Revitalization Model of Community Granary Institutional as Strengthening of Food Self-Sufficiency in Takalar District

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Abstract: *This study aims to determine the factors that correlate and affect the institutional revitalization granary that support the strengthening of food self-sufficiency, and to formulate a model of granary institutional revitalization that support the strengthening of food self-sufficiency. This study was conducted in Takalar District, South Sulawesi Province, Indonesia, at the three subdistricts (Galesong, North Galesong, North Polombakeng). Sampling was conducted using random (for farmers who are non-members of the granary) and purposive method (for farmer member granary). This type of data is a primary and secondary data. Methods of data analysis is descriptive statistical analysis and SEM (Structural Equation Model). The results of this study indicate that the determinants ongranary institutional revitalization is the participation of farmers, the function and role of granary institutional, and supporting systems (structural and cultural). Supporting system significantly positively correlated with functions and roles (91.7%), and were significantly positively correlated with farmers' participation (51.9%). Participation of farmers significantly positively correlated with function and role is 70.2 percent. Factors that influence positively and significantly (94.8%) of thegranary institutional revitalization is a supporting system. Institutional revitalization of granary has not significantly influence the level of food self-sufficiency in the local area. Structural model of granary institutional revitalization as strengthening food self-sufficiency resulting from the analysis of SEM is quite feasible and can also be modified models.*

Keywords: granary, institutional, revitalization, food self-sufficiency

1. Introduction

Community granary (food barn) is one of the institutional of food reserve of society in rural area which basically has the main purpose to overcome food insecurity in bad season and during natural disaster. In addition to serving as a postponement of selling, food barn is also a supporting institution of self-sufficiency and local food security, so if the performance of the food barn is better then it is expected the local community also increasingly self-sufficiency and food security (Mardiyati, 2014).

National food reserves consist of central government food reserves, local government food reserves, and community food reserves, which are undertaken to anticipate food shortages, excess food availability, food price volatility and emergencies. Local government food reserves consist of village government food reserves, district government food reserves, and provincial government food reserves. Community food supply development activities are aimed at developing community food barns, which aim to: (a) increase the stock of food reserves for community needs due to uneven production throughout the year; (B) ensuring access and sufficiency of food for the poor and vulnerable of food that requires adequate food security and (c) as food aid to meet the needs of the community in times of emergency (Food Security Agency, 2015).

Law No. 18 of 2012 on food, mandated that the government and local governments facilitate the development of community food reserves in accordance with local wisdom. The development of community food reserves is done in order to empower and protect the people from food insecurity, by facilitating the physical construction of the barns, the replenishment of food reserves, and the strengthening of group institutions. Through the empowerment, it is expected that the community can manage the existing food reserves in groups, and also can increase the role in carrying out the economic function for its members, so as to maintain and develop the food reserves that are owned (Regulation of the Minister of Agriculture, 2015).

According to Rachmat, et al. (2010), the food barn is a food reserve institutional developed in the community. Food barns not only serve as food warehouses to overcome the problem of food shortages during the famine and disaster conditions, but also develop into institutional financing that serves the needs of capital and production facilities for the community. Strengthening community food reserves can be pursued through institutional development of food barns in rural areas.

The granary of the community is also one of the postponement institutions selling which is the supporting institution of local food security. Its main function is to support collective food reserves which are temporarily more social. Through the diversification of food barns activities also provide an opportunity for increased income for its members. With the current development of distribution and trading systems, the food barn institution has the potential to develop into a rural economic institution that operates both upstream and downstream activities of food production (Irham, 2006).

According to Hariyadi (2012), food self-sufficiency is a domestic food production capability supported by food security institutions capable of ensuring adequate food supply at the household level, both in quantity, quality, security and affordability, supported by diversity food

sources, and in accordance with local diversity. Simatupang (Rachman, et al., 2005) suggests that food self-sufficiency is one dimension of measuring food security. Some indicators that can be used to measure food security in terms of food self-sufficiency include (1) dependence on national food availability on domestic market, (2) dependence on national food availability on imported food and / or import net, and (3) dependence on national food availability transfer of food from parties or other countries.

