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DETERMINANT ANALYSIS OF PRODUCTIVITY ON RICE MANAGEMENT IN INDONESIA

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ABSTRACT

Farming management is done because management is the ability of farmers to plan, organize and control the factors of production that they control as well as they are and can provide the expected agricultural production. The measure of management success is the productivity of each factor as well as the productivity of his effort. The problem of the research is how the simultaneous and partial impact of labor variables, land area, farmer competency, the experience of farming, the role of government and farmer institutions to rice farming and how its performance through productivity analysis and R/C ratio. Primary data analysis using OLS multiple regression. The results of the analysis were obtained simultaneously that labor variables, land area, farmer competency, the experience of farming, the role of government and farmer institutions significant effect on productivity with a coefficient of determination of 56,9%. The farmer competency variable is the dominant factor that affecting productivity with a Beta value of 56,9%. R/C ratio value 1,90, it means that farming is done efficiently by farmers. Optimum productivity is achieved in farming with an area of more than 1 hectare. The research finding of this study is that farmer competency is a determinant of productivity in the management of rice farming.

Contribution/Originality: This study contributes in the existing literature is to be a reference for further researchers who want to deepen or re-examine the management of rice farming and are expected to later be able to make additional contributions to the government. In addition to strengthening institutional management that supports the management of farmer's rice farming to minimize losses on farmer's farming. It is hoped that rice farming can help farmers in obtaining a steady income for themselves and their families, having sufficient competence and skills in conducting efficient and productive farming.

1. INTRODUCTION

Rice (*Oryza sativa*, L.) or paddy is a food crop producing rice, staple food for most of the world's population that is 50-60% of the global population and demand always continues to increase along with increasing population growth (Carriger and Vallée, 2007; Stoop *et al.*, 2009; Mohanty, 2013). Although rice can substitute with other food, however, rice has strategic value for the country and for people who are used to eating it and it's not easy to substitutes it with other basic food sources. Considering the importance of rice commodities, development is needed so that it remains the main priority in farmer's farming (Suger, 2001 *in* Astuti (2013)).

Demand for rice as a consumption for the community has fluctuated. This is shown by data from the Indonesian Ministry of Trade (2016) for 2012 to 2017, rice consumption amounted to 21.409.667 tons, decreased - 0,62% (21,277,431 tons) in 2013, then increased 0,29% (21.340.203 tons); 4,43% (22.285.201 tons); 1,27% (22.568.131 tons); and 1,23% (22.846.053 tons) in 2017.

The fact that farming activities are still the main occupation of farmers, of course, the role of government is needed to advance farmers. Because according to the Statistics Indonesia (2018) the agricultural sector data as of August 2014 - August 2017, in the agricultural sector is still the main employment compared to other sectors, such as industry, trade, transportation, and others. Even though there was a decrease in 2014-2017 of -4,88% from 35.923.886 workforce. In Bekasi Regency, West Java Province, supported by data from the Statistics Indonesia of Bekasi Regency (2018) in 2014 but entering 2017 there was a decrease of 0,21% to 58.410 workforces. This explains that farming occupation has now begun to be abandoned by farmers. However, Susilastuti (2018) declares that agricultural production is still the dominant factor affecting economic growth, poverty reduction and national food security. Food crop farming is influenced by factors of land, capital, marketing, technology and human resources (Mulyadi et al., 2018). Besides, management is needed for farming itself because management is the ability of farmers to determine, organize and coordinate the factors of production that they control as well as they are and can provide agricultural production as expected. The measure of the success of management is the productivity of each factor as well as the productivity of his effort. Thus the full introduction of the factors owned and the factors that are mastered will determine the success of management (Hartono, 2013).

