The effect of field agricultural extension roles on the capacity level of rice farmers in Pesawaran Regency, Lampung, Indonesia

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ABSTRACT

This study explores the effect of field agricultural extension on rice farmers' capacity levels and the factors that influence farmers' capacity. This research was conducted in Negeri Katon District in October–November 2021. The respondents were 62 heads of farmer groups in the district. This study used a survey method with a quantitative descriptive approach. The results showed that the effect of field agricultural extension on farmers' capacity levels could be categorized as moderate, and the overall level of farmer capacity could be classified in the medium category. This is an interesting finding considering the daily activities of farmers consist of farming but their capacity is not yet high. This finding shows that farmers still need agricultural extension agents (AEAs) but the number of AEAs is still limited, meaning that extension activities do not run optimally. The factors that influence the level of farmer capacity are age, level of formal education, length of farming experience, land size, number of dependents, and the role of AEAs. The number and role of AEAs affect the capacity of extension workers; therefore, the number of AEAs must be increased.

Contribution/Originality: Despite farmers' daily activities consisting of farming, their capacity is not high, meaning that farmers need agricultural extension agents (AEAs); however, the number of AEAs is limited, so extension activities do not run optimally.

1. INTRODUCTION

The COVID-19 pandemic greatly affected all business sectors, both micro and macro; more than half of them were significantly affected, and many businesses even had to close. Unlike the business world, however, the agricultural sector continues to grow; therefore, the growth of the agricultural sector is very important (Dunggio, Abdullah, & Neswati, 2021). This was particularly evident during the pandemic; in the second quarter of 2020, the performance of the agricultural sector grew positively, namely by 2.19 percent, significantly better than the growth of the national economic sector, which was recorded at minus 5.32 percent. The agricultural sector is thus key to saving the economic

sector during and in the aftermath of the pandemic (Wuryandani, 2020). The government seeks to continuously improve the welfare of the community through agricultural development by increasing farmers' capacity. Expanding the function of extension agents is one strategy to improve farmers' capabilities. Farmers are encouraged to take part in initiatives to try to boost their capacity. Rice production productivity is predicted to be impacted by increasing farmers' capacity. Moreover, farmers' ability to adapt to climate change may require them to further expand their capacity by adopting the newest innovations to assist their farming activities and boost productivity (Listiana et al., 2021) and incorporating internet usage in agricultural extension activities (Listiana, Sumardjo, Dwi, Prabowo, & Ariyanto, 2019a).

In Indonesia, agricultural development aims to fulfill the food needs of the community. The fulfillment of food needs is strongly dependent on changes in behavior in the community itself; if there is no change and awareness within the community, it becomes difficult to meet food needs and achieve a more prosperous community. Changes in community behavior, especially in the agricultural sector, are closely related to the role of field agricultural extension agents (AEAs), who can guide the main actors and business actors to achieve a change in knowledge, attitudes, and skills (Alyaarbi, Camkin, Neto, & Wegener, 2019; Kreft, Huber, Wuepper, & Finger, 2021; Listiana, Efendi, Mutolib, & Rahmat, 2019b; Listiana, Sumardjo, Dwi, & Prabowo, 2018). Changes in farmers' behavior can occur naturally, but the changes will be very slow to eventuate; to accelerate the process of increasing farmers' capacity, an outside party (extension) is needed.

The involvement of extension workers is thus required to hasten the technological adaptation process. Adjustments to planting time, the adoption of drought-tolerant varieties, soaking, salinity, and the development of water management technologies are among the adaptation strategies that farmers may apply (Fita, Rodríguez Burruezo, Boscaiu Neagu, Prohens Tomás, & Vicente Meana, 2015; Trenberth et al., 2014). The government's current aim is for each village to have one extension worker to support farmers' capacity-building in accordance with Law No. 19 of 2013 concerning the Protection and Empowerment of Farmers. Government efforts to ensure each village has an instructor are still difficult to realize (Owolabi & Yekinni, 2022). This is due to the decreasing number of extension workers because many extension workers have retired, and the recruitment of extension workers is decreasing (Sabir, Sugiyanto, Sukesi, & Yuliati, 2019). Overall, only 89.13 percent of the villages in Indonesia have an agricultural extension worker.

