reviewed in terms of training venues, demonstration and practical equipment, and transportation. The assessment is based on the scores obtained from the training facilities and infrastructure. Therefore, the training facilities and infrastructure are divided into three categories: complete, moderate, and incomplete. For more details, see the following table:

Table 2. Chi-Square Test Results (X2) of the Relationship between Facilities and Infrastructure and the Level of PPL Activity in Agricultural Extension Activities

PPL Activity	Facilities & Infrastructure			Total
	Complete	Moderate	Poor	
High	13 (7.8)	5 (6.0)	0 (4.2)	18
Low	0 (5.2)	5 (4.0)	7 (2.8)	12
Total	13 (13.0)	10 (10.0)	7 (7.0)	30

Source: Primary Data Analysis, 2007

From Appendix 3, the Chi-Square (X^2) statistical test above yields a calculated X^2 value of 19.58, which is greater than the X^2 table value of 5.99 at a 95% confidence level. This

demonstrates a relationship between training facilities and infrastructure and the level of PPL activity in agricultural extension activities. The table above shows that high activity with complete facilities is 13 people, and low activity with no facilities. Thus, the problem of facilities and infrastructure significantly affects PPL activity. The inadequate category has only a small number of participants, compared to the complete and moderate categories.

Skills Training

Skills are a determining factor for extension activities because these skills can build farmer interest and trust in the officers. The score is determined based on the scores obtained from the skills training. Therefore, skills training is divided into three categories: those with frequent skills training, those with moderate skills training, and those with infrequent skills training. The results of field observations can be explained as follows:

Table 3. Chi-Square Test Results (X2) of the Relationship between Skills and the Level of PPL Activity in Agricultural Extension Activities

PPL Activity	**Skills**			**Total**
	Complete	Moderate	Poor	
High	10 (6.0)	8 (6.6)	0 (5.4)	18
Low	0 (4.0)	3 (4.4)	9 (3.6)	12
Total	10 (10.0)	11 (11.0)	9 (9.0)	30

Source: Primary Data Analysis, 2007

From Appendix 4, the Chi-Square (X^2) statistical test above yields a calculated X^2 value of 20.909, which is greater than the X^2 table value of 5.99 at a 95% confidence level. This demonstrates a relationship between skills and the activity level of PPL in agricultural extension activities. The table above shows that 8 individuals with high activity levels (complete) and 9 individuals with low activity levels (empty). Thus, skills significantly influence PPL activity. Similarly, 8 individuals with medium activity levels (medium) were included, while 9 individuals with low activity levels did not significantly influence PPL activity. From this table, it can be concluded that PPL who frequently and moderately receive skills training have high activity levels, while PPL who rarely receive skills training have low activity levels.

Perception of Incentives

Perception of incentives in agricultural extension activities determines the activity levels of agricultural extension workers in the field. This is because perceptions of incentives can improve PPL performance. Based on the assessment, the scores obtained are divided into three categories: PPL who frequently receive incentives, moderately, and rarely. The research results show the following:

Table 4. Chi-Square Test Results (X2) of the Relationship Between Perception and the Level of Field Worker Activity in Agricultural Extension Activities

PPL Activity	**Perception**			**Total**
	High	Moderate	Low	
High	10 (6.0)	8 (6.6)	0 (5.4)	18
Low	0 (4.0)	3 (4.4)	9 (3.6)	12
Total	10 (10.0)	11 (11.0)	9 (9.0)	30

Source: Primary Data Analysis, 2007

From Appendix 5, the Chi-Square (X^2) statistical test above shows a calculated X^2 value of 20.909, which is greater than the X^2 table value of 5.99 at a 95% confidence level. This demonstrates a relationship between incentive perceptions and the level of PPL activity in agricultural extension activities. The table above indicates high activity.

