

## The Influence of Internal and External Factors on Farmers' Perception and Participation in Jeneberang Watershed Conservation

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**Abstract:** The land conditions in the Jeneberang Watershed, Sulawesi, Indonesia has been eroded due to the uncontrolled use of land for vegetable farming. The objective of this paper is to determine the effects of internal and external factors on the perception and participation of farmers around the Jeneberang Watershed in Sulawesi, Indonesia. Data was analyzed by using the Structural Equation Modeling (SEM) and using Analysis of Moment Structure (AMS) version 6. Results showed that the internal factors had more significant direct effects to the farmers' perceptions and participation, while the external factors did not significantly affect the farmers. It can be concluded that the internal factors directly and significantly influenced both the farmers' perception and participation in the implementation of such watershed conservation. This implies that the provincial government needs to provide education and training on land use conservation for local vegetable farming. This suggests that an increase in knowledge, attitudes and skills of perception and conservation will increase farmers' participation in the implementation of conservation in vegetable farming in the Jeneberang watershed upstream.

**Key words:** Conservation Farming % Internal Factors % External Factors % Conservation % Perceptions % Participation

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### INTRODUCTION

Jeneberang Watersheds (DAS) is one of the three watersheds located in South Sulawesi which includes priority of watersheds. Condition of the land in the Jeneberang watershed is damaged due to land conversion and agricultural systems that do not follow the soil and water conservation techniques that are necessary for high slopes. This condition is shown by the high sedimentation in the Bili-Bili Dam and the largest source of sediment derived from soil erosion is 71.22% [1]. This is due to generally cultivated farming communities in the

Jeneberang watershed upstream which is horticulture farming of vegetables. Realizing that the physical characteristics of the watershed conditions in the upstream region generally for agricultural cultivation, the farm conservation is the right alternative farming systems developed in the Upper Basin Jeneberang. Conservation farming is essentially a farming approach that emphasizes the development of an integrated combination of cultivation techniques/dryland farming with soil conservation techniques (the vegetative and mechanical) to ensure the effective use of land, water and vegetation sustainably and profitably [2].

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Farmers' awareness of environmental issues have started to grow, but the awareness is often not realized in real action. Theoretically, farmers' behaviour towards the environment which is not in accordance with the attitude it could happen because the relationship is influenced by several factors. It has been argued that the division of Psychological Sciences recognize the internal aspects of human in three categories: (a) cognitive which includes knowledge and understanding, (b) affective aspects that include feelings, interests, motivations, attitudes and values and (c) psychomotor aspects, which includes observation and motor movements [3]. It was divided six cognitive levels of thinking process that starts from the lowest to the highest levels: knowledge, comprehension, application, analysis, synthetic and assessment [4]. Details were given to the affective domain into five levels, namely: acceptance, responding, respect, set and characterization by a value [5]. Psychomotor domains are divided into seven levels, namely: information, readiness, guided movement, accustomed movement, complex movements, adjustment and creativity [6].

Participation in this study is defined as is to determine to what extent the involvement of farmers in the Jeneberang watershed upstream participate in the implementation of land conservation on their farm in each voluntary. Based on this, the participation is measured from the involvement of farmers in attending meetings/counseling, implementation of conservation and in the maintenance of existing conservation. Therefore, the objective of this paper is to evaluate the influence of internal (knowledge, attitudes, skills) and external factors (social, economic, cultural) on perceptions and participation of farmers in land use farming conservation.

### MATERIALS AND METHOD

The experiment was conducted in the upper watershed, located in Jeneberang Pattapang village, Gowa regency, South Sulawesi province of Indonesia, as the vegetable production centre. Populations are farmers who grow vegetables and randomly selected (simple random sampling) of 182 vegetable growers by using a sampling