In Lampung Province, 83.91 percent of villages have an extension worker. Pesawaran Regency is a regency in Lampung Province, the economy of which relies on agricultural activities. These agricultural activities are supported by agricultural extension workers (Al-Zahrani et al., 2021). In Pesawaran Regency, only 42.36 percent of villages have an extension worker. The limited number of AEAs in Negeri Katon District, in particular, causes the role of the AEA to be performed less than optimally, so farmers' capacity is still not good. Meanwhile, farmers have a strong need and enthusiasm for joining farmer groups. This requires a farming extension strategy that is in line with their needs and problems. Therefore, this research aims to explore the effect of field agricultural expansion on rice farmers' capacity level and the factors that influence farmers' capacity.

2. RESEARCH METHODS

2.1. Research Site and Time

This research was carried out in Negeri Katon District, Pesawaran Regency, in October-November 2021. The site was chosen because the district of Negeri Katon has a large number of farmers who show community enthusiasm to form farmer groups. The method used in this study was a survey method with a quantitative descriptive approach. The quantitative descriptive method describes the condition of the object under study using quantitative data. Quantitative research demands the use of numbers, starting from data collection through the interpretation of the data and the presentation of results (Siyoto & Sodik, 2015). The presentation of results usually takes the form of images, tables, graphs, or other displays that increase reader absorption and facilitate the delivery of information. Quantitative research emphasizes the analysis of numerical data using appropriate statistical methods.

The population in this study includes the heads of farmer groups in Negeri Katon District, Pesawaran Regency. There are 319 heads of farmer groups in Negeri Katon District. The appropriate sample number was determined using the formula of Sugiarto (2003):

$$n = \frac{NZ^2S2}{Nd^2 + Z^2S2}$$

Where:
n = Number of samples.
N = Total population.
Z = Confidence level (95% = 0.95).
S2 = Sample variance (5% = 0.05).
D = Degree of deviation (5% = 0.05).

The appropriate sample number obtained was 62 respondents. The respondents were spread throughout all the villages in Negeri Katon District. Sampling in this study was carried out by simple random sampling, namely sampling based on the comparison of each population of the sample unit. This was done by giving each member of the population the same opportunity to become a member of the sample.

2.2. Data Collection

This study used a quantitative descriptive survey method. Primary data were collected through interviews with 62 respondents and direct observation of members of farmer groups. The secondary data used in this study were

obtained from written sources such as books, journals, articles, general data on village potential, and data from other relevant agencies. The first and second objectives of this research used descriptive quantitative techniques, while the third objective used multiple linear regression analysis techniques. Some of the steps taken to perform quantitative descriptive statistical analysis were:

a. Presenting data in tabulated form.
b. Determining the value of each respondent, with class intervals obtained using the following equation:

$$\text{Class interval} = \frac{\text{max-value min}}{\text{number of classes}}$$

In addition, the analysis also used multiple linear regression with the formula:

$$Y = a + b_1X_{1.1} + b_2X_{1.2} + b_3X_{1.3} + b_4X_{1.4} + B_5X_{1.5} + B_6X_2 + e$$

Where:
Y = Related variable.
a = Constant.
b1,b2,b3,b4,b5,b6 = Coefficient
X1.1 = Age.
X1.2 = Formal education.
X1.3 = Length of farming.
X1.4 = Land areas.
X1.5 = Number of dependents.
X2 = Role of AEA.
e = Error.

3. RESULTS AND DISCUSSION

3.1. Description of Area of Research

Pesawaran Regency is located in Lampung Province with coordinates 5.120–5.840 south latitude and 104.920–105.340 east longitude. Negeri Katon District is located in the north of the regency and has a capital city in the village of Negeri Katon and an area of 152.69 km². Negeri Katon District consists of 19 villages with a population of around 68,844 people, of whom 35,384 are male and 33,460 female.

