Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.7, No.17, 2016

Analysis of Factors Affecting the Economic Behavior of Paddy Farmer-Households in District West Seram, Maluku Province

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Abstract
This research was conducted in West Seram regency, which aims to analyze the factors that affect the economic behavior of paddy farmer households.These factors were analyzed using Statistical Analysis System (SAS). The results showed that simultaneously every variable that compiled the model, has a significant effect. Partially, production is influenced by land area at 90% confidence level, and total fertilizer use at 99% confidence level. Labor in the family showed that off-farm labor and land area affect the production to the level of trust of 95% and 99%. Then non family labor equation, independent variables Labor in the family, the number of families ,and land area affect with a significant level of 99%. Family labor, land area and off farm wage effect on Off farm labor Allocation. Partially, only Wage Levels In the off-farm activities. The coefficient of determination values obtained that independent variable farmer education level, Wage level Non-Agricultural Sector, Farming experience, age, and land area affect on non farm labor only 60.857%. Food expenditure equation, simultaneously variables number of households and total income effect.Partially, significant variables only number of households at 99%. Non-food expenditures equation show that total income affect at a rate of 95% and number of Households at the 99% significant level.
Keywords: the economic behavior, paddy farmers, West Seram.

I. INTRODUCTION

The development of agricultural sector is a part of the overall national development. The purpose of national development is improving the welfare and living standards of the people.The roles of agriculture in national development are to provide food for the community, increase gross domestic product, generate foreign exchange, control inflation and absorb labor in rural. Furthermore, the development of rural area might be increased farmer's income and welfare, which changes the social and economic life aspects of rural communities. For example, in Maluku province, agriculture sector is the leading sector. However, Maluku province only contributed 8.73% to GDP in 2013 (BPS Maluku, 2013).

Maluku has a big potential land area for the development of food crops, particularly paddy. Although Maluku is not the center of rice production area, but today Maluku government has concern to the development of paddy. District of West Seram has extensive area as the center for rice production in the province of Maluku. In West Seram, rice harvested area is about 1, 204 hectares, with a production of 7,7 tons and a productivity of 6.4 tons/ha. However, Productivity is still relatively low compared to the potential 10 tons/ha with the application of innovations (Agency for Agricultural Research and Development, 2007). In area for development of paddy in West Seram, technology access, the high prices of inputs, and lack of family labor participation are the major problem for poor farmer, resulting paddy productivity being low. Activity in the farmer households is divided into three groups: the behavior of households as producers, household behavior as a source of labor, and household behavior as consumers. According to Nakajima (1986), the use of family labor and household consumption is a major factor in the farm household and farming activities cannot be said to be a farmer household if there is no use of family labor. Conversely, a household farming activity is a farmer household, if they use family labor, although they do not consume most of the products that they produced. According to Rosenzweig (1980), that the limitations in the developing countries is making decisions and allocating labor to non farm activities. Paddy farming in West Seram regency is still classified as subsistence. Household needs not only food consumption, but also non-food consumption such as clothes, education and health. Thus, to improve household incomes and welfare of paddy farmers in the district of West Seram, they are considering factors that affect the increase in paddy productivity, especially how to allocate labor on their farming activities and how the economic behavior of households of farmers in improving income and welfare. Therefore, it is necessary to analyze the economic behavior (decisions production, consumption and labor allocation) paddy farmer household in the district of West Seram.

II. LITERATURE REVIEW

Rohaeni and Lokollo (2005), did a research using model analysis approach to the household economy. This study researched the relationship between work time allocation, production and farmers' household expenses. The results showed that the income of non-farm larger than farming activities due to the allocation of work time

members of the household are also greater in non-farm activities. It is suggested that farm households do not reduce the working time on paddy farming and continue to improve extension activities.

A research by Zeng Tao (2005), investigated the relationship between labor supply in off-farm and on-farm, and identify the factors that influenced it. Basic theory used is a model of the farm household. Based on a simple model, it seen that in the face of a wide selection of work, by allocating work time can be maximized the utility. This analysis will enrich our knowledge to understand the role played by labor supply outside the agricultural sector on structural changes in the agricultural sector. The results showed that the substitution effect dominates the income effect on labor supply of farmers in China. labor supply depends on the status of the partner's participation in the labor market off-farm. Interdependence of intrafamily very important because the farm household is a unit of the relevant decision-making for resource allocation and consumption than that of each member. Even when the policy implications of policy changes and relevant changes in the labor market off-farm just touch on a specific group of household members directly (for example, male farmers) in terms of wage levels, availability of employment, or the economic value of time spare at home, policy changes will also affect the allocation of time and resources.

