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# The Role of Agricultural Extension on The Development of Farmers Group (Case Study: Pare Sub-district, Blitar Regency, East Java)

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*Agriculture extension; Agropolitan; Participation; performance; Methods*

**Abstract**

*Agricultural extension is a learning process that designed to improve the skills of agricultural operators, in particular farmers. This study aimed to determine whether agricultural extension activities have a role to play in the development of Agro-politan areas and what factors impact agricultural extension. Descriptive statistical analysis, correlation analysis, and factor analysis were used. Based on descriptive statistical analysis, it can be seen that agricultural extension agents play a role in three subsystems in the Agropolitan Area (input subsystem, process subsystem, and marketing subsystem). Based on the correlation analysis and factor analysis, three factors influenced agricultural extension's success, such as the participation of farmers, the performance of agricultural extensions, and the methods of the extension used.*

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**INTRODUCTION**

The role of extension workers must be improved and empowered, therefore their important role in agricultural development is much greater. The role of agricultural extension workers will improve the quality of farmers nowadays, the benefits must be felt. Because, in addition to providing information, assistants to the agricultural process, extension workers also act as wholesalers for farmers and farmer groups (Mayrowani, 2012). Extension workers sent information from researchers/research institutes to farmers and conveyed the farmers' aspirations to the policy makers. Extension workers have direct contact with farmers or community members (Jordaan, 2014), they knew more about the real problems faced by farmers or community members, so they must have good education and skill including those related to climate change (Olorunfemi et al., 2020).

The extension workers as non-formal education for farmers and their families was a process of community independence. Independence was not patronizing, nor charitable, but required the growth and development of active participation or the participation of all parties who will receive the advantages of extension, especially the farming community itself (Mardikanto, 1993; Sadono, 2008). Extension workers must be competent and experts in agricultural, in addition to being able to communicate effectively with farmers, thus they can encourage interest in learning and must be oriented to the problems faced by farmers (Mardikanto, 1993) and gain economic benefits from agricultural extension (Danso-Abbeam et al., 2018; Kotey et al., 2016).
In farmer groups, extension workers were required to have a role at the national, provincial, regency, sub-district and village levels or local groups (Wang et al., 2020). At the sub-district level the operational task was as extension coordinator, while at the village level and extension groups was also operational with mentoring activities for routine meetings, information delivery through the internet (ICT) (Gow et al., 2020) or directly, mentoring and developing managerial skills, entrepreneurship in agricultural institutions and other agribusiness actors (Mohammadzadeh et al., 2017; Nain et al., 2013). Counseling was conducted in order to provide input and assisted farmers in solving problems in the field (Hailemichael & Haug, 2020) with all members of farmer groups and to increase agricultural production, especially in food crops and horticulture which were mainstay commodities in farming activities (Managanta, 2020; Njura et al., 2020; Nugraha et al., 2019; Raidimi & Kabiti, 2019).

The increasing agricultural production would be better if it was conducted by involving not only one village but also in a rural area (Prayitno et al., 2019). Agropolitan areas based on Law No. 26 of 2007 about Spatial Planning were areas consisted of one or more activity centers in rural areas as agricultural production systems and certain natural resource management which were indicated by functional connection and spatial hierarchies of settlement system units and agribusiness systems (Law No. 26 of 2007 about Spatial Planning, 2007). Agricultural development in Indonesia often faced several problems such as supporting facilities and infrastructure to reduce discrepancy between regions (Nugraha et al., 2020) therefore, agricultural activities and the improvement of rural human resources were conducted by providing agricultural counseling to rural communities.

The planning of agropolitan areas in Kediri Regency has been listed in the Kediri Regency Spatial Planning in the year 2010-2030. The agropolitan area in Kediri Regency has been established in 13 sub-districts which were grouped into 4 agropolitan areas, in which: the Ngawansondat Agropolitan Area, the Pakancupung

Agropolitan Area, the Segobatam Agropolitan Area and the Gampengrejo Agropolitan Area. Based on the RTRW of Kediri Regency in 2010-2030, Pare Sub-district has been designated as the center of agropolitan activities in the Pakancupung Agropolitan Area.