Strengthening community food reserves in their work requires the revitalization of institutional food barns towards a more strategic direction, especially in reducing the number of households that are vulnerable to food. The management of food reserves is a necessity to maintain the stability of food supply so that people can meet their food needs at all times, and create stable food supply in filling the gap between production and demand, especially during disasters, famine and to maintain price stability.

The objectives of this research are: (1) to analyze the existence of function and role of community granary institutionalin strengthening the food self-sufficiency; (2) to formulate the institutional development of community food barns (granaries) that synergize the structural and cultural aspects; (3) determination of institutional revitalization of food granary supporting the strengthening of food self-sufficiency; (4) to formulate a revitalization model of community food barns institution, based on local resources and strengthening food self-sufficiency.

2. Research Methods

The study was conducted in Takalar District, South Sulawesi Province, Indonesia, in three sub-districts (Galesong, North Galesong, North Polombakeng). Determination of location is done purposively because this area already have institution of food granary society which receive social assistance from government program.

Sampling is done by random sampling method (farmer as non-member of granary group) and purposive sampling method (farmer as member of granary group). The sample amount is 50 each, so the total sample is 100 farmers. The type of data used is primary and secondary data. Methods of data analysis are descriptive statistical analysis and SEM (Structural Equation Model)with assisted software AMOS21.

Variables and indicators for the revitalization model of community granaries institutional as strengthening food self-sufficiency:

Unobservable Variable	Notation	Observable Variable
Farmers' Participation	X11	Planning
	X12	Implementation/Utilization
	X13	Contribution
	X14	Management
	X15	Socialization
Functions and Roles	X21	Food Reserves
	X22	Food Insecurity
	X23	Food Distribution
	X24	Value-added
	X25	Social Economics
Supporting	X31	Government Policy
System	X32	Organizational Structure
	X33	Norms / Cultural Values
	X34	Human Resource Performance
	X35	Infrastructure
Revitalization of GranariesInstitutional	Y11	Improved Function / Role
	Y12	Institutional sustainability
	Y13	Value Added and Distribution
	Y14	Stabilization of Food Prices
	Y15	Capacity of Food Barns
	Y16	Multi Commodities
Food Self-Sufficiency	Y21	Main Staple Food
	Y22	Iron Stock on Staple Food
	Y23	Food Accessibility
	Y24	Income / Welfare
	Y25	Rice Agribusiness Improvement

Based on the relationship between latent variables as a whole then can be prepared equation of structural model and measurement model as follows.

Equations for Structural Models:

$$\eta_1 = \gamma_{11}\xi_1 + \gamma_{12}\xi_2 + \gamma_{13}\xi_3 + \gamma_{14}\xi_4 + \gamma_{15}\xi_5 + \zeta_1$$
$$\eta_2 = \gamma_{21}\xi_1 + \gamma_{22}\xi_2 + \gamma_{23}\xi_3 + \gamma_{24}\xi_4 + \gamma_{25}\xi_5 + \gamma_{26}\xi_6 + \beta_{21}\eta_1 + \zeta_2$$

Equations for Measurement Models:

Exogenous Concept	Endogenous Concept
$X_{11} = \lambda_{11}\xi_1 + \delta_1$	$Y_{11} = \lambda_{11}\eta_1 + \varepsilon_1$
$X_{12} = \lambda_{21}\xi_1 + \delta_2$	$Y_{12} = \lambda_{21}\eta_1 + \varepsilon_2$
$X_{13} = \lambda_{31}\xi_1 + \delta_3$	$Y_{13} = \lambda_{31}\eta_1 + \varepsilon_3$
$X_{14} = \lambda_{41}\xi_1 + \delta_4$	$Y_{14} = \lambda_{41}\eta_1 + \varepsilon_4$
$X_{15} = \lambda_{51}\xi_1 + \delta_5$	$Y_{15} = \lambda_{51}\eta_1 + \varepsilon_5$
$X_{21} = \lambda_{12}\xi_2 + \delta_6$	$Y_{16} = \lambda_{61}\eta_1 + \varepsilon_6$
$X_{22} = \lambda_{22}\xi_2 + \delta_7$	$Y_{21} = \lambda_{12}\eta_2 + \varepsilon_7$
$X_{23} = \lambda_{32}\xi_2 + \delta_8$	$Y_{22} = \lambda_{22}\eta_2 + \varepsilon_8$
$X_{24} = \lambda_{42}\xi_2 + \delta_9$	$Y_{23} = \lambda_{32}\eta_2 + \varepsilon_9$
$X_{25} = \lambda_{52}\xi_2 + \delta_{10}$	$Y_{24} = \lambda_{42}\eta_2 + \varepsilon_{10}$
$X_{31} = \lambda_{13}\xi_3 + \delta_{11}$	$Y_{25} = \lambda_{52}\eta_2 + \varepsilon_{11}$
$X_{32} = \lambda_{23}\xi_3 + \delta_{12}$	
$X_{33} = \lambda_{33}\xi_3 + \delta_{13}$	
$X_{34} = \lambda_{43}\xi_3 + \delta_{14}$	
$X_{35} = \lambda_{53}\xi_3 + \delta_{15}$	