Mathse and Young (2004), have researched to analyze the decisions of labor in non-agricultural by farm households in Zimbabwe. The approach used is a model of the decision to participate in the labor market and the amount of time allocated to work. The results showed that the qualitative and quantitative variables gender, education, and assets have different effects in terms of participation and working time. Overall, the empirical analysis confirms the importance of individual characteristics (such as gender and education) and household/farm (eg: land can be accessed by households, productive assets, remittances and agricultural terms of trade) in influencing the decision of the labor market rural household members.

III. METHOD

The factors that affect the economic behavior of the paddy farmer household, analyzed by using analysis model with simultaneous, the equations are estimated by the method of Two Stage Least Squares (2SLS) consists of seven (7) structural equations and ten (10) identity equations. The equation is formulated as follows:

Production equation:

$$PROD = a0 + a1LL + a2PPB + a3PPTot + U1 \quad (1)$$

Equation Labor Allocation In Agriculture Sector

$$TKND = b0 + b1TKNP + b2TKOF + b3LL + U2 \quad (2)$$

Non-family Labor Allocation:

$$TKLK = c0 + c1TKND + c2JRT + c3LL + U3 \quad (3)$$

Equation Total allocation of labor in the agricultural sector is:

$$TPKR = TKND + TKLK \quad (4)$$

Off farm labor Allocation:

$$TKOF = d0 + d1TKND + d2TUPOF + d3LL + U4 \quad (5)$$

Non farm labor Allocation:

$$TKNP = e0 + e1TPD + e2TKND + e3LL + e4PUT + e5TUPNP + e6UM + U5 \quad (6)$$

Total Income Equation

$$PDTot = PPSP + PPOF + PPSNP \quad (7)$$

Equation income in the agricultural sector:

$$PPSP = (Prod * HRP) - BUST \quad (8)$$

$$BUST = (PB*PPB) + (HB*PBB) + (HPUR*PKUR) + (HPLG*PKPLG) + (HPNK*PKPNK) + (PS * PPS) + (W * TPKR) \quad (9)$$

Income from off-farm activities:

$$PPOF = f0 + f1TKND + f2TUPOF + f3LL + U6 \quad (10)$$

Income In non- Agriculture sector:

$$PPSNP = TKNP * TUPNP \quad (11)$$

Food expenditure equation:

$$PUP = g0 + g1PDTot + g2JRT + U7 \quad (12)$$

Non-food expenditure equation:

$$PUNP = h0 + h1PDTot + h2JRT + U8 \quad (13)$$

Total expenditure equation:

$$PNTot = PUP + PUNP \quad (14)$$

Note:

PROD = Production of agricultural enterprises (kg)
LL = land area (ha)
PPB = The use of seed (kg)
PPTot = the use of fertilizers (kg)

TPKR = labor utilization (HOK)
TKND = Allocation of family labor (HOK)
TKOF = allocation of labor in off-farm (HOK)
TKNP = allocation of labor in non-agricultural sector (HOK)
JRT = number of household members (people)
TKNP = allocation of labor in the non-agricultural sector (HOK)
TPD = Level of education of farmers (years)
TUPNP = wage non-agricultural sector (Rp)
UM = age (years)
PPSP = Income in the agricultural sector (Rp)
PPSNP = Income in the non-agricultural sector (Rp)
BUST = total cost of farming (Rp)
PB = the price of seeds (Rp)
PK = fertilizer prices (Rp)
PS = pesticide price (Rp)
W = wages earned (Rp)
PUP = Expenditures for Food (Rp)
PUNP = Expenditure on non-food (Rp)
PNTot = Expenditure Total (Rp)
U1, U2, U3, U4, U5, U6, U7 = confounding variables

RESULT AND DISCUSSION

Factors that affect the Economic Behavior of paddy Farmers Household in West Seram.