The Agricultural Extension Center in Pare Sub-district was one institution of the Agriculture and Plantation Office Kediri Regency which has the responsibility to organize agricultural and plantation extensions in the Pare Sub-district area. Based on the Pare Agricultural Extension Center Profile 2018, the tasks of the Agricultural Extension Center were to provide facilitation for the preparation of sub-district level extension programs, performed extension activities based on determined programs, provided access to information technology, agricultural production facilities and market opportunities, performed the learning process and facilitated all learning activities and the development of farming models. In addition, based on the data contained in the Agricultural Extension Center Profile 2018 in Pare Sub-district, there were 42 farmer groups spread across all villages in Pare Sub-district, the data showed that most of the farmer groups in Pare Sub-district were beginner to intermediate level classes. Thus, there were still farmer groups that have low dynamics to increase the production of agricultural commodities and their income.

In addition, farmers in Pare Sub-district were still not able to meet the availability of subsidized fertilizers that in accordance with the criteria, such as the proper dose, proper type, proper time and proper method. Based on data from the Agricultural Extension Center Pare Sub-district, there were 52% of farmers who have not been able to fertilize in accordance to the criteria (Introduction survey, 2019). Farmers in Pare Sub-district also have limitations in information, knowledge and ability in taking market opportunities. Marketing has not been performed directly; so that the selling price that received was lower (Introduction Survey, 2019). Besides the problems at the farmer level, the problem at the farmer group level was the low change of the group dynamics. Whereas from 2013 to 2018, there were only 9 farmer groups that experienced dynamics changes, while the other 33 remained the same. The nine farmer groups were Sumber Pancur Farmers Group, Sidomukti, Bahagia Subur, Tani Jaya, Tani Mulyo, Sejahtera I, Langgeng and Budi Luhur (Profile BPP Pare Sub-district, 2018).

The agricultural extension was a learning process for the main actors and agricultural business actors, to make it easier for actors to access market information, technology, capital and other resources as an effort to improve welfare, income and public awareness in preserving environmental functions (Minister of Agriculture Regulation No. 91 /Permentan/OT.140/9/2013 about Guidelines for Performance Evaluation of Agricultural Extension Officers, 2013). The aims of this research were 1) To know the role of Agricultural Extension in Farmer Groups; 2) To know the supporting factors of the agricultural extension program in Pare Sub-district.

## RESEARCH METHOD

The scope area in this research was Pare Sub-district which the center of the Pakancupung Agropolitan area in Kediri Regency. This location was the Pakancupung Agropolitan area, but has not developed as planned. The great potential that owned has not been able to provide welfare to the community.

The data collection method in this research consisted of primary data collection and secondary data collection. The primary data collection method was obtained by interviews and questionnaires, while the secondary data collection was obtained from the relevant institutions. The sampling technique used in this research was proportionate stratified random sampling, while to determine the sample in each group used the Issac & Michael method (Sugiyono, 2012). The population in this research was farmer groups which divided into Beginner Farmers Groups, Advanced Farmers Groups and Intermediate Farmers Groups. Meanwhile, samples were taken from all members of the three types of farmer groups, with a total sample of 2,225 farmers. Based on the method of Isaac & Michael, obtained 328 respondents. The following was the number of samples based on the type of farmer group:

1. Beginner Group Sample = 438/2245 * (328) = 64 farmers
2. Advanced Group Sample = 1257/2245 * (328) = 184 farmers
3. Intermediate Group Sample = 550/2245 * (328) = 80 farmers

The research was conducted from July 2019 to December 2019. While the survey was conducted for 3 months, such as during August, September and October by conducting interviews with farmer families, farmer groups, agricultural extension workers, the Agriculture Office of Blitar Regency, and other parties related to agricultural and agricultural extension programs.

