

Model of Community Behavior in the Management of the Community Forest in Bulukumba Regency, South Sulawesi, Indonesia

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Abstract—One of the land rehabilitation patterns by vegetation is to build community forests. Involving the community in the management of community forest should be supported with a correct understanding of the function and the role of forests for life. The aim of the research is to analyze the model of community behavior in the management of community forest in Bulukumba Regency, South Sulawesi, Indonesia. The analytical method used is Structural Equation Model (SEM). The research variables consist of 1 endogen variable that is behavior in the management of community forest and 4 exogenous variable that are farmers' internal factors; community culture; the income of community forest; and community knowledge regarding the benefits of community forest. The results showed that the community knowledge about the benefits of community forest affects the community behavior in managing community forests directly and significantly, which means that a good knowledge of farmers about the benefits of community forests will result to a better behavior of farmers in managing the community forest.

Index Terms—behavioral model, community forest, community forest communities, knowledge about the community forest

I. INTRODUCTION

Community forests are artificial forests located outside the area of State forest, in a vast expanse and owned by the community Indonesia Ministry of Forestry [1]. Forest management by involving forest-dependent communities needs to be supported by the right knowledge and understanding of the functions and the role of forests for living things. Educational programs for communities are very important to increase the participation and behavior of the community in preserving the forest. In addition, the community should be given a role of ownership of the forest so that forests can be safeguarded and cultivated together.

Understanding the behavior of people not only by seeing the physical activity that occurs, but also the background and the process of the occurrence of such activity. According to Wakhidah *et al.* [2] in general, community behavior in supporting efforts to conserve community forests consists of ecological aspect, social

aspect, economic aspect and cultural aspect. Community behavior that is related to ecological aspects for instance planting and maintaining trees, harvesting forest products, and not doing forest destructive activities. Community behavior that is related to economic aspects is income and economic sustainability of community forest products. Community behavior related to social aspects for example are community participation, cooperation with related parties, and values/ norms dealing with the conservation of community forests. Lastly, community behavior related to cultural aspects is local community-based wisdom related to community forest.

Community participation in forest management activities in Nepal and Costa Rica according to Zbinden and Lee [3] is influenced by farmers' age, land ownership, number of family members, income and community perceptions. Similarly, research by Nuraeni *et al.* [4], stated that an increased knowledge, attitudes and skills about conservation will increase the perception and participation of farmers in the application of conservation farming. In addition, according to Sinha and Suar [5], the cultural heredity that exists in the local community is also a factor that needs to be noticed.

Based on the background described above, this study aims to analyze the model of community behavior in community forest management in Bulukumba Regency, South Sulawesi, Indonesia.

II. RESEARCH METHODS

The research was conducted at the community forest in Kajang District as one of the districts that have the largest area of community forest in Bulukumba Regency, South Sulawesi, Indonesia. The study population is the people who manage the community forest in Kajang District, with total sample of 120 respondents.

The research variables consist of 1 dependent variable (endogen variable) and 4 independent variables (exogenous variable) with 15 indicators. Endogen variable is the behavior of society in community forest management (Y) with indicator of society behavior related to ecological aspect (Y1), economic aspect (Y2), and social aspect (Y3).

Exogenous variables are Internal variables (X1) with indicator of age, land area, experience; Knowledge variables (X2) with indicator the knowledge of the

benefits of community forest from ecological, economic and social aspects; Income variable of forest for people (X3) with indicator of income from forest crops, income of plantation crops, and seasonal crops income; Cultural variables related to community forest (X4) with the indicators of religious norms, local wisdom, and government regulation.

Data collection using questionnaires is made based on the indicators that make up each variable and measurement using Likert scale. This study aims to examine and analyze the causal relationship between endogenous and exogenous variables using the Structural Equation Model (SEM) approach.

III. DISCUSSION

A. Goodness of Fit Test Result

In SEM analysis prior to testing model, the goodness of fit of the model was firstly tested. The theoretical model on the conceptual framework, said fit if supported by empirical data (Fig. 1).