Administratively, Negeri Katon District borders 4 other areas: Tegineneng District, Gedong Tataan District, Gadingrejo District, and Natar District. The agricultural land in Negeri Katon District consists of dry land in the form of fields, which are mostly planted with *palawija* (non-staple food crops), horticulture, and plantation crops, as well as wetlands.

3.2. Characteristics of the Respondents

The results of this study indicate that about 95.16 percent of the respondents were productive farmers aged between 15 and 64 years, with an average age of 49 years. Farmers of productive age have the potential physical condition to quickly accept and implement new technological innovations and to support dynamic and creative farming activities. Farmers of a productive age have a high ability to perform productive farming work. One of the criteria that determines a person's level of labor efficiency in building his farming business is his age. Farmers who are relatively young tend to be stronger, more nimble, more amenable to new inventions, and more receptive to their surroundings (Soekartawi, 2001). This is consistent with the findings of Murniati, Widjaya, Adawiyah, and Listiana (2020) in their study on cassava farmers. Given that the majority of research participants are still young (42 years old) and quite productive, there is still plenty of room for them to do more fruitful business. Age has an indirect impact on a person's physical fitness, which is necessary to operate a farm.

The formal education level of the majority of respondents in Negeri Katon District was in the medium category. Specifically, 22.58 percent of respondents had an elementary education, and only 3 respondents, or 4.84 percent, had a higher level of education. The level of formal education will influence the community, especially farmers who aim to increase their farming productivity.

The duration of farming indicates the length of time respondents had farmed rice. Of the respondents, 50.00 percent had a farming duration ranging from 10 to 23 years. The respondents' length of rice farming, and thus rice farming experience, differed. Experience makes it easier for a person to adjust to changes that occur. The longer a person has performed a job, the more difficult it can be to change their mindset and business patterns. Adopting new technology can also be difficult because the farmers are comfortable with their current conditions. However, when receiving information related to their business, it becomes easier to accept. On the other hand, experience can also accelerate the acceptance of innovations, new technologies, and information, because innovative business actors want to continually change and advance their business to continue to grow.

The land area of most of the respondents' farms in Negeri Katon District was in the medium category, with 40.32 percent. Only 24.20 percent of farmers owned large areas of land; the rest had small farms. This shows that rice farmers in Negeri Katon are more likely to have small farms of less than one hectare. Rice farmers' land area is one of the factors that influence their income. Villagers whose main activity is farming depend on their land for a living. Therefore, the area of land owned is an indicator of the amount of income received. If the farmer's land is large, the income of the farmer will also be large, and if the area of land used is small or narrow, the income obtained by the farmer will also be small because only a small amount of rice can be planted (Isfrizal & Rahman, 2018).

The number of dependents in the household is the number of family members who are dependents of the head of the family, including his wife, children, and other people who live in the same house. In line with the necessities of life, the more family members there are in the household, the greater the needs that must be met. In most rice farming families, the number of dependents ranged from 1 to 6, with an average of 3 dependents per family. Most of the rice farming families had a moderate number of dependents, namely 39 respondents, or 62.90 percent, had an average of 3 dependents. The remaining 37.10 percent of respondents had either low (25.81%) or high (11.29%) levels of family responsibility. The more dependents there are in the family, the greater the costs associated with meeting the needs of daily life.

3.3. The Role of Field Agricultural Extension Agents

The role of the AEA is to help farmers solve the problems they face. The agent or instructor acts as a liaison between farmers and practitioners. Professional, creative, and innovative agricultural extension workers are needed to produce quality human resources in agriculture. The role of the AEA in this research is that of a farmer mentor who provides guidance to farmers in terms of farming activities. The distribution of the AEAs' supervisory roles is shown in Table 1.

Table 1. Distribution of the roles of agricultural extension agents in Negeri Katon District.