Group Capability

Group capability is a result of the development of Agricultural Field Officers (PPL). A dynamic group will have high capability because the officers can be considered successful in providing development, and this is related to the level of PPL activity. To determine the extent of the relationship, research is needed between the officers' capabilities and their activities. The value is determined based on the scores obtained from the farmer group's capabilities, which are divided into three categories: high farmer group capability, medium farmer group capability, and low farmer group capability. For more details, see the following:

Table 5. Chi-Square (X2) Test Results: Relationship between PPL Activity Level and Farmer Group Capability in Agricultural Extension Activities

PPL Activity	**Farmer Group Capacity**			**Total**
	High	Moderate	Low	
High	15 (9.0)	3 (4.2)	0 (4.8)	18
Low	0 (6.0)	4 (2.8)	8 (8.0)	12
Total	15 (15.0)	7 (7.0)	8 (8.0)	30

Source: Primary Data Analysis, 2007

From Appendix 6, the statistical test above yields a calculated X2 value of 22.857, which is greater than the X2 table value of 5.99 at a 95% confidence level. This demonstrates a relationship between PPL activity and the ability of farmer groups to engage in agricultural extension activities.

The table shows that 15 farmers categorized as having high group capacity with a high level of PPL activity, compared to 1 farmer with low group capacity with a low level of PPL activity. This indicates that farmers with high group capacity also have a high level of PPL activity. Seven farmers with medium group capacity and high PPL activity, and 10 farmers with medium group capacity and low PPL activity, indicate that farmers with medium group capacity have a low level of PPL activity. Meanwhile, 8 farmers with low group capacity and high PPL activity, and 0 farmers with low group capacity and low PPL activity, are among the farmers with low group capacity. This can be said that farmers whose group capabilities are categorized as low do not necessarily have low PPL activities in extension activities.

From the overall chi-square test analysis (X2) which includes libraries with PPL activities (X2 hit: 22.5 > X2 tab: 5.99), facilities and infrastructure with PPL activity levels (X2 hit: 19.58 > X2 tab: 5.99), PPL skills and activities (X2 hit: 20.90 > X2 tab: 5.99), perceptions with activities (X2 hit: 20.91 > X2 tab: 5.99) and group capabilities with PPL activities (X2 hit: 22.85 > X2 tab: 5.99) all obtained results X2 hit > X2 tab, so it can be said to reject Ho which means there is a relationship between facilities and PPL activities on farming capabilities, in other words, the hypothesis proposed above can be justified or accepted as true.

Relationship between Library Condition and PPL Activity

The Chi-square analysis revealed a statistically significant association between library condition and the level of agricultural extension worker (PPL) activity ($\chi^2 = 22.50$; df = 2; $p < 0.05$). Respondents who perceived the library facilities as complete were predominantly associated with high levels of PPL activity, whereas respondents reporting poor library conditions tended to be associated with lower activity levels. These findings indicate that adequate access to information resources may support the implementation of extension activities.

Libraries serve as important sources of technical and non-technical agricultural information, enabling extension workers to update their knowledge and improve the quality of advisory services provided to farmers. The results suggest that information availability is closely associated with extension performance. This finding is consistent with previous studies

emphasizing that access to agricultural information strengthens the effectiveness of extension services and facilitates knowledge dissemination among farmers.

Relationship between Training Facilities and Infrastructure and PPL Activity

The results showed a significant association between training facilities and infrastructure and PPL activity levels ($\chi^2 = 19.58$; df = 2; $p < 0.05$). Respondents reporting complete training facilities were more frequently associated with high levels of extension activity than those reporting inadequate facilities.

Training facilities such as meeting venues, demonstration equipment, learning media, and transportation support are important components of extension service delivery. Adequate infrastructure enables extension workers to conduct training programs more effectively and facilitates interaction with farmer groups. These findings support the view that institutional support and physical resources are important factors associated with extension performance and service quality.