Table 1: The variables and data collected in the study

Variables	Indicators	Code	Data Collection
Internal Factors: Knowledge (X1)	1. Knowledge	X1.1	Questionnaire with close-ended question
	2. Comprehension	X1.2	
	3. Application	X1.3	
	4. Analysis	X1.4	
	5. Synthesis	X1.5	
	6. Evaluation	X1.6	
Attitude (X2)	1. Receiving	X2.1	Questionnaire with close-ended question
	2. Responding	X2.2	
	3. Valuing	X2.3	
	4. Organization	X2.4	
	5.Characterization by value	X2.5	
Skill (X3)	1. Perception	X3.1	Questionnaire with close-ended question
	2. Set	X3.2	
	3.Guided Response	X3.3	
	4. Mechanism	X3.4	
	5. 5.Complex Overt Response	X3.5	
	6. Adaptation	X3.6	
	7. Origination	X3.7	
External Factors: Social (X4)	1.Formal education	X4.1	Questionnaire with close-ended question
	2.Non-formal education	X4.2	
	3. Organization	X4.3	
	4. Information through media	X4.4	
Economics (X5)	1.Household income	X5.1	Questionnaire with close-ended question
	2. Area of land	X5.2	

Table 1: Continued

Variables	Indicators	Code	Data Collection
Culture (X6)	1. Religious norms	X6.1	Questionnaire with close-ended question
	2. government regulation	X6.2	
	3. Local custom	X6.3	
Farmers' perception (Y1)	1.Improving production	Y1.1	Questionnaire with close-ended question
	2.Reducing erosion	Y1.2	
	3.Improving fertility	Y1.3	
	4.Improving water supply	Y1.4	
	5. Preventing flood and landslide	Y1.5	
Farmers' participation (Y2)	1.Presence in meetings	Y2.1	Questionnaire with close-ended question
	2. Implementation	Y2.2	
	3. Maintenance	Y2.3	

formula. Sampling was done randomly because the populations of farmers in the study sites are homogeneous. Homogeneity of the population in question is, all the farmers in Pattapang village, Gowa regency who become the conservators of highland vegetable farming.

An analytical techniques using a Structural Equation Modeling (SEM) and AMOS (Analysis of Moment Structure) version 6 was used in this study. The translation of variables and indicators and detail data collection are shown in Table 1 where the variables in this study consist of two exogenous variables (internal factors and external factors) and two endogenous variables (perception and participation) with 35 indicators. These data were collected using a questionnaire survey that was made based on the indicators that make up each variable and its measurement using a Likert scale.

## RESULTS AND DISCUSSION

**Structural Model Testing:** The relationship between variables was tested six times in this structural model and was presented in Table 2.

### Relationship Between the Internal Factors and External

**Factors:** The internal factors may be related to the external factors. This result is evidenced by the p-value greater than 0.05 (Table 2). It means that how the external factors will not affect the internal factors and vice versa. There is no relationship between the internal factors which include knowledge, attitudes and skills possessed by those external factors, namely social, economic and cultural background caused by those as community forest management. Experience has shaped the knowledge, attitudes and skills as farmers. They have already implemented these conservation techniques in their lands, although they are still simple and not perfect.

### The Impact of Internal Factors on Farmers' Perception:

The internal factors have a significant impact on perceptions of farmers. This result is evidenced by the P-value which is less than 0.05 (Table 2). This illustrates that the better the internal factors, the better the public perception will be. Most of the respondents consider that the benefits of conservation farming are big enough for themselves and their environment. They look useful in conservation farming to increase production, reduce

Table 2: Structural relation and direct impact

Relation Among Variables	Coefficient	P-value	Comment
Internal factors $\rightarrow$ external factors	0.152	0.070	not significant
Internal factors $\rightarrow$ Farmers' perception	0.500	0.001*	significant
Internal factors $\rightarrow$ Farmers' participation	0.401	0.001*	significant
External factors $\rightarrow$ Farmers' perception	0.063	0.438	not significant
External factors $\rightarrow$ farmers' participation	0.096	0.240	not significant
farmers perception $\rightarrow$ Farmers' participation	0.357	0.006*	significant

Note: \* signifies significance with 5% error.