Analysis of the factors that influence the economic behavior of households rice farmers done using simultaneous equations. Model identification results show that the model farm household economic behavior expressed over-identified, so that the method used to estimate the parameters is the Two Stage Least Squares (2SLS).

Table1. Statistics Result for The coefficient of determination (R^2) value and F probability

No	Prob equation	R^2	Prob-F
1	PROD (Production)	0.87498	<0,0001
2	TKND (Family Labor)	0.33556	<0,0001
3	TKLK (Non Family Labor)	0.7623	<0,0001
4	TKOF (Off-Farm Labor)	0.92148	<0,0001
5	TKNP (Non-Agricultural Labor)	0.60825	<0,0001
6	PUP (Food Expenditures)	0.91983	<0,0001
7	PUNP (Non-Food Expenditures)	0.27186	<0,0001

Source : Analysis Result, 2015

Table 1 shows that those seven equations have diverse The coefficient of determination, where the highest The coefficient of determination are equation 1, 3, 4 and 6 which reached 0.9. Otherwise, the lowest R2 are 2 and 7, with value below 0,5. However, simultaneously, every variable that compose the model has a significant effect because the probability of F value <0.0001. Partially, the results that effect of exogenous variables on the endogenous variables as seen from the t-test probabilities in detail will show as follows:

1. Production (PROD)

In the production equation, involves the independent variable such as the land area (ha), seed usage (kg), total fertilizer usage (kg) and labor (HOK). The results of model parameters simultaneous using 2SLS method can be seen in Table 2.

Table 2. Analysis Result for Production Equation

Variable	Coefficient	Prob-t
Land Area (LL)	2004.641**	0,0535
Use of Seed (PPB)	24.41115	0,9727
Use of Fertilizer Total (PPTot)	2.613661*	0,0069
Use of Labor (TPKR)	2004.641**	0,0535
Prob F	<0,0001	
The coefficient of determination	0.87498	

Source : Analysis Result, 2015

Information : * Significant at level 99% ts : insignificant ** Significant at level 90%

Based on Table 2, the obtained partial results, where the production is affected by land area at the 90 % significant level and total fertilizer use at 99% significant level. Land area affect on production, because land is an important capital to increasing production. Besides land, fertilizer is also considered very significant in

increasing paddy production.

2. Family labor (TKND)

Family labor equation includes a variable allocation of off-farm labor (HOK), allocation of non-agricultural labor (HOK) and land area (ha). Overall, the expected parameter values obtained from the equation has met the economic criteria as shown in Table 3 below:

Table 3. Analysis Result for Family Labor Equation

Variable	Coefficient	Prob-t
Labor of Off-Farm (TKOF)	0.244710**	0.0446
Labor of Non-agricultural sector (TKNP)	0.007117ts	0.9114
Land Area (LL)	11.95238*	<,0001
Prob F	<0,0001	
The coefficient of determination(R^2)	0.33556	

Source : Analysis Result, 2015

Information : * Significant at level 99% ts : insignificant

** Significant at level 95%

Table 3 shows that the R2 value obtained is equal to 0.33556, means that diversity by labor off-farm, family labor and land area only 33.556%. Altough their contribution are small, but simultaneously have a significant effect on family labor because the probability of the F value<0.0001. Partially, as seen from the t probability showed that labor off-farm affect with the trust level of production 95% and land area affect with the trust level of production 99%.

A positive sign of the variable LL, partially affects independent variables, family labor, because each additional area of land will affect the availability of family labor. So if the farmer wants to expand the area to increase the production must be able to provide a sufficient labor. Meanwhile, at the variable labor off-farm which has a positive sign and a partial effect on independent variables, family labor, based on the use of family labor for off-farm activities are easily arranged, because they do off-farm after harvest time or in spare time during maintenance of the paddy.

