

Farmer Behavior on Productivity of Rice Farming in Indonesia (Case Study Local Farmers in Southeast Minahasa Regency, North Sulawesi Province, and Java Transmigrant Farmers in Central Maluku Regency, Maluku Province)

Olvie Liesje Suzana Benu

Lecturer of Agriculture Faculty, Sam Ratulangi University – Manado
University of Sam Ratulangi, Kota Manado, Sulawesi Utara – 95115, Indonesia

August Ernst Pattiselanno

Lecturer of Agriculture Faculty, Pattimura University - Ambon
University of Pattimura. JL Ir. M. Putuhena, Poka, Kota Ambon, Maluku 97234, Indonesia

Harry Fadly Umamit

Student at Study Program of Demographic Science, Postgraduate School,
University of Gajah Mada, Kota Yogyakarta, Yogyakarta, 55281, Indonesia



Abstract — The objective of research is to analyze farmer behavior on productivity of rice farming and to find out factors influencing this relationship. Two places are selected as research location. One is Southeast Minahasa Regency in North Sulawesi Province, and the other is Central Maluku Regency in Maluku Province. Method of research is survey supported with questionnaire and depth interview. Analysis technique includes quantitative descriptive and qualitative descriptive analyses. Result of research indicates that farmer behavior on productivity of rice farming is different in two provinces observed. However, in general, the behavior of farmer in these two provinces is directing toward increasing productivity of their farming. Rice productivity of local farmer in North Sulawesi has reached two folds than that of Java transmigrant farmer in Maluku Province.

Keywords — Farmer Behavior; Farming Productivity; Rice; Transmigrant Farmer; Local Farmer.

I. INTRODUCTION

A. BACKGROUND

Agriculture sector plays strategic roles to improve national development. These roles are not only related with economic growth but also with distribution of development outcome. For economic growth, strategic roles played by agriculture sector include being provider of food for Indonesia people, being producer of national foreign exchange through export, being provider of raw material for industry, improving job and

work opportunities, increasing gross domestic income, eradicating poverty, and improving the capacity of agriculture human resource through agriculture extension service (Soetrisno, 2002). All these roles could be achieved by increasing agriculture productivity.

Paul (1978) said that productivity is about how to produce or improve the output of goods and services as high as possible by using resources in efficient way. Productivity is also said as a ratio of output to input (Sedarmayanti, 2001). Consistent with these statements, Greeberg in Yuniarsih

(2009:157) describes productivity as the ratio of expense total at certain time to revenue total at certain period. This definition signifies the fact that high productivity is highly related to the application of agriculture technology by farmers. Therefore, farmers must be educated through agriculture extension service to change their behavior (concerning with their knowledge, attitude and skill).

Indirect communication is conducted where extension officers are not necessary to create interface encounter with targets, but the meeting can be held only by sending messages through electronic media. Method and technique of communication are varying, and this variety has produced positive impact on audiences due to some reasons, such as: the communication is voluntary, thus reassuring those who abstain; it reduces boredom on audiences; the communication device can be adjusted to respect adult participants; participants' desire and experience can be clearly understood and thus, be quickly attended; and problem is easily discussed and solution would be identified fast. Extension schedule can also be made flexible to give chance for all community members to attend.

Extension is an education process which is aimed to change the behavior of targets (in this case, farmers and their families). Behavior of certain person is determined by knowledge, attitude and skill. The change of behavioral aspect of farmers is directing toward improving their farming comparative quality. The change of farmer behavior expected by agriculture extension service is moving slow, and this is caused by some conditions, such as: (1) farmer knowledge is still low; (2) extension officers' recommendations are only acceptable and applicable when farmers get clear description about benefits they can get. According to Van de Ban (1999), some stages must be passed before understanding a new thing, such as: *awareness, interest, evaluation, trial, and adoption*.

Adoption of innovation, especially related with rice productivity, would fulfill the expectation if the system and media of communication are available and operationally good. Communication media used by village farmers involves several types, including interpersonal communication (across individual), group communication, and mass communication. Any decisions to adopt or to reject innovative technology are determined by the perceived benefit, mostly related with the increase of productivity and income, and also influenced by the utilization of information derived from communication.