Shinta (2012) declares that farming management, modernization and restructuring food crop production that has a concept of agribusiness and market-oriented needs professional business management capabilities. Therefore, farming management skills of farmer groups need to be encouraged and developed starting from planning, production processes, utilization of market potential, as well as capital or investment fertilization. The steps needed to encourage the participation of farmers in providing capital or investment for farming development include: (1). Provide counseling or information and (2). Incentives and conducive conditions that farmers able to utilize capital resources and other resources optimally. The role of the agricultural sector, especially in paddy is still the main thing that is always enhanced by the government. On the other hand, some obstacles occur, such as the increase of farmer's income has not been evenly distributed, not yet formed the entrepreneurial spirit and business culture among farmers. Rice farming also has weaknesses, such as the scale of scattered small businesses, limited control and access to capital, marketing obstacles and farmers' skills (Salim, 2018).

In Indonesia, 10,95% of farmers are "green" (smallholder) farmers with a land area of less than 0,5 ha (Statistics Indonesia, 2018). The smallholder farming system, or what is called smallholder farmers (gum) (Syahyuti, 2013) has different characteristics from large-scale companies that are driven by profit. These characteristics include limited access to land, financial capital and financial inputs, high levels of vulnerability, and low market participation (Kuivanen et al., 2016). This cause inhibits in the progress of innovation.

The education of rice farmers is low, on the average elementary school with an age of more than 45 years. This affects the competence and acceptance ability of technological change and innovation (Susilastuti et al., 2018). Experience or length of farming is an important factor influencing farmer's skills and competencies in managing their farm. The availability of human resources namely agricultural labor is also a problem in rice farming. The fulfillment of labor comes only from domestic family labor, while skilled labor in the labor market is very limited (Gibbon and Riisgaard, 2014; Mulyadi et al., 2018).

The role of the government through financial institutions, educational institutions, and counseling is very significant as a stimulus in the provision of capital and technological improvement, however, government efforts are not continuous, uneven and not holistic access. They require a strong farming institution for empowerment and resilience. Based on the description in the introduction and identification of the problem, the formulation of the problem in this study is (1). How is the simultaneous and partial influence of labor, land area, farmer's competency,

farming experience, the role of government, farmer institutions variables to rice farming?; (2).How is the performance of rice farming through productivity analysis, and R/C ratio?.

2. LITERATURE REVIEW

Farming management is the ability of farmers to determine, organize and coordinate the factors of production that they control as well as possible and be able to provide agricultural production as expected. An introduction to understanding technical and economic principles needs to be done to become a successful manager. Technical principles are elaborated such as (1) Behavior of business branches decided, (2). Technological development. On the economic principle, namely: (1). Determination of Price Development, (2). Farming financing. It depends on the factors of social change, education, and experience of farmers (Astuti, 2013).

Farming management is explained as handling activities in agribusiness starting from business planning, providing facilities and infrastructure, plant cultivation, handling the results and marketing it in an integrated and mutually supportive manner. This certainly requires management that can summarize the factors of nature, capital, labor and technology with the factors of infrastructure, infrastructure, and marketing. This management ability is important because farming is not only a way of life but is also likened to a company. Companies that need management capabilities to support these companies to remain to stand (Rahardi (2000) in Ayati (2018).

This is supported by Sukamdi (2015) management as part of the areas of responsibility, such as finance, marketing, production, and personnel. It can also be seen as coordinating a series of inputs from various resources such as money, markets, materials, machinery, methods, and human labor or can be conceptualized as an effort to achieve the desired results through the use of available resources.

Sryangreini (2017) explained that farm management is defined as the application of management functions in farming which includes planning, organizing and implementing and evaluating a production process, because this production process involves various types and levels of activities, then management is how managing these agricultural activities. In carrying out farming, generally, farmers in Indonesia use labor drawn from within the family such as mothers, children, and siblings. According to (Mubyarto (2011) in Salim (2018)) the use of family labor is influenced by several factors, namely the level of wages, the level of income to be obtained, the reach of available employment opportunities, local labor institutions and owned land assets.

Gibbon and Riisgaard (2014) argued that there has been a paradigm shift in labor management, from domestic to the market system and from social to industrial, especially on large scale agriculture. Agricultural labor which was previously filled by the family moves to be filled from the market, from being social to industrial competency oriented. The consequence is that it is difficult to get labor, and labor costs become expensive.