3. Results and Discussion

3.1 Determination of Revitalization Modelof Community Granary Institutional

Farmers' Participation
Farmer participation is a latent variable that is measured through the assessment of the participation of farmers in various institutional activities of granary, especially in planning activities, implementation/utilization, contribution, management, and socialization. Mubyarto (1984) community participation in rural development should be interpreted as a willingness to help the success of each program in the capacity of everyone without sacrificing self-interest. It is further argued that in the most ideal circumstances the participation of the community is a measure of the level of people's participation.

Table 1: Test of Validity and Reliability of Farmer Participation Indicators on Granaries Institutional

Farmers' Participation	Average Score	Validity ($r_{pearson\ correlation}$)	Reliability (Alpha)
Planning	2,78	0,861***	0,709
Implementation	3,27	0,776***	0,746
Contribution	2,88	0,414***	0,859
Management	2,79	0,727***	0,763
Socialization	2,65	0,897***	0,682
Farmers Participation Rate = 57,48% P = 0,0000 Cronbach's Alpha = 0,800 ***) = significant at level α = 0,01			

Source: Primary Data Analysis, 2016.

All indicators that measure farmers' participation construct variables are proven to be valid and reliable. The results of the analysis indicate that the validity test of all instruments or indicators proves significant at a one percent error level, whereas reliability testing proves that all instruments have an alpha value greater than 0.5 so it is very reliable (Table 1). The results of this analysis indicate that these five indicators have a high degree of accuracy as a determinant of farmers' participation. Farmers' participation rate in various institutional activities of granary can be classified moderate ie reaching score 57,48 percent. The implementation/utilization indicator has the highest average score (3.27) compared to other indicators, while the socialization indicator has the lowest average score (Table 1). This means that the participation or participation of farmers in terms of utilization of programs implemented by the granary group is quite contributive. However, the participation of farmers in the planning and contribution of program activities, organizational management in terms of decision making, and socialization is still relatively low.

Function and Role of Granaries Institutional

In improving the role of food reserve institutional, the government seeks to grow the food barns through the guidance and provision of capital assistance incentives. The coaching efforts are aimed at: (1) increasing community participation in the granary group, (2) increasing the group's business capital (group savings); (3) increased production and productivity of farming and income of farmer group beneficiaries; (4) behavioral change from self-employed habits themselves to working in groups or jointly fostering advanced farmer groups (Rachmat, et al., 2010). In this study, the functions and roles of food barn groups are variables measured through indicators of food reserves, food insecurity, food distribution, added value, and socio-economic.

Table 2: Test of Validity and Reliability on Function and Role Indicators ofGranaries Institutional

Function and Role	Average Score	Validity ($r_{pearson\ correlation}$)	Reliability (Alpha)
Food Reserves	3,32	0,822***	0,674
Food Insecurity	3,12	0,810***	0,676
Food Distribution	2,85	0,847***	0,649
Value-added	2,44	0,434***	0,802
Social Economics	2,48	0,598***	0,760
Rate of Function and Role = 56,84% P = 0,0000 Cronbach's Alpha = 0,765 ***) = significant at level α = 0,01			

Source: Primary Data Analysis, 2016.

