

## Empowering Farmers in Conserving Soil and Water in the Sampeyan Watershed, Situbondo, East Java, Indonesia

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### Abstract

Empowering farmers in managing the watershed Sampeyan Situbondo for soil and water conservation is urgently needed. This is intended to know the efforts of empowering farmers in managing the interrelationships between the human capital, physical capital, social capital, and farmers' perceptions and the government's role in the process of empowerment of farmers, as well as their relation to the empowerment of farmers. It is expected that we get the economic benefits and environmental services for the development and preservation of ecosystems in the watershed Sampeyan Situbondo.

This study deploves two methods, namely the Structural Equation Model (SEM) to test the accuracy of the hypothetical models that have been developed empirically through the theoretical justification and the relationship between the variables built into the model and SWOT analysis for the direct and indirect policy implications to be done in empowering farmers to conserve soil and water in the watershed Sampeyan Situbondo. The results show that: 1) the human capital significantly influences the empowerment process, 2) the role of government significant affects the process of empowerment, 3) farmers' perceptions significantly influence the empowerment process, 4) the empowerment process significantly influences the empowerment of farmers, 5) the results of the SWOT analysis suggest that the factors supporting (dry land availability for agriculture is so vast and labors in agriculture are abundant), inhibiting factors (lack of human capital, physical capital, social capital, farmers' perceptions, the role of government, the process of empowerment, and empowerment of farmers), opportunity factors (increasing the empowerment of farmers through better institutional collaboration and consolidation of government agencies, non-higher education, and financial institutions) and threat factors (developing dryland, farmer empowerment through soil and water conservation, and the limitations of the technology).

**Key Words:** Farmer Empowerment, Soil and Water Conservation

### INTRODUCTION

#### Background

Watershed (DAS) management is an attempt to manage the interrelationships between natural resources, particularly vegetation, soil and water and human resources in the watershed and all the activities to gain economic benefits and environmental services for the sake of the development and sustainability of watershed ecosystems. Principally, watershed management is a land setting or optimalization of the use of land for various purposes and other environmentally-friendly practices that can be assessed by key indicators (ultimate indicator): the quantity, quality and continuity of the flow of the river at the point of outlet. Thus, one of the characteristics of a watershed is a biophysical linkage between the upstream and downstream through the hydrologic cycle.

Watersheds (DAS) can be broadly grouped into forest, moor, plantations, rice fields, residential and other uses (Soedjoko, 2002). The increasing degradation of watershed functions encourages awareness to recognize environmental stewardship activities that can be carried out to maintain the functions of the watershed. The patterns of land use significantly affect watershed functions such as water quality, water flow, erosion control and sedimentation in downstream areas. However, those who are involved in the environmental management in the uplands often receive a small portion of incentives. Yet, those who are in downstream areas obtain more incentives. The increased awareness of the importance of watershed management encourages a wide range of initiatives to protect the watershed, including providing incentives for people to protect upland watershed functions (Lusiana et al., 2008). The optimization of watershed functions, the majority of which is dry land is necessary to embody. This is, of course, in line with the statement by Abdurachman et al. (2008) that the use of dry land for agriculture is often overlooked by policy makers who are interested more in increasing the productivity of paddy/rice fields. In fact, dry land is sufficiently available and has the potential to be developed.

Planning a sustainable forest management and community development in the basin has always been centrally done without involving the community. Some bureaucratic elites thought that achieving efficiencies for a development should be done by people to have the ability to analyze problems and formulate conditions, including finding solutions. This view obviously shows that the community is considered not to have such a

capacity that they are less involved in each stage of the process of empowerment. As a result, people do not have sufficient knowledge on what and how to execute the programs. This condition lets the public not care and not be responsible for the successes and failures of the programs. Several examples of the empowerment programs initiated by the government which have not shown a constantly significant benefit to the community, yet creating dependency on government are divisions of Raskin, Gaskin, revolving funds, BLT, and so on.

