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Staple Food Self-Sufficiency of Farmers Household Level in The Great Solo

Darsono[1]
Agribusiness Study Program, Faculty of Agriculture, Universitas Sebelas Maret
Jl. Ir. Sutami No. 36 Surakarta, Central Java Indonesia 57126.

E-mail: darsono.uns.solo@gmail.com

Abstract. Analysis of food security level of household is a novelty of measurement standards which usually includes regional and national levels. With household approach is expected to provide the basis of sharp food policy formulation. The purpose of this study are to identify the condition of self-sufficiency in staple foods, and to find the main factors affecting the dynamics of self-sufficiency in staple foods on farm household level in Great Solo. Using primary data from 50 farmers in the sample and secondary data in Great Solo (Surakarta city, Boyolali, Sukoharjo, Karanganyar, Wonogiri, Sragen and Klaten). Compiled panel data were analyzed with linear probability regression models to produce a good model. The results showed that farm households in Great Solo has a surplus of staple food (rice) with an average consumption rate of 96.8 kg/capita/year. This number is lower than the national rate of 136.7 kg/capita/year. The main factors affecting the level of food self-sufficiency in the farmer household level are: rice production, rice consumption, land tenure, and number of family members. Key recommendations from this study are; improvement scale of the land cultivation for rice farming and non-rice diversification consumption.

1. Introduction

Food crisis continues to arise when the macro economic factors tend to shock. On the other hand, Indonesia is the largest on the rice as staple food consumption in Asia with the 169 kg/capita/year, average on Asia is 100kg/capita/year [1]. National program to keep stability staple food with the challenges of food insecurity staple sourced from many aspects, such as population control, reduced productivity of staple food commodities, the use of food for renewable energy, even political issues [2]. Programs to achieve food security principal indicated stuck on the macro policy aggregation that are so often ineffective to achieve sustainable food security principal. There are necessary to find the most upstream source of problems in formulating policy.

Analysis of household food self-sufficiency rate is new challenges in the self-sufficiency on the longstanding term [3]. Achievement of food self-sufficiency is generally an increase in the availability of food to the scope of the region, or nationwide. Its main target is the food commodities from agricultural products such as rice, corn, soybeans, peanuts, green beans, cassava, sweet potato. The strategy for food self-sufficiency is to substitute imports with expected target is to increase food production by farmers. Results of food availability met by domestic products (not imported) [4]. The concept of self-sufficiency has been established, then develop a new conception of the self-sufficiency and food sovereignty. But the last major debate is still going on in the world.

Concentration of staple food insecurity and poverty in Indonesia are mostly located in the rural households who are farmers (60%) of the total national poverty rate (11.3 %) [2,5]. Formula-based food policy tends to macro data that are often not able to uncover specific issues existing household level, where the level is the main problem. These were based on the fact that food insecurity situation occurs where food is available but can not be accessed due to the limited resources of households owned economic (income, employment, economic resources). This is consistent with the opinion of Saliem et. al. [6], and Litle et. al. [7], that food production is not the sole determinant of food security, it is only one factor. To date in Indonesia, among many practical and bureaucrats do not understand the sense of self-sufficiency to food security. As a result of these circumstances the concept of food security is often identified with increased production or supply of sufficient food [8]. Darsono Studies [3] find factors that affect the level of household food security in the dryland farmers Wonogiri are: family size, consumption of rice, the total income of farm households, and the exchange rate farmers. Maintain household food security in the drylands Wonogiri district by promoting policies staple and secondary food crops, increased participation of the workforce is employed in agriculture crops and improve farmers' exchange value.

Deepening analysis food security at farmers household level is important to provide a measure of the dynamics on the local staple food insecurity will contribute staple food security policy formulation. More specifically is, farmers as producers of staple food commodities is also indicated on the position of at risk of food shortages. A phenomenon that should be explored in order to find the main factors that cause it. This study is expected to answer the paradoxical phenomenon. The use of object-scale survey in Great Solo region will describe the dynamics of self-sufficiency in staple food on the rice farm household level because this area is one of the national rice granary. The purpose of this study are: (1) identify the condition of self-sufficiency in staple food farming households in Great Solo, (2) analyze the adequacy of staple food availability, in Great Solo, (3) found the main factors affecting the dynamics of self-sufficiency in staple foods farm household level in Great Solo.