The five indicators (food reserves, food insecurity, food distribution, value added, socioeconomic) proved to be valid and reliable to measure construct variablesfunctions and role of granaries institutional. Significant r value at one percent error level and cronbach's alpha value of 0.765 proves that all indicators used are valid and reliable (Table 2). Thus, these five indicators are suitable for further statistical analysis because they have been proven to have a high degree of accuracy as a determinant factor of variables functions and role of granaries institutional.

The existence of function and institutional role of food granary is classified as moderate that is 56,84 percent. Food stocks are the indicators with the highest average score of 3.32, while the added value indicator has the lowest average score of 2.44 (Table 2). This is in line with the factual condition that the function and role of institution of food granary is still dominant as food reserve.

Supporting System ofGranaries Institutional

Supporting system of granaries institutional is one of the latent variables (unobservable variable) used in this SEM analysis. Indicators used to measure the support system on the granaries institutional include government policy, organizational structure, cultural norms/values, human resource performance, and facilities/infrastructure.

All indicators used to measure the supporting system variables on the granaries institutional proved to be valid and reliable. Results of the analysis showed that test the validity of all the instruments or indicators proved significant at the level of error of one percent, while the reliability testing to prove that all the instruments have an alpha value greater than 0.5 so that highly reliable (Table 3).

Table 3: Test of Validity and Reliability on Supporting System Indicators of Granaries Institutional

Supporting System	Average Score	Validity ($r_{pearson\ correlation}$)	Reliability (Alpha)
Government Policy	3,56	0,827***	0,756
Organizational Structure	3,30	0,847***	0,760
Norms/Cultural Values	3,15	0,770***	0,777
Human Resource Performance	2,90	0,646***	0,817
Infrastructure	3,14	0,712***	0,796
Rate of Supporting System = 64,20% P = 0,0000 Cronbach's Alpha = 0,819 ***) = significant at level α = 0,01			

Source: Primary Data Analysis, 2016.

The institutional support system of granaries, which has been measured through several indicators shows a high percentage of 64.20 percent. The average score of government policy scores (3.56) and organizational structure (3.30) is an indicator that contributes considerably in increasing the value of institutional support systems of granaries. Meanwhile, for the human resource performance indicator has the lowest average score of 2.90 so that less give contribution to the improvement of institutional support system of granaries (Table 3). This is reasonable because most of the food barns in the region are still totally dependent on social assistance from the government,

especially the Ministry of Agriculture through the Food Security Agency.

Institutional Revitalization of Community Granary

Revitalization of communitygranary institutional is an effort to increase the success of institutional management activities of granary communities which viewed objectively. Indicators of institutional revitalization include: improved function and role, institutional sustainability, added value and distribution, stabilization of food prices, capacity of food barns, and multi commodities.

Table 4: Test of Validity and Reliability on Indicators Revitalization of Granaries Institutional

Revitalization of Granary Institutional	Average Score	Validity ($r_{pearson\ correlation}$)	Relia-bility (Alpha)
Improved Function/Role	3,75	0,725[***]	0,644
Institutional Sustainability	3,47	0,601[***]	0,699
Value Added and Distribution	3,36	0,705[***]	0,652
Stabilization of Food Prices	2,89	0,501[***]	0,740
Capacity of Food Barns	2,82	0,712[***]	0,613
Multi Commodities	2,96	0,584[***]	0,715
Rate of Granary Revitalization = 64,17% P = 0,0000 Cronbach's Alpha = 0,718 ***) = significantat level α = 0,01			

Source: Primary Data Analysis, 2016.

The six indicators (functional/role enhancement, institutional sustainability, value added and distribution, food price stabilization, food barn capacity, multi commodities) proved to be valid and reliable to measure the variable of institutional revitalization of food barn granaries. Significant r value at one percent error level and cronbach's alpha value of 0.718 proves that all indicators used are valid and reliable (Table 4). Therefore, the six indicators are feasible to be used for further statistical analysis because it has been proved to have a high degree of accuracy as a determinant variable revitalization institutional food barns.

In general, the level of institutional revitalization of food barn is classified into high category ie 64.17 percent. Improved function and role is an indicator that has the highest average score of 3.75, while the capacity of food barn has the lowest average score of 2.82 (Table 4). This fact can happen because the existence of food granary groups in this region is still relatively new (not yet reached five years, re-established ahead of social assistance from the government), so the revitalization program is heavier towards improving the function and role of food barns. On the other hand, the capacity of community food barn is still relatively very less.