Field agricultural extension	Score	Classification	Respondents (Persons)	%
Advisor	12-27	Low	4	6
	28-44	Medium	57	92
	45-60	High	1	2
Organizer	8-18	Low	0	0.00
	19-29	Medium	4	6.45
	30-40	High	58	93.55
Technician	10-23	Low	0	0.00
	24-36	Medium	24	38.71
	37-50	High	38	61.29
Consultant	7-16	Low	12	19.35
	17-26	Medium	18	29.03
	27-35	High	31	51.61
Dynamist	10-23	Low	0	0.00
	24-37	Medium	24	38.71
	38-50	High	38	61.29

Table 1 shows that most farmers, 92 percent, rate agricultural extension workers as advisors as belonging to the medium classification. The role of the agent as an advisor is judged by several indicators; the advisor's role is apparent from the frequency of visits, guiding ideas or suggestions, guidance on cultivation techniques, and direction in obtaining capital. The situation in the field during the COVID-19 pandemic was such that extension workers only made one visit a month, and some made as little as one visit every three months, whereas usually and ideally, extension workers can visit farmer groups once every two weeks. This means that farmers sometimes held meetings to discuss the problems and needs that arose in independent farming. After that, the head of the farmer group contacted the AEA to get suggestions and solutions related to the problems and needs the farmers faced.

Concerning the guiding process, the farmers considered that extension workers played an important role in providing information or suggestions in response to farmers' complaints or problems. Extension agents play a smaller role in providing direction to obtain capital assistance in the form of funds. However, they provide easy access to farming inputs such as fertilizers, seeds, and pesticides. The role of the AEA as an advisor includes a strong commitment to helping farmers solve appropriate cultivation problems (Girma & Kuma, 2022). An extension worker must know the farming system well, sympathize with farmers' lives, and support the decisions made by farmers both in theory and practice. Extension workers must be able to provide practical demonstrations of methods of plant cultivation and help farmers locate or use appropriate agricultural production facilities and equipment.

The results showed that 93.55 percent of farmers considered the role of the AEA as an organizer to be categorized as high; this was based on extension workers assisting farmers in creating farmer groups, facilitating group meetings and assisting in the preparation of farmers' organization needs (FON) and farmers' organization basic needs (FOBN). The purpose of the preparation of the FOBN is to assist the main agricultural actors in planning the provision of subsidized fertilizers according to standards. The AEA's role as an organizer has to do with their efforts to help farmer groups advance and develop.

Table 1 shows that 61.29 percent of farmers assessed the AEA's role as a technician in the high category. This role of the AEA is apparent from their skills in conducting technical demonstrations and training farmers in new crop cultivation techniques. Based on this finding, it appears the assistance with rice cultivation techniques has been going well. Extension workers provide farmers with knowledge about soil cultivation, seed maintenance, fertilization, and correct harvesting techniques.

The role of the AEA as a technician is related to the extension worker's ability to support farmers with the cultivation of crops. Every AEA needs to have a strong understanding of agriculture and good technical skills. When extension workers are a reliable source of information for farmers, they help farmers increase productivity (Antwi-

Agyei & Stringer, 2021). The abilities that farmers gain from extension workers can help farmers to apply new innovations obtained from extension workers (Sawitri, Amanah, Saleh, & Hubeis, 2020).

As a consultant, the extension worker assists farmers in solving the problems they experience and provides alternative solutions and advice if farmers experience problems when carrying out agricultural activities. The distribution of the AEA's role as a consultant is shown in Table 1. Table 1 shows that 51.61 percent of farmers rated the extension worker's role as a consultant in a high category. This role is apparent when extension workers help farmers solve farming problems by providing various solutions and by inviting farmers to discuss. Extension workers have been very good at providing advice, especially about controlling pests and diseases. However, this control is still chemical in nature, and it is still rare for farmers to use biological and vegetable pesticides because farmers like instant results. This is why farmers' use of biological pesticides is still low.

Extension agents as dynamists can serve as facilitators to advance farmer group initiatives through the implementation of various ideas, both internal and external. The distribution of extension agents as dynamists in the Negeri Katon District is shown in Table 1. Table 1 shows that 61.29 percent of farmers assess the role of the AEA as a dynamist as high. Features of the AEA's role as a dynamist include the ability of the extension agent to create a conducive group climate and group cohesiveness, as well as group structure, goals, and cooperation. Extension workers create group cohesiveness by continuously providing motivation and guidance to achieve group and individual goals.