The analysis technique that used in this research was descriptive statistical analysis, correlation analysis and factor analysis. Descriptive statistical analysis aimed to explain the data obtained at the time in collecting data, which was the characteristics of farmer groups which include age, land area, type of commodity and activeness in agricultural extension activities. Correlation analysis aimed to determine the influence level of agricultural extension on farmer groups and the increase in production and income of farmer group members in Pare Sub-district. Factor analysis aimed to determine the obstacle and supporting factors of the agricultural extension program in Pare Sub-district.

The analysis method to determine the role of agricultural extension to farmer groups (group members' activeness in extension activities) used descriptive statistical analysis. This analysis explained how the obtained data related to the involvement of group members in agricultural extension activities that performed in each group. To answer the second research aim, which was to know the supporting factors of the agricultural extension program in Pare Sub-district were performed Correlation Analysis and Factor Analysis.

## RESULT AND DISCUSSION

### The Role of Agricultural Extension to the Farmer Group

### Agricultural Extension Center

The Agricultural Extension Center Pare Sub-district was an institution under the Department of Agriculture and Plantation Kediri Regency. The function of the Agricultural Extension Center in Pare Sub-district was as a meeting place for extension workers, farmers/main actors and business actors to facilitate the implementation of agricultural extension tasks in Pare Sub-district.

The agricultural extension work area in Pare Sub-district consisted of 4 parts, so that there were four agricultural extension officers. The Pare I working area consisted of Sumberbendo Village and Sambirejo Village. The Pare II working area consisted of Sambirejo Village, Darungan Village and Bendo Village. The Pare III working area

consisted of Pelem Village, Tulungrejo Village and Tertek Village, while the Pare IV working area consisted of Gedangsewu Village and Pare Village.

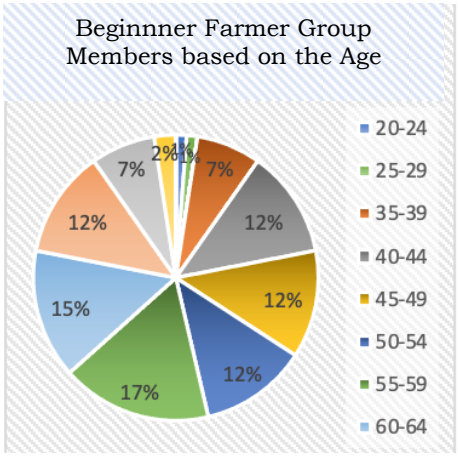
The BPP of Pare Sub-district was equipped with various facilities such as an extension center building, area of demonstration and applied study, green house, library room and prayer room. Agricultural extension programs that have been organized by the Agricultural Extension Center in Pare Sub-district included disease control programs (HDB), pest control programs (WBC), agricultural product technology training programs, karak kitri activity development programs, as well as cultivation education and training programs for students who want to performed field activities in Pare Sub-district.

**The Role of Agricultural Extension**

Farmer group dynamics was a mutual movement performed by members of farmer groups to achieve a common goal in increasing production and income (Suhardiyono, 1990). The dynamics of farmer groups in Pare Sub-district consisted of beginner farmer groups, advanced farmer groups and intermediate farmer groups. The role of agricultural extension workers was conducted by measuring the involvement of farmer group members in extension activities performed by field extension workers.

1. Beginner Farmer Group

   The beginner farmer groups who became research respondents in Pare Sub-district were the Pasir Subur Farmer Group I, Pasir Subur II, Sido Makmur, Harapan Jaya, Tani Maju, Sejahtera I, Budi Luhur and Tani Bahagia Group.