2. Experimental

This study is an extension of the previous regional scale studies used only one district (Wonogiri) into all the termed former residency of Surakarta (Surakarta city; and district of Boyolali, Sukoharjo, Karanganyar, Wonogiri, Sragen, Klaten) termed Great Solo or Surakarta Kingdom. The basic method is a descriptive study, with in-depth analysis [10]. Food commodities analyzed were rice as a main food and micro strategic base on World Food Programme Guidelines [11]. Research sites in Surakarta (for secondary data); Boyolali, Sukoharjo; Karanganyar; Wonogiri (based on previous year data); Sragen, and Klaten.

2.1. Food Security Analysis

To measure the level of household food security levels used rice balance formula: SPSE = (Number of monthly rice production/S) - (consumption of all households for one month/D). Balance between supply (S) and Demand (D = private consumption needs) there are 3 levels, that is surplus/food secure (S greater than D, the value of SPSE> 1), balanced (S = D, SPSE value = 1), and deficit/not food secure (S less than D, the value of SPSE <1).

To determine the level of self-sufficiency in staple food farming households developed semi-log regression equation as follows:

$$SPSE = a+b_1\log(PRODUCTION)+b_2\log(CONSUMPTION)+b_3\log(NTP)+b_4\log(LPST)+ b_5\log(PDKK)+b_6\log(JAK)+b_7\log(PTRT)+ b_8\log(USIA)+ei \quad (1)$$

Description: SPSE: Balance of rice farming households, namely the balance of production and consumption of households is the difference between production and consumption is approached in the last one month (kilograms). PRODUCTION: Total production of rice in the farm for 1 (one) month in the last growing season (kilograms). CONSUMPTION: Total consumption of rice whole family for 1 (one) month (kilograms). NTP: Farmers Exchange value, is the ratio between the index of prices received by farmers (It) with the index of prices paid by farmers (Ib) expressed as a percentage. NTP is conceptually measuring the ability of the exchange of goods of agricultural products produced by farmers with goods or services consumed by households of farmers and their purpose in producing agricultural products. Formula for the calculation of the Farmers Exchange:

$$NTP = \frac{It}{Ib} \times 100 \qquad (2)$$

Description: NTP = Farmers Exchange, It = index price received by farmers, Ib = Index price paid by farmers.
LPST: total rice cultivation area in rice farming (hectares). PDKK: Education of household head (years). JAK: Number of family members (people). PTRT: total household income (Rupiah). AGE: age of the household head farmer (years). ei: Error (error) arising on observations to i assumed as random variables independently distributed with mean equal to zero (Ordinary least square /OLS method). a: intercept, and b: regression coefficient.

Variable coefficient estimation was conducted using OLS (Ordinary Least Squares) then the error term (e) is minimized. Panel data is used as a combination of spatial data (from analysis LQ) and the moment of data (cross section) of the farm household level primary data.

2.2. Testing the model

To determine how much influence estimator variables on the level of household food security of farmers, as well as test the accuracy of the model used coefficient of determination (R^2). Value (R^2) ranging from 0 to 1, the greater the value (R^2), the greater the influence of variables estimators of the amount bid. To determine whether the variables used jointly affect household food security levels farmers used the F test with a confidence level of used 90%, 95%, and 99%.To determine the effect of each predictor variable on the level of food self-sufficiency farming households t test was used with a level of confidence that is used 90%, 95%, and 99%. To determine which variables are most influential on food self-sufficiency standard used value of the partial regression coefficient t-test analysis. Estimation of variable coefficients using SPPSS software version 19.

2.3. Classical Assumptions Testing

Once the model is obtained then have to test the model includes BLUE (Best Linear Unbiased Estimator) or not. The model is said to BLUE if it fulfills the following requirements; non multicollinearity; avoid multicollinearity can be detected by looking at the value of the matrix Pearson Correlation (PC) with a value of less than 0.8 [12], [13]. Not a case of Heteroskidastity; heteroskedatisitas test conducted by park test and scatterplot charts are spread randomly. Not a case of autocorrelation; performed using statistical test of Durbin Watson d with the following criteria: (1) 1.65 <DW <2.35, which means no autocorrelation, (2) 1.21 <DW <1.65 or 2, 35 <DW <2.79 which means it can not be inferred, and (3) DW <1.21 or DW> 2.79 which means there is autocorrelation.