3.4. Capacity of Farmers

The development of farmers' livelihoods is always related to the capabilities that exist within them and the external influences of their environment. Farmer capacity comprises the abilities, potential, and behaviors possessed by farmers in carrying out their farming. The distribution of farmer capacity in Negeri Katon District is shown in Table 2.

Table 2. Distribution of farmer capacity.

Score	Classification	Respondents	Percentage (%)
49-114	Low	4	6.45
115-180	Medium	54	87.10
181-245	High	4	6.45
Amount		62	100.00
Average: 169.34 (High)			

Table 2 shows that the level of farmer capacity is categorized as medium, with a percentage of 87.10 percent. The level of farmer capacity is judged using several indicators, namely managerial ability, ability to improve farming, cooperation with other parties, and climate adaptability.

Table 3. Results of the analysis of the influence of individual characteristics on rice farmers' capacity level.

Variable	Coefficient	Significance
Constant (C)	35,412	0.034
Age (X1.1)	0.908	0.043
Formal education (X1.2)	0.781	0.001
Length of farming (X1.3)	0.243	0.028
Land areas (X1.4)	-0.013	0.048
Number of dependents (X1.5)	-0.132	0.037
Role of AEA (X2)	0.234	0.018
F count	412,359	0
R-squared	0.547	
Adjusted R-squared	0.465	

3.5. The Influence of Individual Characteristics and AEA Role on Rice Farmers' Capacity Level in Negeri Katon District, Pesawaran Regency

Table 3 shows the results of using multiple linear regression to test the effect of individual characteristics and the AEA role on the capacity level of rice farmers in Negeri Katon District, Pesawaran Regency. The results of the regression show that the F count is 412,359 with a significance value of 0.000. If the significance value <0.05, the independent variable simultaneously affects the dependent variable. Therefore, it is clear that six sub-variables simultaneously affect the level of farmer capacity. From Table 3, it can be seen that the value of R-squared is 0.547. This means that the six independent variables explain 54.7 percent of the variance in the farmers' capacity.

Based on the data gathered from the field, the farmers' capacity can be influenced by age; 95.16 percent of respondent rice farmers in Negeri Katon District were of productive age. Farmers of productive age have the potential physical ability to quickly accept and implement new technological innovations and to support productive farming activities (Guo, Wen, & Zhu, 2015; Seok, Moon, Kim, & Reed, 2018). The number of respondents who were of productive age shows that there is still interest in farming (Ntshangase, Muroyiwa, & Sibanda, 2018).

The capacity of farmers is also influenced by their level of formal education. The higher the education of farmers, the higher their chances of increasing farm productivity. Rice productivity is also closely related to the amount of farming experience, which differs according to the duration of the rice farming activities carried out by the respondents.

Rice productivity is also influenced by land area. In addition, the role played by field agricultural extension workers is also very influential in increasing rice productivity.

4. CONCLUSION

The role of field agricultural extension workers has been shown to be influential. Most of the respondent farmers considered the level of farmer capacity to be in the medium category. This is because there are still many farmers who do not cooperate with marketing agencies, so many farmers sell their crops to middlemen. Factors that affect farmer capacity include age, level of formal education, length of farming experience, land area, number of dependents, and the role played by the AEA. This is an interesting finding; although farmers' daily activities consist of farming, their capacity is not yet high. This shows that farmers are still strongly dependent on AEAs; however, the number of AEAs is limited, so extension activities do not run optimally. The number of AEAs is limited, but because the role of the AEA affects farmer capacity, the number of AEAs must be increased.

Farmer capacity also lags because farmers fail to cooperate with marketing agencies. Many farmers sell their crops directly to middlemen. Factors that affect farmer capacity include age, level of formal education, length of farming experience, land area, number of dependents, and the role played by the AEA.

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