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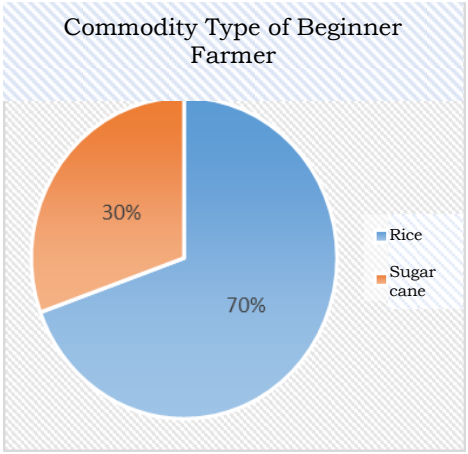


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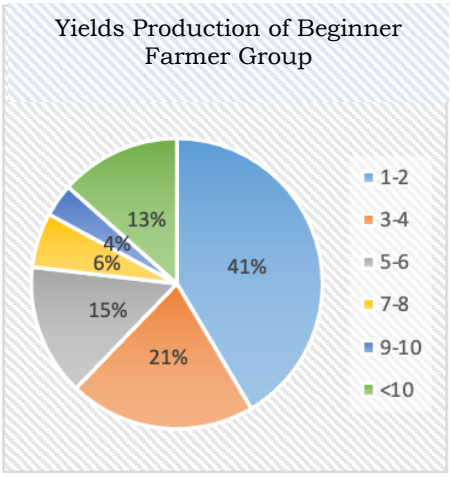


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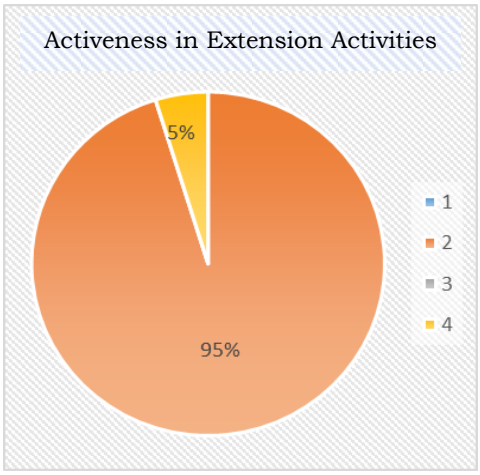


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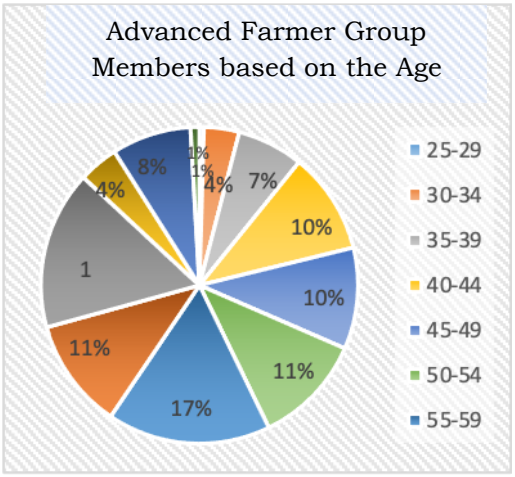
**Picture 1. (a) Beginner Farmer Group Age (b) Commodity Type of Beginner Farmer Group (c) Total Production of Beginner Farmer Group (d) Activeness of Beginner Farmer Group**

The average age of the beginner farmer group in Pare Sub-district was 54 years, while the median age was 56 years old or classified as old farmers. Most of the farmers were aged between 55-59 years, which was 17% or 14 people. The commodities planted by farmers who were members of the beginner farmer group were rice and sugar cane, 57 farmers (70%) planted rice, and 25 farmers (30%) planted sugar cane. The area of agricultural land owned by members of farmer groups in Pare Sub-district varied from 0.14 hectares to 2 hectares with an average of 0.6 hectares, based on the calculation can be known that most of the farmers' yields production was 1-2 ton of rice of 41% with a land area of 0.14 hectares to 0.3 hectares, 3 members (5%) who participated in 4 extension activities in 1 harvest season, and 79 members (95%) only participated in 2 agricultural extension activities. This means that for beginner farmer groups, the majority of members (95%) participated in 2 agricultural extension activities.