Mass media are used as communication channel because it facilitates dissemination of farming-related messages in fast and extensive ways. Meanwhile, interpersonal and group communication channels are conducted to create deep interaction between information source and farmer. Adoption of innovation describes a condition where farmer behavior is supportive to the productivity of their farming. Ruwaida & Krisnawati (2015) have found that adoption of innovation is possibly the most ultimate goal because it involves the highest level of knowledge among farmers about technology, but this goal still does not determine the productivity level of farming.

B. FORMULATION OF PROBLEM

A scientific research is then conducted to review farmer behavior that determines productivity of their farming. Preliminary data are farming potential, especially for rice commodity, in Southeast Minahasa Regency in North Sulawesi Province. In 2016, rice harvest was counted for 8,894 hectares with production level of 35,576 tons. In other words, the level of productivity was 4 tons/ha. Number of patriarch in farmer household was 6,205 local farmers (Southeast Minahasa in Numbers on Period 2016). At same year, in Central Maluku Regency, the extent of rice harvest was reaching 9,265 hectares with production of 18,530 tons. Based on these numbers, it can be said that productivity level has attained for 2 ton/ha. Number of patriarch in farmer household was 4,886 farmers who were mostly transmigrant farmer from Java (Central Maluku in Numbers on Period 2016). National productivity has reached 5-6 tons per hectare (Ministry of Agriculture, 2016). Speaking of productivity, North Sulawesi Province is moderate, while Maluku Province is low. Both provinces differ on cross-regional accessibility. North Sulawesi Province has higher accessibility than Maluku Province. Farmer in North Sulawesi Province is mostly local, while in Maluku Province, Java transmigrant farmer is more dominant, and both of them have different method of farming.

Weltin, Zasada, Franke, Piorr, Raggi, & Viaggi (2017) conceded that European farmer has used a variety of income diversification as their strategy in coping with fluctuating economic condition. However, their decision to diversify economic activity out of farming is greatly depending on farming business and household characteristic. Comparative study involving Sweden and Turkey carried on by Soylu, Cevher, Schirone, & Medeni (2016) indicated that both countries have different criteria of development. Therefore,

recommendations on further study about service delivery and information literacy programs targetted for farmer shall always be conformed with developmental characteristic in Sweden and Turkey. Other study done by Heffernan, Azbel-Jackson, Brownlie, & George Gunn (2016) was analyzing farmer behavior on eradication of livestock disease in Britain. Their result of study showed that farmers have used two different schemes of disease control, but still remain supportive to the more restrictive rule on livestock health. This attitude comes up because farmers do not trust voluntary method of disease control. Group cohesiveness on those schemes may be vary but problem on these schemes is very common, which is that without sustainable financial backup, long-term disease control would be impossible.

Studies in Indonesia give various results. Irwandi (2015) found that farmers who work on tide-ebb land in Central Kalimantan are receiving information about farming innovation from personal communication, social interaction, and social learning with other farmers, or from the exposure of mass media such as printed media (brochure, leaflet, poster, farming news, and others) and audio visual media (radio and television). Farmers' acceptance level to information of innovation is influenced by drive (motivation) and attitude of farmers on innovation. In general, farmers have applied innovation in their farming. They use technology system involving integration of rice and orange and they ensure the success of this system by passing through stages of *awareness, interest, evaluation, trial, and adoption*. A review by Malik (2015) has revealed that farmer response to the application of technology to improve productivity of irrigation rice in Nabire Regency is greatly depending on how far is this technology able to improve productivity and income of farmers. The dynamic of farmer response to productivity maximization technology is relatively stable because farmers still use general components in cultivating rice (such as land processing, weeding, and fertilization). Result of review from Mantiri, Rotinsulu, & Murni (2016) indicated that low productivity is often caused by low technology, incapacity of farmer human resource, and low business capital.