3. Non Family Labor (TKLK)

Equation of Non Family Labor include the independent variable of family labor (HOK), the number of households (people) and land area (ha). The results of parameter estimation on non family labor equation are:

Table 4. Analysis Result for Non Family Labor Equation

Variable	Coefficient	Prob-t
Labor in the family (TKND)	0.464394ts	0.1475
Number of Households (JRT)	-2.64572ts	0.2193
Land Area (LL)	40.90988*	<,0001
Prob F	<0,0001	
The coefficient of determination (R^2)	0.76233	

Source : Analysis Result, 2015

Information : * Significant at level 99%

Based on Table 4, the value of R2 is very high, reaching 0.76233 or a 76.233% contribution of family labor, number of housholds and land area affect on non family labor. It is also supported that effect of three independent variables either simultaneously or partial marked with a probability value-F and t probability <0.01. In other words, either simultaneously or partially independent variables land area affect the non family labor a confidence level of 99%. The land area has a positive influence on non family labor, this is because at the time of the availability of labor in the family is considered inadequate, then the farmers will seek employment outside the family in order to keep improving production. This is in line with increase in the number of households that also affect non family labor, due to the increasing number of household members increases the chances of farmers to empower labor from outside the family, when it is considered that the availability of the amount of labor in the family is not enough

4. Off-Farm Labor (TKOF)

The land area has a positive effect on TKLK, because the availability of family labor is considered inadequate, so the farmer will seek non family labor to keep improving production.

Table 5. Analysis Result for Off Farm Labor Equation

Variable	Coefficient	Prob-t
Labor in the Family (TKND)	-0.08298[ts]	0.3221
Wage Levels In the off-farm activities (TUPOF)	0.000542*	<,0001
Land area (LL)	0.119038[ts]	0.9267
Prob F	<0,0001	
The coefficient of determination ($R^{2)}$	0.92148	

Source : Analysis Result, 2015
Information : * Significant at level 99% ts : insignificant

Based on Table 5 is known that the three variables family labor, Wage Levels In the off-farm activities and land area simultaneously affect non family labor with the probability value -F <0.0001. Partially, probability variables < 0.01 only on Wage Levels In the off-farm activities. Family labor and land area have no partial effect. Value of The coefficient of determination obtained is also high, reaching 0.92148 or 92.148%, means the contribution of the use of independent variables family labor, Wage Levels In the off-farm activities and land area in the model is 92.148%. The level of wages in the off-farm will affect the level of off-farm labor where if the higher wage rate, the farmer households tend to allocate labor to the off farm to earn extra household income.

5. Non-farm labor (TKNP)

That include In TKNP equation are the independent variable, family labor (TKND), level of farmer education (TPD), the level of non-agricultural wages (TUPNP), farming experience (PUT), land area (LL) and age (UM).

Table 6. Analysis Result for Non Farm Labor Equation

Variabel	Coefficient	Prob-t
Labor in the Family (TKND)	0.309562[ts]	0.4311
Farmer Education level (TPD)	2.641529***	0.0532
Wage level Non-Agricultural Sector (TUPNP)	0.001069*	<,0001
Farming experience (PUT)	-0.56294***	0.0617
Land Area (LL)	-4.08932[ts]	0.5325
Age(UM)	0.827503**	0.0263
Prob F	<0,0001	
The coefficient of determination (R^2)	0.60825	

Source : Analysis Result, 2015
Information : * Significant at level 99% ts : insignificant
Significant at level 95% * Significant at level 90%

Based on Table 6, sixth variables simultaneously, there are family labor, Farmer Education level, non-farm wage, farm experience, land area, and age effect on Non-farm labor with the value of the probability F < 0.0001. Partially, significant variables are Farmer Education level at 90% significant level, Wage level Non-Agricultural Sector at 99% significant level, Farming experience at 90% significant level, and age at the 95% significant level. Values of R2 obtained reaching 0.60825 or 60.825% level of contribution, so that can be interpreted that independent variable like Farmer Education level, non-farm wage, farm experience, land area, and age effect on Non-farm labor only 60.825%.

Non-farm labor positively influenced by Farmer Education level that can be interpreted that the higher the education level, the number of workers outside the agricultural sector will increase. This is certainly supported by the labor requirements that meet the quality standards and competent as civil servants and the armed forces that need resources manuasia highly educated. The level of education also has a relationship with age so that the positive effect also on the increase in the number of non-agricultural employment.