(Sukirno (2013) and Felipe and Adams (2005) in Hamdan (2016)) argued that agricultural land is the whole area that is the place of planting or working on the planting process, in addition to that agricultural land must have enough area to guarantee the amount of yield obtained by farmers. If the area of land increases, farmer's income will increase, and so does the opposite effect. So the relationship between land area and farmer's income is positive.

Mulyana (2012) and Sajogyo (2002) in Hamdan (2016) explained that farmer competency is an illustration of farmer's ability to manage to farm based on effective and efficient planning following plant cultivation techniques. Farmer's competence shows the performance and responsibility of farmers in carrying out farming better and more sustainably (Mulyadi et al., 2018).

The experience of farming is one of the factors that influence the success of the farming activity process. Longer work experience can make farmers have the ability to carry out production and development activities in the agricultural sector compared to less experienced farmers. However, this is not absolute (Asni, 2016).

In the sector of agriculture, institutional analysis is an analysis aimed at obtaining a description of an agricultural socioeconomic phenomenon related to the relationship between two or more actors in socioeconomic interaction, including the dynamics of the rules that apply and are mutually agreed upon by the farmers of

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interaction, accompanied by analysis regarding the final results obtained from interactions that occur (Syahyuti (2002) in Nuraini (2016)).

Besides, the study of Ebanyat et al. (2010) in Africa, on institutional issues, shows that policy factors in the field of institutions and population growth drive changes in land use. Political instability, communal labor placement agencies can also affect changes in land use, productivity, and sustainability.

The role of local government, especially in farming in the region, has a big role in the effort to empower farmers. The process of empowering these farmers must be categorized based on the potential of the region and locality of regional superior commodities so that each region is able to grow and develop with their respective superior commodities, so that later they can create programs needed by the community (Mardikanto and Soebianto (2012) in Fredika (2014)).

Several studies in Indonesia, Ayati (2018) found (1). The farmer group that is the object of research, has 5 (five) management functions, namely: planning, organizing, directing, coordinating and supervising properly, (2). Rice farming management as factors that significantly influence to help farmers' decision making, namely: age, income, education, farming experience, land area, and training in organic methods. For the part of the labor force that still uses labor from the family, it does not significantly influence the farmer's decision making.

Suprapto (2010) provides conclusions: (1). Land area, capital, costs, labor, fertilizer costs, pesticide costs, and counseling affect farmers' income, (2). Variable land area, capital variable, fertilizer cost variable, counseling variable have a significant effect on farmer's income. For variable labor costs, variable seed costs, pesticide costs do not have a significant effect on farmer income. However, for land area variables being the most dominant variable the effect on farmers' income. Pradinata et al. (2016) analyzed the effect of the cost of several types of fertilizers on the optimization of lowland rice production in Bekasi Regency, West Java Province, the results were obtained: (1). The problem of farmers in rice farming is more due to the inability of farmers to allocate inputs as well as possible so that the results obtained are less than optimal. The final results of the study showed the simultaneous cost of using fertilizer significantly affected rice production. The cost of using fertilizer by rice farmers is not optimal. Gustiana (2017) states that farmers as producers are an important part that determines the development of an agricultural commodity. The production process is carried out to make a profit. The profit from rice farming is determined by the number *of inputs* or production costs incurred and the amount of revenue that will be received by farmers.

Kuivanen et al. (2016) added a typology of structural and functional diversity of agricultural farming systems can be grouped by the size of household (*household*), utilization of land, labor, livestock and variable income. The grouping can be used for targeting and innovation interventions by institutions and governments to improve the performance of farmers in their farming.

Farmers in farming must be given knowledge related to one of them, namely shocks or surprises that can be faced in their farming. The first response is designed to prepare the farm so that it is not in a position that is too vulnerable when shocks occur. Response in the event of a shock involves the reallocation of resources so that the impact of risk on production can be minimized, whereas for responses after the shock is directed to minimize subsequent impacts. The three types of responses are interdependent with each other (one response is a function of the other responses) (Malton (1991); Adiyoga and Soetarso (1999) in Saptana (2010)).

The Hypothesis Proposed in this Study are: (1). There is a significant and positive influence on the factors that determine how to rice farming management, namely: labor, land area, farmer competency, the experience of farming, the role of government, and simultaneous and partial development of productivity; (2). It is suspected that the use of labor and land area owned is not optimal so that it can still be improved and farmer competence is a dominant factor.