2.4. Data and Data Sources

Primary data include household farmers who represent districts with a base of rice (25 farmers) and non-rice basis (25 farmers), total data are 50 farmers. The selection of samples was done by the farmers proporsive with random sampling based on considerations such as the representation of research surplus and deficit dynamics rice household level, education level, family size, and total household income level.

3. Results and Discussion

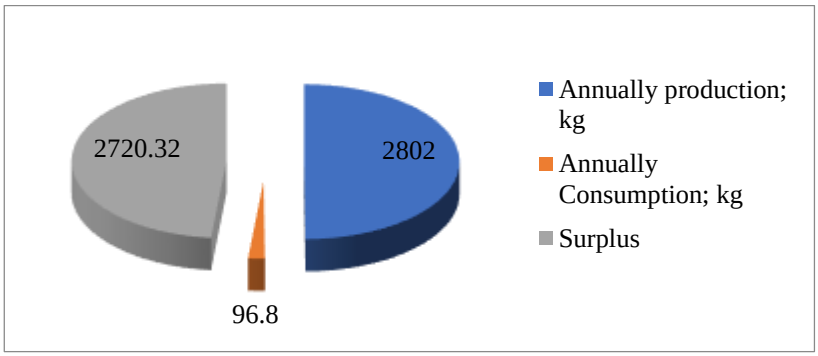
3.1. Analysis Farmer Household Staple Food Conditions

In Figure 1, note that the balance of rice farming households in Great Solo surplus situation for an average of 2750.2 kg/capita/year. If the number is a stock that is actually stored by the farmers, in the farm household level in Great Solo reached sufficiency/food staple rice self-sufficiency. Unfortunately sizable surplus was "forced" to be sold to meet non-food needs of families whose number is much higher than the basic food needs. This was compounded by a low on farmers exchange value. The level of per capita consumption of rice farming households Great Solo average of 96.8 kg/capita/year. This number is much lower than the national rate of 136.7 kg/capita/year [14], [15], [16].

3.2. Key factors Farmers Household Staple Food Self-Sufficiency

Test results merit level models Great Solo region indicated by the R^2 value of 0.266 manifest until the confidence level up to 99 % (α = 1 %) is indicated by the F test Because less powerful models can explain the dynamics of food security at the regional level, then the next (in the next section) will be analyzed at the micro household level. Model at the household level, the real value of R^2 is 0.997 confidence level up to 99 % (α = 1 %). It means that all the independent variables were entered

(specified) in the model is able to better explain the dynamics of real influencing on household food security of farmers in Great Solo at 99%. The factors outside the model that describes the dynamics of food security is only about 1 %.



Sources: Primary Data Analysis (2013).

Figure 1. Household Staple Food Balance Sheet Regional Farmers Great Solo

Testing for the classical regression model assumptions used include (1) multicollinearity test based on the value of Pearson Correlation Matrix is known that the correlation between the independent variables are worth no greater than 0.8. It can be concluded that there is no multicollinearity among the independent variables affecting food security in the region and the Great Solo farm household level, (2) autocorrelation test to detect the presence or absence of autocorrelation used Durbin Watson d- statistics and analysis of the results obtained d values of 1.697 and 1.917 level, region level farming households. Because the value of d is obtained located at 1.65 < DW < 2.35 it can be concluded that there is no autocorrelation, (3) heteroscedasticity test is done by using a scatterplot diagram. From the results of analysis show that there are points in the scatter diagram and do not form a particular pattern which means it does not happen heteroscedasticity. It can be interpreted that the errors have the same variance was going homoskedastisitas [12].

3.3. Main Factors Influencing the Dynamics of Farmers Household Food Security Levels in Great Solo

As presented in Table 1; partially significant variables on the dynamics of food security at the household level up to the Great Solo confidence level of 99% or α = 1% is; production of rice, rice consumption, amount of land tenure and family members.