A positive sign of the variable Wage level Non-Agricultural Sector affect on Non-farm labor also based on the increase in non-farm wages that will expand the chances of increase in the number of non-farm labor force, due to with the increase in wages, the farmer expected achieve the welfare.Non-farm labor activities are negatively affected by the experience of farming, means that the more experienced a household in the development in farming, means the greater employment opportunities for the agricultural sector and vice versa.

6. Food Expenditure (PUP)

In food expenditure equation, includes the independent variable total income and the number of households The results of parameter estimation on food expenditure equation are:

Table 7. Analysis Result for Equation of Food Expenditure

Variable	Coefficient	Prob-t
Total income (PDTot)	0.002080[ts]	0.1975
Number of Households (JRT)	113933.7*	<,0001
Prob F	<0,0001	
The coefficient of determination (R^2)	0.91983	

Source : Analysis Result, 2015

Information : * Significant at level 99% ts : insignificant

Based on Table 7, simultaneously, Number of Households and Total income affect PUP with probability value F <0.0001. Partially, only variables Number of Households which is significant, ie at the level of confidence 99%. The coefficient of determination reaches 0.91983, or approximately 91.983%. May mean that the contribution of the use of independent variables total income and number of households to the food expenditure amounted to 91.983%.

Partially, the results of testing the influence of a variable, it can be concluded that the number of household effect on food expenditure. Increasing the number of family members, then the expenditure for food will be greater, because food is a basic requirement for human survival.

7. Non-Food Expenditures (PUNP)

Non-Food Expenditures equation also include independent variables, total income and the number of households. The results of the parameter estimation in the equation for Non-Food Expenditures can be seen in Table 8:

Table8. Analysis Result for Non Food Equation

Variable	Coefficient	Prob-t
Total income (PDTot)	0.003404**	0.0968
Number of Households (JRT)	70299.88*	0.0002
Prob F	<0,0001	
The coefficient of determination (R^2)	0.27186	

Source : Analysis Result, 2015

Information : * Significant at level 99% ** Significant at level 95%

Based on Table 8, simultaneously Number of Households and total income variables, affect the Non-Food Expenditures with probability value -F <0.0001. Partially, variables that affect the Non-Food Expenditures is total income at 95%, while Number of Households at 99% significant level. The value of coefficient of determination obtained is 0,27186 or 27,186% means the contribution of the use of independent variables total income and Number of Households at 27,186%.

Positive sign of the variables total incomet can be defined as an increase of 1 USD, will increase the total income and also for non-food expenditures such as education, health, and clothing. The number of household also affects non-food expenditure. It is also due to the tendency of the greater household number, then the needs of non food will be greater. For non-food expenditures. simultaneously, number of Households and total income variables affect the Non-Food Expenditures with F probability value < 0.0001. Partially, the two variables that affect the total income at a rate of 95% and number of Households at the 99% significant level.

CONCLUSION

1. Simultaneously, every variable that makes up the model has a significant effect because the probability of F value <0.0001.
2. Partially, the results of testing the effect of exogenous variables on endogenous variables as seen from the t-test probabilities:

a. For the production equation, obtained partial results, production is influenced by land area at the 90% significant level and usage of fertilizer at 99% significant level.
b. For the family labor equation showed that land area affect the production at the level 99%.
c. Then for equation of non-family labor, independent variables family labor, land area affect the non family labor with a significant level of 99%.
d. There are family labor, Land area, and off-farm wage effect on off-farm labor with F probability value <0.0001. Partially, only Wage Levels In the off-farm activities that have a probability value < 0.01.
e. For non farm labor, family labor, farmer education level, non-farm, wage level non agriculture sector, farm experience, land area and age effect with the value of the probability-F<0.0001. Partially, significant variables are farmer education level at 90% significant level, wage level non agriculture sector at 99% significant level, farming experience at 90% significant level, and age at the 95% significant level. Coefficient determination values obtained reaching 0.60825 or 60.825% level of contribution.
f. For food expenditure equation, simultaneously, variables number of housholds and total income effect on with F probability value < 0.0001. Partially, significant variables only number of housholds at 99% significant level.

g. For non-food expenditures, simultaneously, number of households and total income variables affect the non food expenditure with F-probability value <0.0001. Partially, show that the two variables that affect the non food expenditure, total income at a rate of 95% while number of households at the 99% significant level.

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