3. RESEARCH METHODS

The research area and respondents were determined purposively, namely rice farmers in the rice-producing centers in the Bekasi Regency, West Java, namely in the District of North Tambun as a population area. Samples were taken with the criteria of farmers: 1). As a member of a farmer group, and 2). As a farmer manager either for his land or rent. Primary data obtained through interviews directly with respondents with questionnaires and field observations.

Variables dependent are Labor (X1), Land Area(X2), Competence Farmers (X3), Experience of Farming (X4), Role of Government (X5), and Institutional (X6). Productivity (Y) is treated as an independent variable.

The definition and operational constraints of variables are as follows:

1. Labor is the amount of labor expended in farming used during the production process from land management, plant maintenance such as weeding, fertilizing and eradicating pests and plant diseases and measured in units of people.
2. Land area is the area of land used by farmers to cultivate rice from planting to harvest, measured in hectares.
3. Farmer competence is an illustration of the ability of farmers to manage their farms and is measured by a sign of being able or unable.
4. The experience of farming is explained as activities or things that have been experienced by farmers in farming and are measured in units of years (duration of farmers running their farming).
5. The role of government is described as a collaboration between government and farmers in assisting farming, and is measured by a sign of having a role or no role.
6. Institutional is a social order that farmers should be able to follow and become a place of learning for farmers to help their farming. The referred institution, such as Agricultural Counseling Center, Cooperatives Institution, Farmers Group and it measured by a sign of role or no role.

3.1. Hypothesis Testing

3.1.1. Simultaneous Significance Test (Statistical Test F)

F test was performed to see the effect of variables Labor (Lb), Land Area(L), Competency of Farmer (CF), Experience of Farming (EF), The Role Of Government (TRG), Institutions (I) simultaneously on the variable Y, *Level of Significance* used by 5% or (α) = 0,05; Criteria for acceptance and rejection of Ho, by looking at the level of probability, namely: if the significance <0,05 then Ho is rejected and if the significance> 0,05 then Ho is accepted (Haslinda, 2016).

3.1.2. Test t

Priyatno (2014) *in* Akila (2017) explained that the t-test was used to find out whether each independent variable individually had a significant effect on the dependent variable.

3.1.3. Regression Analysis

To find out the factors that influence productivity, an analysis was carried out using Multiple Linear Regression OLS. The model created is a functional relationship between factors: Labor (Lb), Land Area (L), Competency Of Farmer (CF), Experience of Farming (EF), The Role of Government (TRG), and Institution (I) to productivity (Y). The functional relationship in the multiple linear regression model (Silamat, 2014) can be formulated as follows:

$$Y = a + α1Lb + α2L + α3CF + α4EF + α5TRG + α6I + e \qquad (1)$$

Information:

a: Regression of constant.

α1 ... 6: Coefficient of regression.

e: error.

Lb: Labor.

L: Land Area.

CF: Competency of Farmer.

EF: Experience of Farming.

TRG: The Role of Government.

I: Institution.

3.1.4. The Coefficient of Determination (R^2)

R^2 to measure how far the model's ability to explain variations in the dependent variable. The coefficient of determination is between zero and one. R^2 value close to 1 means that the independent variables can explain the variation of the dependent variable (Ghozali, 2006).

3.1.5. Analysis of R/C Ratio

R/C ratio analysis is used to determine the efficiency of farming activities through a comparison between the total revenues of each farm with the total costs (Fitriani, 2019).

$$R/C = \text{Total Revenues/costs}$$
$$R/C = Q \times Pq / TFC + TVC$$

Description: R = Revenue; C = Cost; Q = Total Production (Tons); Pq = Price of product union (Rupiah); TFC = Total Fixed Cost ; TVC = Total Variable Cost.