2. Advanced Farmer Group

The advanced farmer groups who became respondents during the survey in Pare Sub-district consisted of the Pasir Subur, Sejahtera, Mukti Sejati, Twang Sari, Randu Alas, Lestari, Asri, Suka Maju, Subur, Tani Jaya, Tani Makmur I, Tani Maju I, Sari Bumi, Dewi Sri, Subur Makmur, Langgeng, Sido Maju and Sido Makmur Farmers Group.

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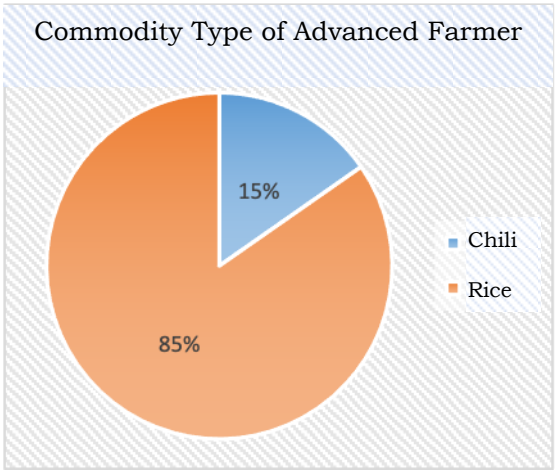


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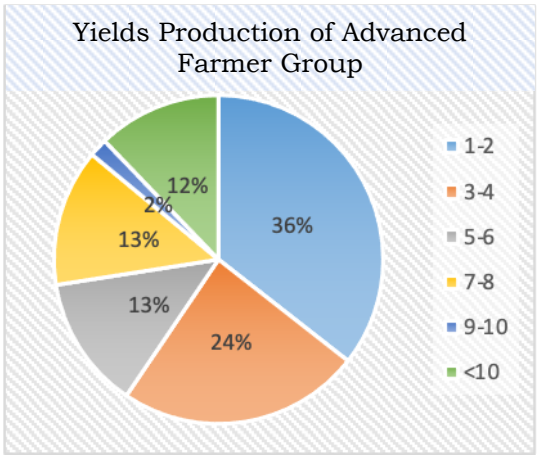


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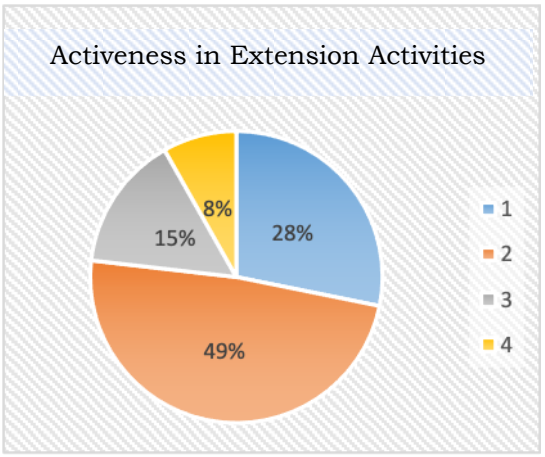