Empowerment as a process refers to a series of actions carried out systematically reflecting the phasing of the effort to change the less powerful communities towards empowerment. According to Ife (1995), Sumitro (Vitayala et al, 1995), Sumardjo (1999), and Slamet (2000) on the characteristics of the powerful community, the community can be said to be powerful if it has adequate knowledge, attitudes, and skills. Community empowerment is an embodiment of community's capacity building in the form of empowering human resources through the development of institutional development from the national level to the village level together with the implementation of mentoring, counseling and services. Mentoring can mobilize the participation of local communities. Counseling can respond to and monitor changes taking place in society. Services become the controlling element of asset distribution of physical and non-physical resources needed by the community (Vitayala et al., 1995)

The main abilities the empowerment actors should possess (stakeholders) are the abilities to dig, cultivate, develop and exploit the potential of the local resources. Developing the potential of local resources is very important for people so that they do not depend on outsiders or other people. Perpetrators of empowerment have to be sure that if local resources and potentials can be made use of, the empowerment process to create independence will easily be achieved. It means that the local potential will be incentives toward a growing community, empowered and independent.

According to Fukuyama (2002), the capital for business today is no longer merely a form of lands, plants, equipments and machinery. Forms of capitals are even likely to wane and will soon be dominated by human capitals such as knowledge and skills. Coleman (1998) adds that in addition to knowledge and skills, the other portion of the human capital is the ability of people to perform association (connected) to each other.

Coleman (1998), Fukuyama (2002) and Todaro and Smith (2003) say that the high and low levels of human capital of the community can be measured by: (1) education, (2) health, and (3) the ability of interaction among people. Therefore, every individual is said to have high human capital if he/she has a level of education, health and a harmonious relationship among people that are able to carry out an activity.

Social scientists are aware that the economic success is determined not only by economic capital in the form of material, but also in the form of immaterial capital. The immaterial capital is by many scientists called a social capital. The social capital can be attached to individual human beings and can also be the result of social interaction in the form of social networking (Alder and Seok, 2002). Putnam (1995), Coleman (1998), and Fukuyama (2002) state that the level of social capital among others, can be seen from: (1) social networking / job, (2) trust (mutual trust), (3) adherence to norms, (4) concern for others, and (5) involvement in social organizations.

Conyers (1994) suggests that there are two factors that determine whether people really want to be involved in the planning or not: (1) the presence or absence of the influence of community involvement results to the final plans, (2) the presence or absence of a direct influence they feel.

Elok et al. (2005) in their study of local farmers' knowledge and ecology innovation dealing with land conservation and management of coffee-based farming conclude that the farmers have had local knowledge about ecology. Yet the application of conservation are not optimal due to the fact that the farmers face many constraints, especially capital and labor factors which are not balanced with low coffee prices.

Pranadji (2006) in his study on strengthening the social capital for the rural community empowerment in the management of dryland agroecosystems "concludes that the elements of social capital which are considered important are the values, HR competencies, social management, social organization, social structures, leadership and good governance.

Sidu (2010) states that the analysis of effective empowerment model which has been formulated from a combination of factors: physical capital, human capital, social capital, the actors' ability of empowerment, the empowerment process, and empowered communities suggests that these factors have not been adequate or tends to decrease, namely, the physical capital has an average score of 44, the human capital has an average score of 53, the social capital has an average score of 52, the capability of empowering actors has an average score of 41, and the empowerment process 36 with a range of scores 0-100.

Watershed (DAS) sampean Situbondo is monitored by PSAWS Sampean Bondowoso. Sampean watershed is a dry land that has only 4 months of rain. Soil and water conservation in the watershed Sampean is considered timely daryland conservation. The dryland conservation is a constructive step; it can improve the functions of the land to produce, expecting that its potentials can be optimized as a source of income for farmers. According to Notohadiprawiro (1988), the status of marginal and critical drylands is characterized by

shallow soils, steep slope, the high rate of erosion, very low organic matter content, and many rock outcrops at surface.

The weak farmers around watershed Sampean Situbondo can be researched through a variety of viewpoints, including the general condition of the capital / asset, particularly human capital, physical capital, social capital, as well as farmers' perceptions and the role of government around the Sampean watershed and its influence on the process of empowerment and farmer empowerment. Empirical facts are analyzed quantitatively and qualitatively in order to design an effective model of empowering farmers around Sampean Situbondo.