3.1.6. Farm Productivity

Farm productivity is measured using the equation (Silamat, 2014):

$$\text{Farming Productivity} = \frac{Amount\ of\ Production\ (Ton)}{Land\ area\ (Hectar)}$$

4. RESULTS AND DISCUSSION

4.1. Overview of Research Locations

North Tambun District Bekasi Regency - West Java Province is a rice commodity development area in Indonesia. Indonesia Statistic in 2017 shows that North Tambun district is a rice center production with relatively few horticultural crops and legumes. The harvested area and production of rice during the 2012-2017 range is quite fluctuating. The harvested area in 2012 was 96.550 ha, increased in 2013 to 98.584 ha, decreased and increased again in 2014-2017 with an area of 85,472 ha, 89.819 ha, 97.577 ha, and 91.945 ha. In the same way, production increased and decreased, wherein 2012 it was at 597.939 tons, and fluctuated continuously from 2013-2017 to 610.203 tons, 516.982 tons, 572.898 tons, 611.386 tons and 573.928 tons. So it can be concluded that the level of productivity over the past 5 years (2012-2017) ranged from 6,05-6,38 tons/ha (Ministry of Agriculture, 2015; SIBR, 2019). There are still families engaged in agriculture and families that have members as agricultural laborers. Surely this has become good because it supports the North Tambun District as an area of rice commodity development. This is strengthened by data from the SIBR (2017) in the North Tambun District in numbers 2017, regarding the number of farming families and families with family members working as farm laborers.

4.2. Characteristics of Respondents

Rice farmers selected as respondents are farmers who live in the area of North Tambun District, Bekasi Regency, West Java Province. Respondents generally manage their farms by relying on human and machine labor. In general, farmers attempt their land to cultivate rice with an average area of 1,65 ha/planting season. In this research, it is known that the average respondent is male with the average age of the respondent being 40-50 years. Most formal education of the respondents was elementary school graduates 46,67%, junior high school 33,33% and high school 20%, with long experience of farming which averaged 19,96 years. This shows that rice farming in North Tambun District has become a part of family life for generations and the main source of livelihood of farmers. The low level of education they have has also caused their access to absorb new technology. The nature of their farming largely relies on hereditary knowledge. Besides, the experience of farming owned by respondents for more than 10 years, can be interpreted as respondents having high ability in farming (Hernanto (2002) *in* Setyowati and Widodo (2014)). The number of respondent family members varies between 1-5 peoples, thus the labor potential, as well as the amount of expenditure of the farm family, becomes different. Thus the more the number of family workers, the greater the potential and availability, but becomes ineffective.

4.3. Hypothesis Test

The F test results are presented in Table 1. Based on the F test, simultaneously the dependent variables researched were Labor, Land Area, Farmer Competency, Farming Experience, Role of Government and Farmer Institutional have a significant effect on productivity.

Table-1. Test results F.

ANOVA

	Model	Sum of squares	df	Mean Square	F	Sig.
1	Regression	22.773	6	3.796	5.071	.002[aa]
	Residual	17.216	23	.749		
	Total	39.989	29			

a. Predictors: (Constant), KLMBG, PB, KP, TK, PP, LP.
b. Dependent Variable: PRDKTVTS.
Source: Primary data (2019).

The t-test results are presented in Table 2. Based on the t-test results, partially the farmer competency and experience of the farming variables have a significant positive effect on productivity, while the labor and land area variables have no significant effect on productivity. Labor, the role of government and the institution has a negative direction.

Table-2. Test results t.

Coefficients

		Unstandardized coefficients		Standardized coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.292	2.058		.628	.536
	Labor	-.116	.93	-.346	-1.243	.226
	Land area	.413	.318	.376	1.299	.207
	Farmer Competency	.141	.046	.569	3.101	.005
	Experience of Farming	.477	.020	.329	2.305	.31
	The Role of Government	-.053	.116	-.113	-.462	.649
	Institutions	-.046	.120	-877	-380	.707

Source: Primary data processed (2019).

Based on Table 2, the multiple linear regression output equation is formulated as follows:

$$Y = 1,292 - 0,116Lb + 0,413L + 0,1141CF + 0,047EF - 0,053TRG - 0,046I \qquad (2)$$

Based on *Standardized Coefficients* in Table 2, Farmer Competency is the dominant factor that positively influences the productivity of rice farming. The scale of the dominant factor is indicated by the amount of Beta coefficient which is equal to 0,569 or 56,9%> 50%. Other factors which have a magnitude of influence are land area (37,6%) and experience in farming (32,9%).