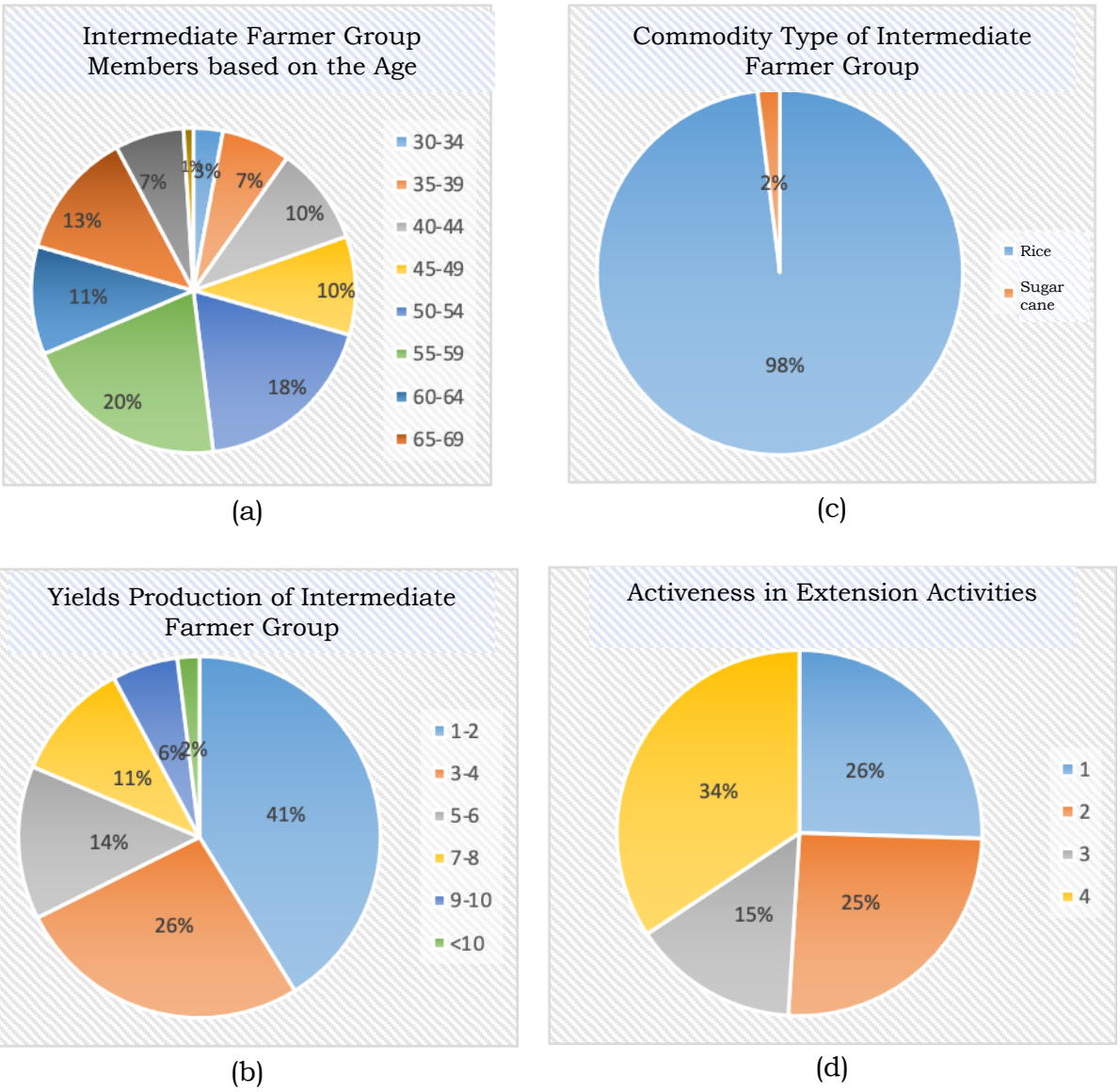

(d)

**Picture 2. (a) Advanced Farmer Group Age (b) Commodity Type of Advanced Farmer Group (c) Total Production of Advanced Farmer Group (d) Activeness of Advanced Farmer Group**

The average age of the advanced farmer group in Pare Sub-district was 55 years, while the median age was 56 years old or was classified as an old farmer. Most of the farmers were aged between 55-59 years, which was 17% or 37 people, while the least number of farmers were in the age group of 25-29 years, which was 1 person. The commodities planted by farmers who were members of advanced farmer groups were rice and chili. There were 188 farmers (85%) who planted rice, and 25 farmers (15%) who planted chilies. The area of agricultural land owned by members of advanced farmer groups in Pare Sub-district varied from 0.07 hectares to 2 hectares with an average of 0.68 hectares. Based on the survey results, it can be seen that most of the farmers' crops production was 1-2 tons rice of 36% with a land area of 0.14 hectares to 0.3 hectares. Based on the activeness in participating extension activities, there were 62 farmers (28%) who participated in 1 extension activity in 1 harvest season, 107 farmers (49%) participated 2 times, 33 farmers (15%) attended 3 extension activities, and 18 farmers (8%) attended 4 times.