Based on this explanation, it can be said that productivity of rice farming is below expectation or less optimum because farmer behavior does not support the productivity of rice farming. Therefore, it is important to review farmer behavior that supports productivity of rice farming and to find out

factors influencing this support. The objective of this research is to analyze (1) productivity of rice farmers in North Sulawesi Province and Maluku Province, and (2) farmer behavior that supports productivity of rice farming in North Sulawesi Province and Maluku Province.

II. METHOD OF RESEARCH

A. PLACE AND TIME

Research was conducted for six (6) months. First three (3) months were spent in Maluku Province from March to May 2016, while other three (3) months were allocated for North Sulawesi Province from June to August 2016. Some districts are purposively selected based on requirement of existence of rice production centers. Both provinces have specific characteristic, respectively local farmers in North Sulawesi Province and transmigrant farmers in Maluku Province.

B. LOCATION AND SAMPLE

Within the context of North Sulawesi Province, research was conducted on two (2) districts, precisely Ratahan District and Tombatu District, and both of them belonged to Southeast Minahasa Regency. In Maluku Province, research was emphasized on two (2) districts, respectively Seram Utara Timur Kobi and Seram Utara Timur Seti, and these two remain within Central Maluku Regency. Both provinces have 250 farmer households working on rice land. Each province contributes 125 farmer households. Sampling technique is simple random sampling because farmer population in each province is considered as homogenous. North Sulawesi Province is represented by local farmers, whereas Maluku Province is represented by Java transmigrant farmers.

C. DATA ANALYSIS TECHNIQUE

Method of research is survey supported with questionnaire and depth interview. The analysis technique involves quantitative descriptive and qualitative descriptive analyses (Babbie, 2004), (Bogdan and Biklen, 1982).

III. RESULT AND DISCUSSION

A. PRODUCTIVITY OF RICE FARMER

Productivity of rice farmers in North Sulawesi Province and Maluku Province, based on statistical data on 2016, has shown difference. Productivity of rice farmers in North Sulawesi Province has reached 4 tons per hectare whereas that

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of Central Maluku Regency has attained 2 tons per hectare (Southeast Minahasa in Numbers on Period 2016; dan Central Maluku in Numbers on Period 2016). These statistical data are

derived from measurement on productivity in the field. Result of analysis on these data is shown in Table 1.

TABLE 1. RESULT OF ANALYSIS ON PRODUCTIVITY OF RICE FARMERS

Productivity	Number of Farmer (Person)	Percentage (%)
North Sulawesi Province		
>= 4 tons / ha	96	76.8
< 4 tons / ha	29	23.2
Total	125	100.0
Maluku Province		
>= 2 tons / ha	65	52.0
< 2 tons / ha	60	48.0
Total	125	100.0

Source: Result of Research (Processed, 2016)

Above table indicates relatively huge difference on productivity in two provinces. Productivity of rice farmers in North Sulawesi Province is two folds more than that of farmers in Maluku Province. The highest farmer productivity in North Sulawesi Province has attained as 4.3 tons/ha, while the lowest is only 3.7 tons/ha. The highest productivity of farmers in Maluku Province only achieves 2.2 tons/ha, and this number is still lower than the lowest farmer productivity in North Sulawesi Province. The lowest productivity in Maluku Province is 1.8 tons/ha. It confirms the finding that there is a quite huge difference on productivity of these two provinces. Regarding to farming culture, both provinces are similar because they do practicing what so called *intensive farming*. Rice farmers in North Sulawesi Province also cultivate alternative commodity, which is clove, and other food commodity, respectively corn. Most transmigrant farmers in Maluku Province have worked on rice farming since the beginning. Harvest failure has once forced them to cultivate orange as main supplement to household income. Fortunately, this supplement commodity is successful, and it provides a leverage to transmigrant farmers in Central Maluku Regency of Maluku Province to become the potential orange producers for immediate region or even including Eastern Seram Regency (SBT).

Result of field interview indicates that farmers in Maluku Province are challenged with some problems. These problems include less support for farming, poor infrastructure of irrigation, and low accessibility to capital and information technology (internet). This difference makes farmers in two

provinces to give different response in questionnaire about farmer behavior that supports productivity of rice farming.