Based on Table 3 the coefficient of determination (R^2) is 0,569 indicating the model has not been able to explain together independent variables of labor, land area, farmer competency, the experience of farming, the role of government and institutions. Residual 43,1 percent has not been ably explained by the model. Other factors not included in the model, allegedly such as climate, source of seeds, soil fertility, technology, and others.

Table-3. Test results R^2.

Summary model

Model	R	R square	Adjusted R square	Std. The error of the estimate
1	.755[a]	.569	.457	.86516

a. Predictors: (Constant), KLMBG, PB, KP, TK, PP, LP*.
Source: Primary data processed (2019).

4.4. Discussion

4.4.1. Factors that Affect Productivity

i.   Labor

In the results of multiple regression analysis can be seen that the labor parameter sign is negative with a regression value of -0.116. This shows that if there is an additional workforce of 1 person, it makes rice productivity decline, but the results of the analysis are not significant. This explains that changes in the workforce do not affect productivity. It is suspected that because farmers allocate a large amount of family labor so that the resulting work productivity is low and ineffective due to reduced output produced by each workforce.

In farming, the development of the capability of agricultural human resources (HR) becomes important because human resources act as an actor in the development of the agricultural sector. The quality of human resources in agriculture is still low when compared to other sectors and there are still many workers in the agricultural sector who are not educated or with low education. This is consistent with research data in North Tambun District, where the average farmer has elementary school education. Therefore, the low education that farmers have as human resources in agriculture will affect the ability of farmers to adopt technology and will result in productivity (Salim *et al.*, 2017; Mulyadi *et al.*, 2018).

ii.   Land Area

The results of the analysis show that the land area variable has a positive regression coefficient, but it is not real. This is thought caused by the land area that is fixed and cannot be expanded due to ownership factors, relatively small land area and land conversion that occurred. So this makes farmers unable to add land area and affect the resulting productivity. Even so, the magnitude of the effect is positive and the effect is quite large based on the Beta value of 37,9%, thus if in terms of quantity the land area cannot be expanded with various reasons but the quality of the land should be improved by increasing soil fertility.

In farming, land ownership is one of the factors of production that is very supportive of the development of farming. With the more extensive land cultivated by farmers, so the greater potential of farmers to develop their farming (Salim *et al.*, 2017).

iii.   Farmers Competency

The results of the analysis showed that the variable of farmer competency had a significant positive effect on productivity. This explains the higher competency of farmers, then higher the products produced. The competency variable based on Beta value is 56,9% more than 50% so it is a dominant factor. This shows that the competency of farmers' knowledge about plant cultivation technology and ways of managing the farm is the most important factor in efforts to increase the productivity of their farming. Of course, this reason is also influenced by several other factors, such as farming experience, and interaction with extension agents. The experience of farming influences the competency of farmers because it is considered that farmers who have high experience will usually be more mature in dealing with various problems in farming (Mulyadi *et al.*, 2018).

Interaction with extension agents will provide opportunities for farmers to improve farmers' competency in farming. The relationship between extension agents and farmers, both directly and indirectly, shows that communication between the two is very good. Continuously relationship between extension agents and farmers can create a sense of kinship, which will facilitate and accelerate the giving and receiving of information to increase production and productivity (Manyamsari and Mujiburrahmad, 2014).

iv.   Experience of Farming

The results of the analysis showed that the experience of farming had a significant positive effect on productivity. This explains the higher the experience of farming, the more farmers know the problems in cultivation. In the end, it can improve decision-making policies. Manyamsari and Mujiburrahmad (2014) explained that farmers whose experience is more than 10 years have mastered the field of competence in a combination of business branches.

v.   Role of Government

The result of the analysis shows that the role of the government variable is negative and has no significant effect. This means that farmers' perceptions of the government's role are lacking or ineffective. It is hoped that the attention of the government so that businesses in this sector can improve the lives of farmers. This is because several phenomena are often faced by farmers, namely the level of production is generally influenced by components such as land management, labor quality and venture capital spent in carrying out their business activities (Gunawan, 2018). Also, the role of the government is continuously needed in providing moral support, capital assistance through farm credit, infrastructure, and technology counseling to accelerate the welfare of farmers to increase the productivity generated (Suprapto, 2010).