## THEORETICAL FRAMEWORK

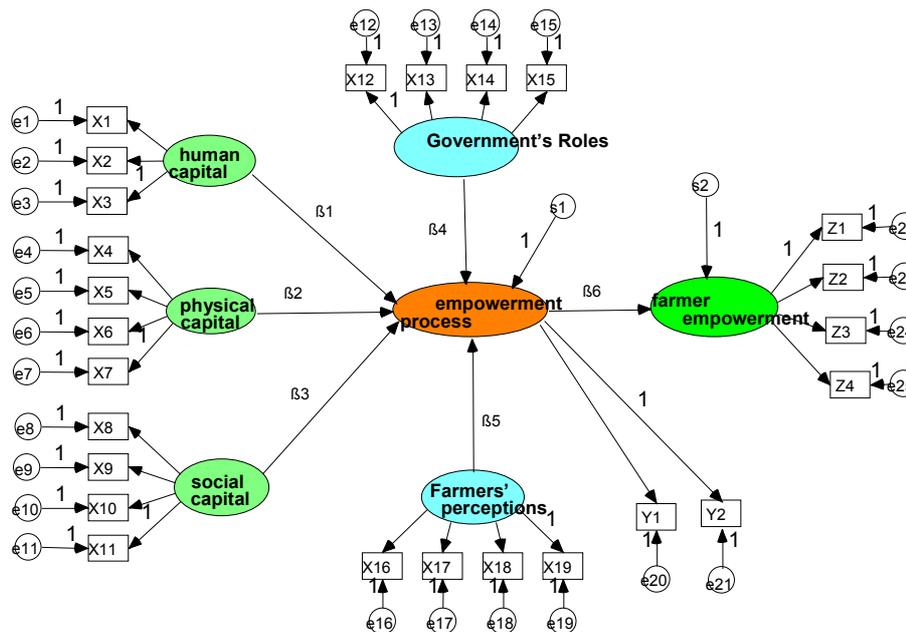


Figure 1. Model of SEM Hypothesis Analysis: Relationship between the farmer empowerment and human capital, Physical Capital, Social Capital, Government's Roles, Farmers' Perceptions, and empowering Process.

## RESEARCH METHOD

### Setting and Time of Research

This study was conducted in Situbondo Regency from June 2011 to June 2012

### Sampling Techniques

According to Ferdinand (2002), using the *Structural Equation Modeling (SEM)* requires the researcher to take the samples 100 at least. Then, five observations for each *estimated parameter* were used to compare so that  $5 \times 25 = 125$  samples could be obtained.

### Techniques of Data Collection

The data used in this study are those which reflect a causality. Such kind of data are of those that can be hypothesized among the existing constructs. This enables the researchers to explicate a causality within which, among others, a tiered causality may exist. These primary data are also complemented with the secondary data in the watershed (DAS) in Situbondo.

### SEM Analysis

This analysis employs AMOS 16 for Windows program. This analysis aims at answering proposed research hypotheses in the following stages.

Stage 1. Developing a concept and theory-based model

Stage 2. Constructing a Path Diagram

- Stage 3. Converting the Path Diagram into a Structural Model
- Stage 4. Choosing input Matrix
- Stage 5. Assessing identified problems
- Stage 6. Evaluating *Goodness of Fit*
- Stage 7. Interpreting and Modifying the Model

**SWOT Analysis (Strength, Weakness, Opportunity, Threats)**

The results of the data analysis and information obtained from both the literature study and field observations about empowering farmers to conserve soil and water in the watershed Sampeyan in Situbondo are identified by using the SWOT analysis. A detailed description of the supporting factors (strengths), constraints, opportunities and threats are then important to commit.

The results of the SWOT analysis are then used as a reference for the determination of the direct and indirect policy implications of empowering farmers for soil and water conservation in the watershed Sampeyan in Situbondo

**FINDINGS AND DISCUSSIONS**

**Results of Data Analysis**

**The Results of Analysis of Structural Equation Modelling (SEM)**

The results of test analysis Goodness-of-Fit Model Overall SEM early stage are presented in Table 1, while the results of the analysis of test results goodnes-of-Fit Model Overall SEM final stage is presented in Table 2.