3. Intermediate Farmer Group

Intermediate Farmer group that became survey repondents in Pare Sub-district consisted of Sumber Pancur, Sidomukti, Rukun Mulyo, Margomulyo, Bahagia, Suka Usaha, Tani Rukun, tani Maju II, tani Mulyo and Karya Bakti Farmer Group. The total of farmer group's members that became respondents in this research as follows




**Picture 3. (a) Intermediate Farmer Group Age (b) Commodity Type of Intermediate Farmer Group (c) Total Production of Intermediate Farmer Group (d) Activeness of Intermediate Farmer Group**

The average age of the intermediate farmer group in Pare Sub-district was 54 years, while the median age was 55 years old or classified as old farmers, 98% of farmers planted rice and 2 farmers planted sugar cane. The commodities planted by farmers who were members of the intermediate farmer group were rice and sugar cane, it can be seen that there were 100 farmers (98%) who planted rice, and 2 farmers (2%) who planted sugar cane. The area of agricultural land owned by members of the intermediate farmer group in Pare Sub-district varied from 0.07 hectares to 2 hectares with an average of 0.52 hectares, based on the survey results

it can be seen that most of the farmers' production was 1-2 tons of rice by 41% with a land area of 0.14 hectares to 0.3 hectares. Based on the Activeness in participating extension activities in 1 harvest season, it can be seen that 26 members (26%) participated in 1 extension activity, 26 members (25%) participated in 2 extension activities, 15 members (15%) participated in 3 extension activities, and 35 members (34%) participated in 4 extension activities.

Based on farmer involvement analysis in agricultural extension, it can be seen that members of farmer groups participated more in extension activities than advanced farmer groups and beginner farmer groups. So that, it directly affected the production that obtained by the dynamics level of farmer groups. The higher the farmer groups the more members' activeness in agricultural extension activities.

**Supporting Factor in Agricultural Extension Program Development**

**Pearson Correlation Analysis**

The calculation of correlation analysis was conducted using IDM SPSS 23, and consisted of two analyzes, such as correlation analysis of extension activities (Y) with production results (X) and correlation analysis of production (X) and income (Y). The following were the analysis results of each farmer group dynamics.

The effect of production results on the farmers' income in Pare Sub-district based on the analysis results showed a value of 0.996 for beginner farmer groups and 0.997 for advanced and intermediate farmer groups. This figure means that the correlation between the commodity production results and the amount of income earned by farmers has a unidirectional relation, so that the higher the production yield, the more income will be obtained.

**Factor Analysis**

Factor analysis in this research used five independent variables, such as farmer participation, extension program, extension worker performance, extension method and infrastructure. There were seven outputs from the calculation of factor analysis, starting from the KMO value and Barlett's test, the value of anti-images matrices, the value of communalities, and the total variance explained.

This analysis assessment was divided into two stages, such as determining the Barlett Test of Sphericity and determining the Keiser-Meyers-Oklin Measure of Sampling Adequacy.

1. Barlett Test of Sphericity used to find if that variable has a significance correlation.
2. Keiser-Meyers-Oklin Measure of Sampling Adequacy (KMO-MSA) used to measure the sample adequacy by comparing the observed correlation coefficient and the partial correlation coefficient.

Below was the calculation result of KMO and Barlett's Test by using IDM SPSS 23 application.

**Table 1. KMO and Barlett's Test Value**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | ,562 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1175,503 |
| | df | 10 |
| | Sig. | ,000 |

The results of the above calculation indicated that the factor KMO value in this research was 0.562. Based on the existing guidelines, factor analysis can be conducted when the KMO value was between 0.5 and 1, therefore the analysis can be continued.

Based on the analysis of anti-image matrices, it was obtained which variables were suitable for use in factor analysis, there was letter (a) which means a sign for the MSA (Measures of Sampling Adequacy) value, so it can be seen that the MSA value in each variable was farmer participation 0.502, the performance of agricultural extension workers 0.580, infrastructure 0.529, extension methods 0.580, and extension programs 0.535. This value indicated that the MSA value for all variables can meet the requirements because it was more than 0.50.