Government capital assistance can form the existence of financial institutions. The problem of financial institutions in rural areas can be identified in three aspects: first, the problem of access to credit. The characteristics of rural communities with a small business scale cause they do not have sufficient assets that are used as collateral. As a result, farmers' credit to financial institutions is limited. Second, the very low bargaining position and information of rural communities make it vulnerable to manipulation practices of formal and semi-formal financial institutions. Forms of manipulation include, for example, the imposition of high-interest rates from government policies and the lending of credit so late that its use is not following the original plan. Third, asymmetric information from the creditor to the borrower. Every formal financial institution has limitations in recognizing the economic and business capabilities of each business actor in rural areas (Hartono, 2013; Purwantini and Sejati, 2014).

vi.   Farmer Institutions

The result of the analysis shows that the institutional variables are negative and not real. Interpreted that the institutional role is not considered by farmers. In this study, an institution is a farmer group or farmer institutional.

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Some of the reasons farmers do not participate in farmer group members include: not interested, not seeing benefits, and no time. The reason for the farmers not joining most group members is because they do not have time because of their busy in farming activities, besides they are not interested in attending because they do not see the benefits to be gained. There are many farmer groups whose activities are not active, generally because there are no operational funds, there are no programs, other than that partly because the management or members are not active. Although the activities of farmer groups only revolve around routine meetings, members acknowledge that they are interested in attending meetings, because they feel that they get to benefit from the meetings, especially as a means of exchanging various farm business information among farmers.

The participation of farmers in general as members of existing farmer groups depends on the needs and interests of farmers. If farmers feel the need and interest in group activities, farmers are motivated to participate. Member participation can be built or aroused by good leadership from the group administrator, it could also be due to the attractiveness of the activities that the group will do.

Farmer groups are one form of important institutions in rural areas, especially for farmers. Farmer groups can function well as a forum for organizing various activities and accommodating farmer information needs for farmers, if carried out according to their functions effectively, efficiently and efficiently. The success of the implementation of development programs and policies in agriculture both in the field of penetration and development and acceleration of agricultural technology, as well as counseling and market information, is one mirror of the functioning of the institutions of a farmer group. The role of farmer groups is important in supporting government programs and the distribution of production facilities.

4.4.2. R/C Ratio Analysis

Cost is the value of all necessary economic inputs, which can be estimated and can be measured for both objects and services during the production process. Costs incurred in rice farming during one growing season can be seen in Table 4. Farming costs are influenced by the variety of commodities cultivated, cultivation techniques and the level of technology used. Farmers in rice farming in North Tambun District spend money to produce rice. Costs incurred by farmers include labor costs, purchase of fertilizers, pesticides, insecticides, seeds, water machine costs, and land tax fees. The biggest cost incurred by rice farmers is the cost of using labor, following the opinion of Sundari (2011).

Table-4. Cost of rice farming per hectare at one planting season in kecamatan north tambun.

No	Description	Total cost (Rupiah/hectare/season)
1	Labor	IDR 18.000.000
2	Inorganic fertilizer	IDR 3.250.000
3	Pesticide	IDR 6.000.000
4	Insecticide	IDR 1.500.000
5	Seed	IDR 750.000
6	Water machine	IDR 1.000.000
7	Land tax	IDR 1.000.000
Total		IDR. 31.500.000

Source: Primary data processed (2019).

The second biggest cost is the cost of pesticides. On average, farmers in North Tambun District still use chemical pesticides to assist farmers in controlling pest organisms, which are also supported by the use of insecticides by farmers to control insects at the third-largest cost. Water machine costs become the fourth sequence where these costs are incurred by farmers to pay for water pumps used to irrigate rice fields and are carried out cooperatively and finally for seed costs, being the smallest costs incurred on rice farming in North Tambun District per planting season.