**Table 1. Scores *Goodness-of-Fit* and Early Stage of SEM Critical Values**

Criteria	Critical value	Trial Model	Notes
$\chi^2$ – Chi Square	small & nonsignificant	687,066 (p=0,000)	Not eligible
CMIN/DF	≤ 2,00	2,554	Not eligible
RMSEA	≤ 0,08	0,100	Not eligible
GFI	≥ 0,90	0,753	Not eligible
AGFI	≥ 0,90	0,702	Not eligible
TLI	≥ 0,90	0,824	Not eligible

**Table 2. Scores *Goodness-of-Fit* and Final Stage of SEM Critical Values**

Criteria	Critical Values	Trial Model	Notes
$\chi^2$ – Chi Square	small & significant	236,854 (p=0,169)	Good model
CMIN/DF	≤ 2,00	1,091	Good model
RMSEA	≤ 0,08	0,024	Good model
GFI	≥ 0,90	0,900	Good model
AGFI	≥ 0,90	0,850	Marginal model
TLI	≥ 0,90	0,990	Good model

**Formulation of the Model**

Based on the results of the SEM analysis of the final stage trials in Appendix 7, the model to empower farmers to conserve soil and water in the watershed Sampeyan in Situbondo can be formulated as follows.

**a. Direct Influence**

The model explicating the direct influence toward the farmers empowerment (KP) is as follows.

1.  $KP = 0,263\text{human capital} + 0,252\text{empowerment Process} + 0,15$
2.  $KP = 0,01\text{physical capital} + 0,252\text{empowerment Process} + 0,15$
3.  $KP = 0,029\text{social capital} + 0,252\text{empowerment Process} + 0,15$
4.  $KP = -0,272\text{government's roles} + 0,252\text{empowerment Process} + 0,15$
5.  $KP = 0,436\text{farmers' perceptions} + 0,252\text{empowerment Process} + 0,15$

**b. Indirect Influence**

$$KP = 0,263\text{human capital} + 0,01\text{physical capital} + 0,029\text{social capital} - 0,272\text{government's roles} + 0,436\text{farmers' perceptions} + 0,252\text{empowerment Process} + 0,15$$

## Discussions of the Results

### 1. The Influence of Human Capital on the Empowerment Process

The coefficient influence of the human capital on the process of empowerment is equal to 0.263, and has a level of significance with a p-value of 0.000 (far below 0.05). Thus, the hypothesis 1, which states that the human capital positively affects the empowerment process, is acceptable. This means that the process of empowerment is influenced by the human capital. The structural coefficient of human capital in the process of empowerment is equal to 0.263, this means that each 0.263 unit increase in the human capital will raise the level of the empowerment process by 1 unit. Despite a small structural coefficient, if improved, it will also increase the empowerment of farmers in the watershed Sampeyan in Situbondo.

Health indicators play an important role in the human capital. When farmers are physically and spiritually healthy, this condition will indirectly affect the process of empowerment of farmers. The survey shows that the majority of the farmers interviewed do not have certain diseases that are chronic such as that suffered by the public at large cities such as cancer, complications, and kidney. Besides, the farming communities in the location of research are rarely sick, so they rarely go to the doctor. If they get sick they usually go to the paramedics only, as the paramedics can be called to their homes and the medicines are cheap. They rarely do a visit to a doctor because of high cost and far distance.

### 2. The Influence of Physical Capital on the Empowering Process

The coefficient influence of the physical capital to the process of empowerment is of 0.01, and has a level of significance with a p-value of 0.862 (far above 0.05). Thus, the hypothesis 2 which states that the physical capital has a positive influence on the process of empowerment cannot be accepted. This means that the process of empowerment is not affected by the physical capital. The structural coefficient of physical capital in the process of empowerment is equal to 0.01, this means that every 0.01 unit increase in the physical capital will raise the level of the empowerment process by 1 unit. Despite a small structural coefficient, if improved, it will also increase the empowerment of farmers in the watershed Sampeyan in Situbondo.

The indicators of production facilities and infrastructures that are parts of the physical capital in farming communities play an important role in the process of empowerment of farmers. The survey indicates the limited availability of agricultural land, only for certain arable crops (peppers, tomatoes, upland rice), the limited availability of seeds for crops on dry land, unaffordable seed prices due to the low economic conditions, poor availability of organic and non organic fertilizers, the limited availability of agricultural equipments both modern (machine hijackers) and traditional (hoe) ones. If such conditions can be optimized, it will be very influential at the empowerment process.

### 3. The Influence of Social Capital on the Empowering Process

The coefficient influence of the social capital on the process of empowerment is equal to 0.029, and has a level of significance with a p-value of 0.000 (far above 0.05). Thus, the hypothesis 3, which states that social capital has a positive influence on the process of empowerment, cannot be accepted. This means that the process of empowerment is not influenced by the social capital. The coefficient of structural social capital in the process of empowerment is at 0.029, this means that each 0.029 unit increase in the social capital will increase the level of the empowerment process by 1 unit. Despite a small structural coefficient, if improved, it will also increase the empowerment of farmers in the watershed Sampeyan in Situbondo.