Asnawi (2014) attempted to distinguish difference on productivity between farmers who attend Farmer Field School and those who do not. Attendant farmers have higher productivity in their farming than non-attendant. The attendance into Farmer Field School has increased farmer income at range from 29.07% to 76.23%. A review by Riyadi, Kartono, & Andri (2015) has made a deduction that is almost similar to above finding that technology may influence farming productivity.

B. FARMER BEHAVIOR THAT DIRECTING TOWARD INCREASING PRODUCTIVITY OF RICE FARMING

Agriculture extension service can influence farming productivity by changing knowledge, attitude and skill of farmers. The participation of farmers into education & training activity that provides agriculture extension service shall support the change of their productivity. Participation of farmers into this extension activity would give them good access to information, which then influences their productivity because this information impels a change on their knowledge, attitude and skill.

Farmer knowledge not only influences productivity but also their attitude and skill. Their knowledge level would lead to the change in their attitude and skill, and also farming productivity.

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Farmer attitude has an effect on both skill and productivity. Their attitude may change their skill in applying technology, and this change influences farming productivity. Farmers who apply technology to their farming would give them the desired level of farming productivity.

Farmer skill shall bring a change on rice farming productivity into certain direction. The following table would explain participation of farmers into extension-based education & training activity, and also illustrate farmer behavior that directing toward increasing productivity of rice farming.

Table shows that farmer behavior is mostly directing toward increasing productivity. Such behavior is created after farmers take participation into extension-based education & training activity. Through this participation into this activity, farmers would be informed about specific skills needed for

rice farming, especially those concerning with selecting high-quality seeds, eradicating pest and disease, implementing rice land management, and applying certain technique for irrigation water management. North Sulawesi Province and Maluku Province have a similarity because both are using semi-technical irrigation. It means that embankment is already available but irrigation channel that directs water to the rice land is not permanent. Despite this condition, farmer behavior is still directing toward supporting farming activity. Both provinces also have their farming groups working together to make their farming successful. Some cooperations are made at some events, such as planting, distributing irrigation water, and harvesting. Transmigrant farmers do marketing their harvest together to keep price stable.

TABLE 2. COMPARISON OF TWO PROVINCES ON FARMER PARTICIPATION INTO EXTENSION-BASED EDUCATION & TRAINING ACTIVITY AND ALSO ON FARMER BEHAVIOR THAT DIRECTING TOWARD INCREASING PRODUCTIVITY

Farmer Behavior	Category				Total	Percentage (%)
	Local (North Sulawesi Province)	%	Transmigrant (Maluku Province)	%		
Directing Toward Increasing Productivity	103	82.4	75	60	178	71.2
Not Directing Toward Increasing Productivity	22	17.6	50	40	72	28.8
Total	125	100	125	100	250	100

Source: Result of Research (Processed, 2016)

Supportive behavior of farmers is surely the result of their participation into extension-based education & training activity. Farmers in North Sulawesi Province are attending this activity more intensively because it has been orderly scheduled. Number of farmers who participate into extension activity reaches 114 individuals (91.2%). Meanwhile in Maluku Province, number of transmigrant farmers who attend extension activity is only 68 individuals (54.4%). This different participation level at extension-based education & training activity is caused by schedule and frequency. In North Sulawesi Province, extension activity is held once in a month, and the extension officers are very supportive and willing to stay within two sample districts. Meanwhile, in Maluku

Province, frequency of extension activity is not certain, and the extension officers live in North Seram District which shall be far away from the session class. It takes an hour for them to go for the class, and they are easily exhausted to facilitate farmers in sample districts. Besides, transmigrant farmers in Maluku Province do not rely greatly on extension officers for getting information they need. It is reasonable option because some extension officers live in the capital of Central Maluku Regency (Masohi) and it would take five hours of journey to get to the class. Other problem is unstable communication network, which indeed causing difficulty for farmers when they intend to use cellular phone or internet. Transmigrant farmers then take self-initiative to search for information from

any sources they can find. In general, they successfully acquire information from agriculture scholar who works at oil-palm company, respectively PT Nusa Internasional, or those who works at cacao company, precisely PT Olam Internasional. Although this information is less relevant because farmers work with rice other than plantation commodity, at least, their knowledge is improving with some information they get. In the other side, farmers in North Sulawesi Province can participate more frequent into extension activity because it is organized in continuous way, with regular schedule, and by utilizing information technology (cellular phone and internet) which helps extension officers as information source to connect with farmers.