The average income from rice farming in North Tambun District in one planting season can be seen in Table 5. Table 5 shows that the average income from rice farming is IDR 28,500,000 per hectare. The economic measure commonly used to describe the performance of agribusiness sectors and commodities is the R/C (*revenue and cost ratio*) *ratio* which shows the comparison between farm income and costs (Soehardjo (1996) *in* Sundari (2011)). From the amount of revenue and costs incurred by farmers, the calculated R/C ratio shows the efficiency of rice farming. R/C ratio of rice in the North Tambun District is 1,90. This means that for every one rupiah costs incurred will generate revenue of 1,90 rupiah. R/C ratio value more than one provides information that farming is carried out efficiently by farmers.

Table-5. Average revenue and income of rice farmers in the North Tambun district at one planting season.

No	Description	Amount per hectare
1	Revenue	IDR 60.000.000
2	Income	IDR 28.500.000
3	R/C Ratio	1,90

Source: Primary data (2019).

4.4.3. Analysis of Farm Productivity

Productivity is an activity or process that changes product factors (*inputs*) into a product (*output*) or the amount of use of *inputs* to produce *output*. Average productivity is presented in Table 6.

Table-6. Average productivity of rice farming per land area (ton / ha).

No	Land Area (Ha)	Average productivity (ton/ha)
1	0,5-1,0	4,39
2	1,1-2,0	5,14
3	3,0-6,0	5,00

Source: Primary data (2019).

Based on the table above, the average productivity of rice farming in a narrow area is in the range of 0,5 to 1,0 ha, lower than that of a wider land or more than 1 ha. Optimum productivity inland with a broad range of 1,1-2,0 ha. This shows that the narrower the farmland, the more expensive farm costs due to fixed costs that cannot be reduced. On a wider area of land, the variable costs are getting cheaper. Fixed costs include the cost of farming capital, namely the cost of land, labor, and input of production facilities.

Productivity per farmer area each produces paddy production of 4,39 tons on a land area of 0,5-1,0 hectares, 5,14 tons on a land area of 1,1-2,0 hectares and 5 tons on a land area of 3- 6 hectares. Following the provisions expected by the Department of Agriculture, the productivity standard of rice farming in one hectare is five tons with a reference in 2014 (Tirtayasa, 2016).

Rice productivity on land more than 1,0 ha in North Tambun District still exceeds those stipulated by the Department of Agriculture, this shows that the more extensive the land, the more efficient it will be. However, on a land area of more than 2 ha, efficiency decreases, which is allegedly due to lack of labor, not yet optimal mechanization and cultivation technology.

5. CONCLUSIONS

5.1. The Conclusions of the Study are

1. Simultaneously the variable of labor, land area, farmer competency, the experience of farming, the role of government and the institutions have a significant effect on productivity with a coefficient of determination of 0,569 or 56,9%. Partially, the competence and experience of farming variables have a significant positive effect on productivity, the variable of labor and land area does not significantly affect productivity. The competency variable is the dominant factor that influences productivity with a Beta value of 56,9%.

2. R/C ratio of rice is 1,90. This means that for every one rupiah costs incurred will generate revenue of 1,90 rupiah. R/C ratio value greater than one provides information that farming is carried out efficiently by farmers.

3. Total Average productivity of rice farming per area of farmer each produces paddy productivity of 4,39 tons in an area of 0,5-1 hectares, 5,14 tons in an area of 1,1-2 hectares and 5 tons in area of 3-6 hectares. Optimum productivity is achieved in farms with an area of more than 1 hectare.

The research finding of this study is that farmer competency is a determinant of productivity in the management of rice farming.

5.2. Recommendation

To increase farm productivity, it is suggested to farmers to improve their competency in advancing rice cultivation technology, one of which is by following counseling and guidance provided by the government through the Agricultural Counseling Center; Improving the institutional performance of its farming through Farmers Group Association. Increasing soil fertility with environmentally friendly technology. Protect farmers by setting a reasonable product selling price, the price of affordable production facilities so that farmers get a profitable profit.

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