The indicators of trust among people play a very important role in backing up the process of empowerment of farmers. Trust among people in the research site is indicated by the high level of trust among people, for example, they tolerate each other in the distribution of irrigation water. The high trust to the farmer community leaders (religious leaders) is caused by the condition of the people who are predominantly Muslim, and consistent in carrying out their religious activities. The survey also shows a lack of trust to the outsiders and governments, for instance, lack of cooperation with external parties on soil and water conservation.

Narayan (2002) describes the concept of social capital as proposed by Porter. In this regard, the concept of social capital becomes a concept that is generally accepted by the social scientists from various disciplines. This concept is then developed rapidly and becomes a concern to many parties. The social capital even is believed to play a role in the economic development. Besides, the concept of social capital is also a debatable matter in sociology, anthropology, psychology, politics, and economics. The social capital has a uniqueness that is rational. The economic capital is located on a person's bank account, the human capital is on their brain, and the social capital is in the structure of relationships between individuals. In order to get the social capital, one must connect with others for a mutual benefit.

### 4. The Influence of the Government Roles on the Empowering Process

The coefficient influence of the role of government on the process of empowerment is equal to -0.272,

and has a level of significance with a p-value of 0.000 (far below 0.05). Thus, the hypothesis 4, which states that the government's role has a positive influence on the process of empowerment, is acceptable. It means that the empowerment process is influenced by the role of government. The structural coefficient of the government's role in the process of empowerment is at -0.272, it means that each -0,272 unit increase in the government's role will increase the level of the empowerment process by 1 unit. Despite a small structural coefficient, if improved, it will also increase the empowerment of farmers in the watershed Sampeyan in Situbondo.

Most of the respondents 41.4% (65 respondents) know the government's roles in improving the human resources of farmers for the sake of empowering them to conserve soil and water in the watershed Sampeyan Situbondo. The indicators of human resource development play an important role in the process of empowering the farmers. The survey results show that the lack of training models and practices of soil and water conservation by the governments greatly impacts on the empowerment of farmers. The government has often visited the study site yet the farmers are less involved, thus the farmers are very pessimistic and apathetic towards the role of government.

The quality of farming communities is still poor. Their weakness is caused by several factors, including the lack of economic security, the lack of experience in the political arena, the lack of access to information, lack of financial support, lack of training, and the physical and emotional strain. Empowerment is defined as the provision or improvement of power (power) to the weak or unlucky (disadvantage). Ife (1955) states that empowerment refers to the effort of reallocating the power through changing the social structures. Simply, empowerment is defined as a way that people, organizations, and communities can be directed to be able to take control of their lives.

#### **5. The Influence of the Farmers' Perceptions on the Empowering Process**

The coefficient influence of the farmers' perceptions on the process of empowerment is equal to 0.436, and has a level of significance with a p-value of 0.000 (far below 0.05). Thus, the hypothesis 5, which states that the farmers' perceptions have a positive effect on the empowerment process, is acceptable. It means the empowerment process is influenced by the perception of farmers. The structural coefficient of the farmers' perceptions on the process of empowerment is equal to 0.436, this means that each 0.436 unit increase in the perception of farmers will increase the level of the empowerment process by 1 unit. Despite a small structural coefficient, if improved, it will also increase the empowerment of farmers in the watershed Sampeyan in Situbondo.

Most of the respondents 55.4% (87 respondents) do not know the signs of land degradation in the watershed Sampeyan Situbondo. The indicator signs of land damage are shown by the changes: 1) colors of the soil, 2) soil texture, and 3) the effect on plant growth. The farmers' perceptions about the signs of land degradation play an important role in the process of empowerment of farmers. The results of the survey show that the majority of farmers do not know the signs of land degradation that include colors, soil texture and factors that influence the plant growth. If the farmers' knowledge about signs of land degradation can be improved, there will be an increase also in the process of empowerment of farmers.

Perception is a process taken by an individual to organize and interpret his/her sensory impressions in order to give meaning to his/her environment. Our perceptions and judgments of the person's actions will be very much influenced by our control on a person's internal state. Furthermore, according to Robbins (2001) the perception formation process is very complex, and is determined by the dynamics that occurs in a person when he/she sees, hears, smells, tastes or feels a stimulus. There are three main factors that affect: the perceiver, target and situation.