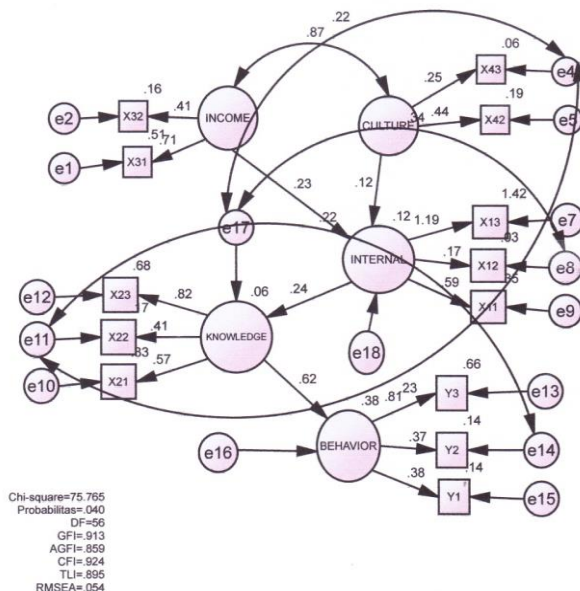


Figure 1. Mode of forest community behavior

Based on the table and picture from Goodness of Fit Overall test results for model, it is seen that not all of the criteria showed a good model. It appears that only Chi Square/DF and RMSEA criteria have met the cut off value, where the value of Chi Square/DF model is 1.565 (≤ 2), RMSEA is 0.054 (≤ 0.08); GFI of 0.913 (≥ 0.90); CFI of 0.924 (≥ 0.90). According to Arbuckle and Wothke, in Solimun [6], the best criteria used as an indication of goodness of the model are Chi Square/DF values of less than 2, and RMSEA below 0.08. In this study, the values of CMIN/DF and RMSEA have met the cut off value. Therefore the SEM model in this study is suitable and feasible to be used, so that interpretation can be done for further discussion.

Furthermore, testing of the measurement model and structural model is carried out. The measurement model in SEM is equivalent to Confirmatory Factor Analysis.

The loading factor value shows the weight of each indicator as a measure of each variable. The indicator with the largest loading factor shows that the indicator is the dominant variable. Whereas the structural model is testing the relationship between research variables identical with hypothesis testing.

B. Measurement Model

Measurement model is intended to test the indicator used to form a variable. Measurement of loading factor can be done by looking at estimate value on standardized regression weights.

TABLE I. THE VALUE OF LOADING FACTOR (STANDARDIZED REGRESSION WEIGHTS)

Indicator		Variable	Estimate
Income from Woody Crops (X3.1)	←---	Community Forest Revenue (X3)	0,714
Income from Plantation Crops (X3.2)	←---	Community Forest Revenue (X3)	0,406
Government Policy (X4.3)	←---	Culture of the Society (X4)	0,249
Local Wisdom (X4.2)	←---	Culture of the Society (X4)	0,440
Experience (X1.3)	←---	Internal Farmers (X1)	1,190
Land Area (X1.2)	←---	Internal Farmers (X1)	0,172
Age (X1.1)	←---	Internal Farmers (X1)	0,592
Ecological Knowledge (X2.1)	←---	Community Forest Knowledge (X2)	0,574
Economic Knowledge (X2.2)	←---	Community Forest Knowledge (X2)	0,411
Social Knowledge (X2.3)	←---	Community Forest Knowledge (X2)	0,824
Ecological Behavior (Y1)	←---	Behavior of HR Management (Y)	0,379
Economic Behavior (Y2)	←---	Behavior of HR Management (Y)	0,368
Social Behavior (Y3)	←---	Behavior of HR Management (Y)	0,811

Table I shows that income variables are measured based on two indicators, which are income from woody crops (X3.1) and income from plantation crops (X3.2). The income from woody crops is the strongest indicator as a gauge for income variable from the community forest with the largest loading factor (0.714). The strongest indicator of cultural variables is the indicator of local wisdom with loading factor of 0.440. The strongest indicator of internal factor of farmers is the farmer experience with loading factor of 1.190. The strongest indicator of community forest knowledge is social knowledge with loading factor of 0.824. At last, the strongest indicator of community forest management behavior is social behavior indicator with loading factor of 0.811.

C. Structural Model

There are five relationships between variables that have been tested in this structural model, which can be seen in Table II below:

TABLE II. STRUCTURAL RELATIONS TESTING

Relationship between Variables	Estimate	S.E	C.R	P
Income \longleftrightarrow Culture	0,054	0,031	1,725	0,085
Internal \longleftrightarrow Income	0,394	1,207	0,326	0,744
Internal \longleftrightarrow Culture	0,613	3,669	0,167	0,867
Knowledge \longleftrightarrow Internal	0,134	0,082	1,625	0,104
Behavior \longleftrightarrow Knowledge	1,136	0,283	4,012	0,000

Based on Table II, the results of structural model testing are presented as follows:

D. The Influence of Culture on Community Forest Income

The result of SEM analysis obtained a Critical Ratio (CR) value from culture that influence community forest income, and vice versa, with the value of 1,725 ($CR \leq 1,967$) and the probability value (p) equals to 0,085 ($\geq 0,05$). In this case it can be explained that there is no significant direct effect of community forest income on the culture of society, and vice versa. A positive CR score indicates that culture can still contribute directly to the income level of community forests.