Food Self-Sufficiency

Food self-sufficiency at the local level is the ability of a region to meet basic food needs independently (local produce), which in this case is measured through basic household food indicators, iron stock on basic food, food accessibility, income/welfare, and rice agribusiness improvement. The five indicators proved valid and reliable to measure the variable of food self-sufficiency. Significant r value at one percent error level and cronbach's alpha value of 0.768 proves that all indicators used are valid and reliable (Table 5). Thus, these five indicators are appropriate to be used for further statistical analysis because it has been proven to have a high degree of accuracy as a determinant variable of food self-sufficiency at the regional/local level.

Table 5: Test of Validity and Reliability on Indicatorsof Food Self-Sufficiency

Food Self-Sufficiency	Average Score	Validity ($r_{pearson\ correlation}$)	Reliability (Alpha)
Main Staple Food	4,01	0,577[***]	0,772
Iron Stock on Staple Food	3,31	0,847[***]	0,658
Food Accessibility	3,67	0,801[***]	0,683
Income / Welfare	2,76	0,851[***]	0,655
Rice Agribusiness Improvement	2,29	0,463[***]	0,810
Rate of Food Self-Sufficiency = 64,16% P = 0,0000 Cronbach's Alpha = 0,768 ***) = significantat level α = 0,01			

Source: Primary Data Analysis, 2016.

Food self-sufficiency at the local level, as measured by several indicators shows a high percentage of 64.16 percent. The average score of household staple food scores (4.01) and food accessibility (3.67) is an indicator that contributes considerably in increasing the value of food self-sufficiency. Meanwhile, the indicator of agribusiness of rice developed has the lowest average score of 2.29, thus less contributing to the increase of food self-sufficiency (Table 5). This can happen because most of the local farming community has been able to meet the needs of its staple food through its own production. The existence of food granary groups in this region is still completely dependent on social assistance from the government, especially the Ministry of Agriculture through Food Security Agency, so it has not fully able to influence the development of agribusiness, especially rice agribusiness.According to Mardiyati (2014), the performance of food barn has a positive effect on food self-sufficiency in rice farmers' households during the second growing season or dry season.

3.2 Structural Model of Institutional Revitalization of Community Granaryas Strengthening Food Self-Sufficiency

SEM analysis method (Structural Equation Model) is done to explain thoroughly the relationship between variables that exist in the research. The structural equation model is one multivariate analysis that can analyze complex relationships among variables. Structural model is able to reflect the relationship of one variable with other variables in the form of correlation and influence. According to Suradisastra (2006) the main components in institutional revitalization that play an important role in the process of regional development are community participation, clear impacts, and support systems. The influence of factors: farmer participation, function/role, supporting system, and revitalization of community granary on food self-sufficiency is presented through SEM model (Figure 1).
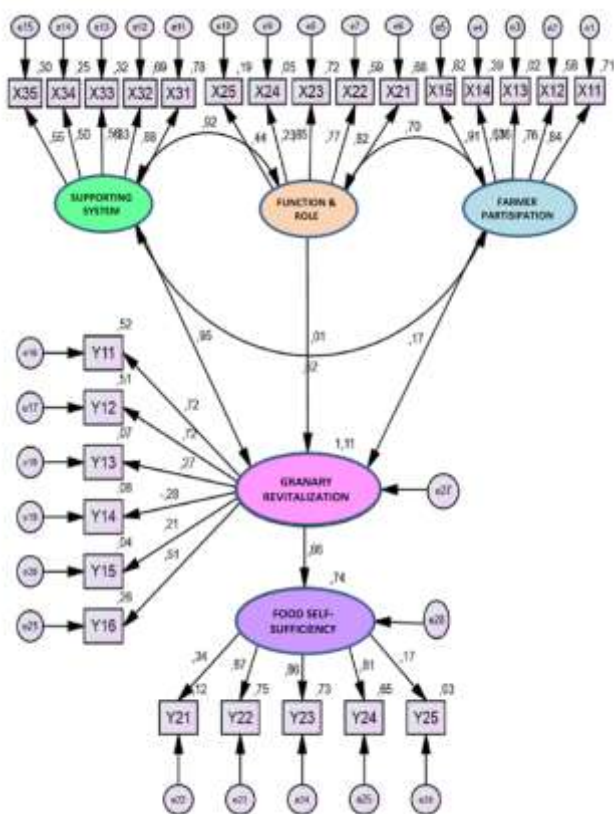
Figure 1: SEM Model of Institutional Revitalization of Community Granary as Strengthening Food Self-Sufficiency