#### **6. The Influence of Empowering Process on the Farmer Empowerment**

The coefficient influence of the empowerment process on the farmer empowerment is at .252, and has a level of significance with a p-value of 0.000 (far below 0.05). Thus, the hypothesis 6, which states that the process of empowerment positively affects the farmer empowerment, is acceptable. That means that the farmer empowerment is affected by the process of empowerment. The structural coefficient of the process empowerment on the farmer empowerment is 0.252, this means that each 0.252 unit increase in the empowerment process will increase the level of empowerment of farmers by 1 unit. Despite a small structural coefficient, if improved, it will also increase the empowerment of farmers in the watershed Sampeyan in Situbondo.

Most of the respondents 70.7% (111 respondents) do not have the capability of enabling. Enabling is indicated by 1) supports for a self development, 2) atmospheres for improving knowledge, 3) financial supports, and 4) supports for the weak. The indicators of enabling are dominant in the empowerment process. The results of the survey show that the majority of farmers do not have the capability of enabling. The indicators of enabling indicate a lack of supports for self-development, atmospheres for the improvement of knowledge, financial

supports, and supports for the weak.

Empowerment as a process refers to a series of actions carried out systematically reflecting the phasing of the efforts to change the less powerful communities towards empowerment. Based on the description proposed by Ife (1995), Sumitro (Vitayala et al., 1995), Sumardjo (1999), and Slamet (2003) on the characteristics of the powerless, it can be concluded that the community can be said to be empowered if they have the knowledge, attitudes and sufficient skills.

### **Findings**

The model of empowering farmers in conserving soil and water in the watershed Sampeyan in Situbondo

### **Implications of Policy**

#### **Direct Policy Implications**

- a. Increasing and improving the human capital
- b. Repairing and procuring the physical capital
- c. Increasing services on social capital
- d. Increasing and improving the role of government
- e. Increasing the dissemination of information on farmers' perceptions
- f. Increasing and improving the process of empowerment
- g. Training and improving the characters that make up the empowerment of farmers

#### **Indirect Policy Implications**

- a. Increasing the role of agriculture and irrigation departments in deciding policy in favor of soil and water conservation in the watershed Sampeyan Situbondo.
- b. Increasing active participations of universities for research and co-operation on the conservation of soil and water in the watershed Sampeyan Situbondo.
- c. Good supports and cooperation with universities and agriculture departments in the provision of agricultural services or grants tools / technologies for soil and water conservation in the watershed Sampeyan Situbondo.
- d. Good supports and cooperation from the banks for the provision of capital equipped with easy and fast services as well as low interest rates on the agricultural development in the watershed Sampeyan Situbondo.
- e. Increasing active roles of cluster for assistance in coordination with the local and central departments of agriculture on agricultural development in the watershed Sampeyan Situbondo.
- f. Structuring and improving the consolidation of the institutions involved in the development of agriculture in the watershed Sampeyan Situbondo.
- g. The awareness to abide by and comply with the commitments established between parties that partner.

## **CONCLUSIONS AND SUGGESTIONS**

### **Conclusions**

1.
  - a. Social capital and physical capital do not significantly influence the process of empowerment.
  - b. Human capital, the role of government, and farmers' perceptions significantly influence the process of empowerment.
  - c. The process of empowerment significantly influences the empowerment of farmers.
2. There are two policy implications concerning the farmer empowerment model for soil and water conservation in the watershed Sampeyan Situbondo.
  - a. Direct policy implications on the empowerment of farmers are focused more on improving and enhancing the quality of human capital (health level), physical capital (infrastructure and facilities of production), social capital (trust among people), the role of government (increasing HR farmers), farmers' perceptions (signs of land damage), and the process of empowerment (enabling).
  - b. Indirect policy implications are not focused on increasing the active roles of both government and private institutions in the conservation of soil and water as well as the increasing agricultural productions in the watershed Sampeyan Situbondo.

### **Suggestions**

1. It is necessary to conduct further research on the roles and institutional patterns in the watershed Sampeyan in Situbondo.
2. It is necessary to conduct research on use of appropriate technologies to increase agricultural production in the watershed Sampeyan in Situbondo.
3. It is needed to conduct a study of decision making on increasing agricultural production in the watershed Sampeyan in Situbondo on small and medium scale enterprises

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