erosion, improve soil fertility and increase the availability of water and preventing floods and landslides. High perception of the benefits of farming is influenced by the internal factors, including knowledge, attitudes and skills that have been possessed before the farming of vegetables. As the farmers' community often has guidance or counseling from the Forest Service about the function and impact of logging in the forest. Therefore, an increase in knowledge, attitudes and skills of conservation farming will affect a good perception of the environment. These findings support the idea which suggests that the formation of the perception of the environment includes the cognitive, affective and congnate. Cognition process consists of acceptance, understanding and thinking. The process includes feelings of affection and emotions, desires and values about the environment. The act or process of cognate includes the treatment of the environment in response to cognitive and affective processes. This whole process produces perceptive environment [7]. This is in line with the opinions that the perception is an integrated activity in man and then what is within the individual will participate actively in perception [8].

**The Impact of Internal Factors on Farmers' Participation:** The internal factors have a significant influence on farmers' participation in the implementation of conservation farming, with a P-value is less than 0.05 (Table 2). This illustrates those efforts to increase farmers' participation in conservation farming needs to be coupled with an increase in knowledge, attitudes and skills they do specifically about conservation in vegetable farming. Changes in the mindset of farmers need to be done on the economic orientation to ecological-economic orientation. Farmers need to acquire the knowledge that in the long term conservation of the land is more profitable than not applying conservation. Farmers need to be shown that the productivity of farming potatoes and other vegetables is lower than the recommended range of production, as well as the use of chemical fertilizers is much higher than the recommended range. It is stated that expanding people's participation in this field depends on informing local people, decentralizing management process, reducing poverty, facilitating and improving the participation mechanism [9]. Further, it has been found that the level of participation in watershed management has a significant and positive relationship with their knowledge of watershed management [10].

**The Impact of External Factors on Farmers' Perception:** There is no significant and positive influence on farmers' perception of external factors, it is seen from the p-value on the 0.05 (Table 2). It means that how well any external factors will have no effect on farmers' perception. This condition illustrates that a high perception of the benefits of farming is not influenced by the external factors, including social, economic and cultural. Respondents' perceptions of the benefits of conservation farming which includes benefits increase production, reduce erosion, improve soil fertility, increase the availability of water and the benefits of preventing floods and landslides, based on the knowledge and experience they gained prior to vegetable farming, as well as from parents and among farmers' communities.

**The Impact of the External Factors on Farmers' Participation:** There is no significant effect of the external factors on community participation; it is seen from the p-value which is greater than 0.05 (Table 2). The external factors do not affect community participation. Farmer' participation in conservation has been done, although the application is still limited and not perfect. This is due to the absence of the influence of external factors (the social, economic and cultural), for it is expected that the improvement of condition to support the implementation of conservation in order to affect an increase in knowledge, attitudes, skills and perceptions of farmers, for which they get from their experiences before the farming of vegetables and also from parents or fellow farmers.

**The Impact of Perception on Farmers' Perception:** Perception has a significant effect on the participation of farmers with a P-value is less than 0.05 (Table 2). This illustrates that the better perception of it will be the better the participation of farmers. The implementation of land conservation in vegetable farming can be improved by increasing their perception of the benefits of conservation of vegetable farming. It means that the higher their insights about the conservation, the higher perception of the benefits of conservation of vegetable farming they will have, so that the farmers' participation in the implementation of conservation will increase. It is stated the results of the environmental risk perception, environmental concern and probability to participate in organic farming programs occur. The significance tests for the structural model parameters show 'environmental risk perception' as the strongest determinant of farmers' propensity to participate in organic farming programmes

[11]. It is argued that the conservation farming projects should not only focus on technical approaches to increase adoption rates but also consider social aspects such as perceptions that are equally important in conservation farming [12].

### CONCLUSION

The internal factors directly and significantly influence both the farmers' perception and participation in the implementation of conservation. But, the external factors do not directly influence the farmers' perception and participation in the given implementation. This implies that an increase in knowledge, attitudes and skills of conservation will increase the farmers' perception on the benefits of conservation of vegetable farming, so that participation in the farming /conservation can be improved. It is recommended that further improvements are required to improve farmers' knowledge, attitudes and skills on conservation farming of vegetable in Jeneberang watershed upstream.

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