Farmers in Maluku Province show behavior that is not directing toward increasing productivity of rice farming. Reason behind this is that farmers find difficulty in developing their farming because of their low skill and the lacking of support to the accessibility to work capital. There are 17.6% farmers in North Sulawesi Province who do not direct their behavior toward increasing productivity of rice farming, and they do this because they give more emphasis on clove commodity which in the last few years, the price can reach IDR 100,000 per kilogram. That is why these farmers are willing enough to abandon their rice farming and seeking more fortunes from clove commodity. Pattiselanno, et al (2017) said, if one source is failed or disrupted, other source may cover the needs

Nasarudin & Muis (2016) provided a description that the use of a certain technology at farming production structure could have obvious effect on rice farming productivity. This description is supported by Chun, Li, Wang, Lee, Lee, & Horstman (2015) in their study of Cambodia, Laos, Myanmar, and Vietnam, from which they found that good irrigation would increase rice productivity at range between 8.2% and 42.7%. Such finding equals to the condition of rice farming in Southeast Minahasa Regency in North Sulawesi Province where the presence of technical irrigation support has been successfully directing behavior of local farmers to increase rice productivity. The absence of technical irrigation channel in Central Maluku Regency in Maluku Province has engendered lower productivity in rice farming worked by Java transmigrant farmers. Study by Emmanuel, Sekyere, Owusu, & Jordaan (2015) in Ghana has found the importance of extension-based education and training activity in giving

information to farmers about how to utilize organic fertilizers to improve rice productivity. Their finding is supported by Chhay, Seng, & Tanaka (2017) who found that farmers who attend in Farmer Field School can use production factors more efficiently than traditional farmers, and this impacts on the increase of their income and productivity.

IV. CONCLUSION

Productivity of rice farmers in North Sulawesi Province and Maluku Province is greatly different if both are compared. Productivity of local farmers in North Sulawesi Province is higher two folds than Java transmigrant farmers in Maluku Province. Productivity of rice local farmers in North Sulawesi Province remains in the range between 3.7 and 4.3 tons/ha with the mean of productivity reaching 4 tons / ha. Meanwhile, in Maluku Province, the productivity stands in the range between 1.8 and 2.2 tons/ha with the mean of productivity attaining 2 tons/ha.

This different productivity is caused by different frequency of extension-based education & training activity held in both provinces. In North Sulawesi Province, extension activity is highly frequent and continuous; the supporting infrastructure, such as irrigation channel, is available; capitalization is quite accessible with the availability of People Credit in village; and accessibility to technology because internet network is more reliable. These differences impel farmers to show different behavior on productivity of rice farming when North Sulawesi Province and Maluku Province are compared to each other. Farmer behavior that directing toward increasing productivity of rice farming in North Sulawesi Province is 82.4% while it is only 40% in Maluku Province. Farmer behavior that is not directing toward productivity of rice farming is only 17.6% in North Sulawesi Province, but it stands for 40% in Maluku Province.

Pursuant to the result of research, the following suggestions are proposed.

1. Farmer behavior that directing toward productivity of rice farming could be shaped by organizing extension-based education & training activity, increasing accessibility to information through printed or electronic media (internet), supporting the availability of important structure and infrastructure (mainly irrigation), and facilitating accessibility to capitalization.

2. The government should attend some considerations before successfully ensuring that the desired farmer behavior on productivity of rice farming would finally manifest. These considerations include: designing extension-based education & training activity in continuously on clear schedule, increasing accessibility to information technology (internet), supporting the renewal of irrigation and road, and improving accessibility to capitalization in rural area.

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