The strongest indicator that formed the cultural variables of the community is the local wisdom of the community in protecting the environment. According Keraf [7], local wisdom is all forms of knowledge, belief, understanding and customs that guide human behavior in life in the ecological community. The existence of local wisdom has begun to fade in various community groups. One of the most vulnerable groups of society experiencing a decline in the existence of local wisdom is the people living in forest area. This is in line with the research conducted by Santoso (2006), on forest edge farmers. Local wisdom on farmers in preserving forest ecosystems has shift and is replaced by economic wisdom.

E. Effect of Community Forest Income on Farmers Internal Factors

Based on the result of SEM analysis, the value of Critical Ratio (CR) from the influence of community forest income on farmer's internal factor is positive at 0.326 ($CR \leq 1.967$) with the probability value (p) of 0.744 (≥ 0.05). So it can be explained that there is no significant direct effect of community forest income on internal factors of farmers. Positive CR values show that incomes from community forest can still contribute directly to income levels from community forests.

The strongest indicator as a measure of income variables from community forests is a source of income from woody crops. This indicates that the existing woody crops plantations on community forest were planted from one generation to another generations with mixed cropping or intercropping pattern, besides planting trees with wood species such as teak, mahogany, silk tree, they

also planted crops such as cocoa, cloves, pepper, and rubber. According to Surayanto *et al.* [8], people tend to choose agroforestry models with the intercropping system, because beside the community can maximize the benefits of land use, there are also products from woody crops and food crops at the same time, so that the community needs for short, medium and long term can be fulfilled.

Intercropping system models does not use land spacing. Moreover, an intensive maintenance is not needed for woody crops, so it does not require an extensive land, a good experience and a productive age of farmers, which are the indicator of the internal factors of farmers.

F. The Influence of Community Culture on Farmers Internal Factors

Based on the result of SEM analysis, the value of Critical Ratio (CR) from the influence of culture on the internal factor of farmer is positive 0,167 ($CR \leq 1,967$) with the probability value (p) of 0,867 ($\geq 0,05$). This explains that there is no significant direct influence of the culture of the community on the internal factors of farmers, but the positive CR value shows that community culture can still contribute directly to the internal factors of farmers.

The strongest indicator as a measure of the cultural variables of the community is local wisdom, while the strongest indicator as an internal factor of farmers is the experience of farmers in managing community forests. This signs that local wisdom prevailing in society has been defeated by economic needs, so even though farmers already have experience of a good understanding of the environment, they do not always practicing it. Limitations of household resources (capital and labor) are an obstacle. The fading process of local wisdom according to Santoso (2006) is influenced by multi factors, especially the high population density, the low man to land ratio, geographical location of a village where information is accessible and public transportation facilities are available, the relatively high population mobility, and a sharp decline in environmental capacity.

G. Effect of Farmers Internal Factors on Knowledge of the Benefits of the Community Forest

SEM analysis result from the influence of farmer's internal factor to farmer's knowledge about the benefit of community forest generates a Critical Ratio (CR) value of 1,625 ($CR \leq 1,967$) with the probability value (p) of 0,104 ($\geq 0,05$). This means that there is no significant direct effect of farmers' internal factors on farmers' knowledge about the benefits of community forests, but positive CR values denotes that the internal factors of farmers can still directly contribute to the farmers' knowledge of the benefits of community forests.

The strongest indicator as a measure of internal factor variables of farmers is the experience of farmers. This suggests that the experience of farmers in managing community forests has an effect on improving farmers' knowledge about the ecological benefits, economic benefits and social benefits of community forests,

although it does not show a significant result. Knowledge of farmers about ecological benefits is about improving the environment; behavior related to economic aspects is increasing household income; while behavior related to social aspects is creating cooperation among farmers.

H. Effect of Farmers' Knowledge on Farmer's Behavior

Based on the result of SEM analysis, the value of Critical Ratio (CR) obtained from the influence of farmer's knowledge about the benefits of community forest on farmer's behavior in managing the community forests is 4,012 ($CR \geq 1,967$) with the probability value (p) of 0,000 (≤ 0.05). This implies that there is a significant direct and positive influence of farmers' knowledge about the benefits of community forests on the behavior of farmers in managing community forests. Thus, the better the knowledge of farmers regarding the advantages of community forests, the better the behavior of farmers in the management of community forests.

The level of knowledge about the benefits of community forests owned by farmers can influence and become a factor that drives the emergence of community behavior in managing community forests. According to Pretty [9], human capital such as skills and knowledge can be the basic capital in managing the environment. Therefore, to optimize the behavior in managing community forests, efforts should be made to increase knowledge about the benefits of community forests.

IV. CONCLUSION

1. The variable used in the structural model in this study is the community behavior in managing community forest as the endogenous variable and the four exogenous variables are the internal factors of the respondents, the culture of society, the income that is generated from community forest, and the community's knowledge about the community forest.

2. The knowledge about the benefits of community forest has a direct and significant impact on people's behavior in managing community forests. This shows that the higher the people's knowledge about community forest, the better the community behavior in community forest management.

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