The next result was communalities analysis. The communalities analysis aimed to determine whether the values of the variables that studied were able to explain the factors or not. The variable was considered capable of explaining the factor if the extraction value was more than 0.50. Based on the analysis results, it can be seen that the extraction value of each variable was more than 0.50, such as farmer participation 0.967, extension worker performance 0.983, infrastructure 0.580, extension method 0.986, and extension program 0.972, so that all variables can be used to explain factors.

Table 3 showed the value of each analyzed variable. Based on the table above, it can be seen that the total of all variables was 1.982+1.065+1.003+0.923+0.28= 5 variables, but in the extraction sums value there were total 3 factors that can be formed, such as 1,982, 1,065 and 1,003.

**Table 2. Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 1,982 | 39,638 | 39,638 | 1,982 | 39,638 | 39,638 |
| 2 | 1,065 | 21,303 | 60,941 | 1,065 | 21,303 | 60,941 |
| 3 | 1,003 | 20,056 | 80,997 | 1,003 | 20,056 | 80,997 |
| 4 | ,923 | 18,451 | 99,448 | | | |
| 5 | ,028 | ,552 | 100,000 | | | |

Extraction Method: Principal Component Analysis.

The eigevalues 4 and 5 were not calculated because they were less than 1. This means that the model can be explained of 80% by using 3 variables, such as farmer participation, extension performance and extension methods. The correlation value

for each component was 0,996, and 0,995 or more than 0.5, so that the three factors were feasible to summarize the analyzed five variables.

Based on the analysis results above, it can be seen that the factors that influence success were:

1. Farmers' participation. This was in line with research (Sadono, 2008) that the role of farmers (farmer participation) was very important in the success of agricultural extension. Because farmers as actors and implementers in the field, played a very important role in the success of extension conducted by field extension workers.
2. Extension Performance. The research results (Njura et al., 2020) also showed that the performance of extension workers as the spearhead in the field played a major role in the success of extension. To increase the farmer groups from beginner farmer groups to intermediate farmer groups, the role of agricultural extension workers was very big.
3. Extension Methods. In line with research (Managanta, 2020; Njura et al., 2020) the selection of the proper method in the implementation of extension played a very important role in the success of the program. It can also be found in Pare Sub-district, that the proper extension method was a very big factor. The success of the agricultural sector and the development of farmer groups were strongly influenced by the extension methods used by agricultural extension workers.

**CONCLUSION**

The changes in the agricultural land function in Pare Sub-district to non-rice agricultural land such as housing and commercial and services caused the number of farmer groups in Pare Sub-district was also decreased, this caused a change in the function of the agropolitan area in Pare Sub-district.

In general, the role of agricultural extension in the development of agropolitan areas can be seen from the increase in production on beginner farmer groups, advanced farmer groups and intermediate farmer groups. The effect of production results on farmers' income based on the analysis results showed that the advanced and intermediate farmer groups were greater than the beginner farmer groups. Agropolitan areas both in their subsystems (input, process, and marketing sub-systems) really need the role of agricultural extension workers. Because extension workers can increase farmers' knowledge in the selection of certified superior seeds in the input subsystem, how to handle pests and diseases in the process subsystem, reducing the role of wholesaler included in the marketing subsystem.

Based on the results of factor analysis, it can be seen that there were 3 factors that can represent the variables that have been surveyed, such as the farmer participation variable, the performance of agricultural extension workers, extension programs and extension methods. Factor 1 included the performance variable of extension workers, factor 2 included extension methods, and factor 3 included farmers' participation. The development directions to increase the participation of the community or farmers in extension activities; develop processing production facilities and research land facilities to support the function of agropolitan area in Pare Sub-district as a center for industry as well as commercial and services.

**RECOMMENDATION**

This research has not conducted depth discussion in the role of extension on farmers' income and motivation in maintaining agricultural land. So that further research can be performed using this approach.

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