Table 1. Effect of Variables on Household Food Security Farmers in Great Solo

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.064	.312	-.206	-.206	.838
Production	1.162***	.021	54.361	54.361	.000
Consumption	-.081**	.039	-2.087	-2.087	.043
Total Expenditure	-.054^{NS}	.044	-1.240	-1.240	.222
Farm income	-.003^{NS}	.026	-.131	-.131	.896
Total Land Tenure	.058*	.031	-1.853	-1.853	.071
Education of Household Head	.054^{NS}	.046	1.186	1.186	.243
Number of Family Members	.147***	.050	2.970	2.970	.005
Total Household income	.011^{NS}	.032	.345	.345	.732
Age	-.103^{NS}	.073	-1.413	-1.413	.165

Dependent Variable: Balance of Rice

Source: primary data analysis (2013)

Description : *** = significant to the 99 % confidence level (α = 1 %), ** = significant to the 95% confidence level (α = 5 %); * = significant to the 90 % confidence level (α = 10 %), NS = not significant until the 90 % confidence level (α = 10 %).

Standard regression coefficient indicate rank of variables that affect the household food security of farmers in Great Solo. The greater the value of the regression coefficient, the greater the influence of the independent variables.

Table 2. Variable Regression Standard koefisisen value (Key Factors) which Influential Against Household Food Security Dynamics Farmers Great Solo

Variable	Partial regression coefficient of variable	Rating
Rice production	1.3014	1
Rice consumption	-0.2045	2
Tenure	0.10417	3
Family size	0.48479	4

Source: Primary data analysis (2013)

Analysis of the main factors that affect farmers' household food security based on the order of magnitude in Great Solo coefficients are presented in Table 2. Based on the order of magnitude after the partial regression coefficients weighted by the standard regression coefficients then the greatest effect are the production of rice, rice consumption, land tenure, and number of family members. The four main factors that increase 1 unit will be significantly used effects on household food security status opportunities farmer respectively in Great Solo at 1.3014; -0.2045; 0.10417; 0.48479 units of surplus rice staple food commodities .

Rice production is the main factor of the most influential, so efforts to increase rice production, especially with intensification in Great Solo is still needed. From the description can be summarized that the main factors affecting food security at household level farmers in Great Solo are: (1) the number of family members (participation age to work in the agricultural sector), (needs improvement); (2) the production of rice, (need to increase productivity); (3) the acquisition and exploitation of land, (there needs to be institutional innovation and intensification of land). Of the main factors affecting consumption are : (1) consumption of rice, (need to decrease/diversification). In terms of the welfare of farmers , the main factors that influence are: (1) the production of rice, (need to increase productivity); (2) land tenure, (need to increase the intensity); (3) farmer exchange value, (needs improvement). These findings are in line with and confirms the main factors affecting food security at regional level aggregate in Great Solo, except exchange rates and household income farmers.

4. Conclusions

Conclusions of this study are first, consumption of rice per capita farming households in Great Solo average of 96.8 kg/capita/year. This number is much lower than the national rate of 136.7 kg/capita/year. Third, food balancing of Farmers household was surplus carbohydrate (rice was 676.33 kg and 2.13 kg maize) during the growing season. However, farmers exchange value is very low at 0.35. Value of surplus agricultural food production deficit more to meet non-food needs. This is the main source of farm household poverty. Fourth, the main factor in the level of farmer households in Great Solo will be influence on food self-sufficiency opportunities are: rice production, rice consumption, land tenure, and number of family members.

Recommendations from this research are first, farm household consumption needs improvement in terms of diversification of food sources so not depending on rice. Second, strengthening food security at the regional level with a reduced number of Great Solo family members (in the long run) , decrease in the level of per capita consumption of rice, accompanied by intensification of rice production through improved in institutional of expanse scale farming, fixes and improve the farmers exchange value to increase the farmer household welfare. Third, strengthening food security at the farmers household level in Great Solo with increased productivity of rice to meet the feasible scale, lowering the level of consumption per capita rice consumption, land tenure, and in the long term reduce the number of family members. Fourth, realizing food self-sufficiency at both the regional and farm households still need in Great Solo effectiveness of policy instruments menyakut rice production and consumption management.

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