In SEM analysis does not avoid the occurrence of autocorrelation because the structural model explains the relationship between variables complex. The correlation values between these variables can be seen from the estimation of the coefficient of covariance.

Table 6: Result of Covariance Estimation Analysis on Revitalization Model of Institutional Granary Community

Covariance			Estimate	P
Support System	↔	Function Role	0,116	0,001
Support System	↔	Farmer Participation	0,176	***
Farmer Participation	↔	Function Role	0,195	***

Source: Primary Data Analysis, 2016.

The results of SEM analysis presented in Table 6 indicate that between support system variables and role/function significantly have a positive correlation of 0.116 or 11.6 percent. This means that the higher the support system the higher the level of function and its role to reach 11.6 percent, and vice versa. On the other hand, the support system also proved to be significantly positively correlated with the participation of farmers by 0.176 or 17.6 percent. This indicates that the higher the support system, 17.6 percent will be associated with the increasing influence of farmers' participation in the institutional activities of the food granary of society, and vice versa. In addition, farmer participation variables are also significantly positively correlated with function /role variables of 0.195 or 19.5 percent. This means that the higher the participation of farmers the higher the level of function and role to reach 19.5 percent, and vice versa.

Regression analysis is part of the SEM analysis results that test the causality of the model. The AMOS statistics program can inform regression weight results or regression weights between latent variables called an estimation of loading factor or lambda value.The influence of farmer participation, function/role, and supporting system, to the revitalization of granaries institutional, and the effect of revitalization of granaries institutional on food self-sufficiency (Table 7).

Table 7: Results of Estimation Regression Weights Analysis for Causality Test on Institutional Revitalization Model of Community Granary

Regression			Estimate	P
Granary Revitalization	←	Function/ Role	0,017	0,978
Granary Revitalization	←	Support System	1,246	0,014
Granary Revitalization	←	Farmer Participation	0,101	0,218
Food Self-Sufficiency	←	Granary Revitalization	0,194	0,124

Source: Primary Data Analysis, 2016.

Factors that significantly influence the revitalization of community food barn (granaries) institutions are support systems ($\alpha = 0.05$). According to the result of causality test and structural equation of revitalization model of food barn, indicate that in general independent variable (exogenous construct) that is farmer participation, function/role, and support system, have positive influence to dependent variable (endogenous construct) that is revitalization of institutional granary community, and revitalization of institutional granary community have a positive effect on food self-sufficiency. If it is related to the value of squared multiple correlations which is the embodiment of the coefficient of determination (R^2) then the R2 value of the food independence is 0.735. Thus, all independent variables together are only able to give a positive effect of 73.5 percent on food self-sufficiency, while the effect of the rest is caused by other factors outside this model.

4. Conclusions and Recommendations

Determinant of institutional revitalization of food granary is participation of farmer, function and role of granaries institutional, and supporting system (structural and cultural). Support systems were significantly positively correlated with function and role indicators (91.7%), and also significantly positively correlated with farmer participation (51.9%). Farmers' participation significantly correlated positively with the function and role of 70.2 percent. Factors that significantly positively affect the revitalization of granaries institutional is a supporting system (94.8%). The institutional revitalization of food barns (granaries) has not significantly affected food self-sufficiency at the local level. The structural model of institutional revitalization of community food barns (granaries) as a strengthening of food self-sufficiency resulting from SEM analysis is sufficiently feasible and can be modified again.

Increasing the function and role of granaries institutional community (besides its main function as community food reserve), should also be focused on the activity of increasing

value added and food distribution. Institutional revitalization efforts of community food barns (granaries) can be improved primarily through strengthening support systems, both structurally and culturally based on local resources. Institutional strengthening of food granary should synergize with modern institutional and other food institutional.

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