Relationship between Skills Training and PPL Activity

The Chi-square test demonstrated a significant association between skills training and PPL activity levels ($\chi^2 = 20.91$; df = 2; $p < 0.05$). Respondents categorized as receiving frequent skills training were more likely to be associated with high extension activity levels, while those receiving limited training were more frequently associated with lower activity levels.

Continuous professional development is essential for extension workers because agricultural technologies, cultivation methods, and farmer needs continuously evolve. Regular training may enhance communication skills, technical competence, and problem-solving abilities, thereby supporting more active engagement in extension activities. Similar findings have been reported in agricultural extension literature, where extension worker competence is considered a key determinant of extension effectiveness.

Relationship between Incentive Perception and PPL Activity

A statistically significant association was also identified between incentive perception and PPL activity levels ($\chi^2 = 20.91$; df = 2; $p < 0.05$). Respondents with positive perceptions of incentives tended to be associated with higher levels of extension activity. Incentives can contribute to work motivation and encourage extension workers to maintain active engagement with farmer groups. Although this study does not establish a causal relationship, the findings suggest that favorable perceptions regarding incentives are associated with greater participation in extension activities. Previous studies have similarly reported that motivational factors and institutional support contribute to improved extension service performance.

Relationship between PPL Activity and Farmer Group Capability

The analysis further revealed a significant association between PPL activity and farmer group capability ($\chi^2 = 22.86$; df = 2; $p < 0.05$). Farmer groups categorized as having high capability were predominantly associated with high levels of PPL activity, while groups with lower capability tended to be associated with lower levels of extension activity. This finding suggests that active extension services are associated with stronger farmer group performance. Regular interaction between extension workers and farmer groups may facilitate information exchange, encourage participation, strengthen organizational management, and improve farmers' capacity to adopt agricultural innovations. However, the cross-sectional design and Chi-square analysis used in this study only indicate an association and do not provide evidence of a causal effect.

The overall findings indicate that extension facilities, training support, incentive perceptions, and extension worker activity are significantly associated with farmer group capability in Kalipuro District. The results highlight the importance of institutional support systems in strengthening agricultural extension services. Adequate information resources, training opportunities, infrastructure, and motivational support appear to be associated with higher levels of extension activity, which in turn are associated with stronger farmer group

capacity. These findings align with contemporary agricultural extension theories that emphasize the role of human capital, organizational support, and knowledge-sharing mechanisms in rural development. In the context of Kalipuro District, the relatively high level of farmer participation and extension activity may explain the observed associations. Nevertheless, the findings should be interpreted cautiously because the study employed a relatively small sample size and a cross-sectional design. Future research should incorporate larger samples, multiple districts, and multivariate analytical approaches to further examine the factors associated with extension effectiveness and farmer group development.

CONCLUSION

From the results of a study conducted by the Agricultural Extension Center (BPP) in Kalipuro District, examining the relationship between agricultural extension worker activities and facilities and the capacity of farmer groups, the following conclusions can be drawn: Agricultural extension worker activity in Kalipuro District is relatively high. This is due to the attitudes and behavior of agricultural extension workers who have fostered good relationships with their farmer contacts and members. Farmer group capacity in Kalipuro District is relatively high, due to the high level of farmer response in participating in their farmer group activities. Facilities related to the level of agricultural extension worker activity in agricultural extension activities include: a) library condition; b) training facilities and equipment; c) skills training. Meanwhile, the level of agricultural extension worker activity, as seen from d) perception of incentives and e) group capacity, indicates a relationship with PLL activity. Therefore, the relationship between facilities and activities in agricultural extension has a significant impact, as evidenced by the high scores obtained.

SUGGESTION

As the driving force and implementer of extension services in the field, agricultural extension workers should be more intensive in providing extension services to the farmer groups they are mentoring. Agricultural extension activities are crucial for increasing farm productivity. Farmers who participate in agricultural extension activities are expected to benefit from the support provided by the facilities, namely by increasing their knowledge and skills related to agriculture.

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