THE ROLE OF FARMERS IN THE STUDY OF OPERATIONS AND MAINTENANCE OF IRRIGATION ON IRRIGATION DISTRICT AREA BOGOR SASAK

Suardi Natasaputra 1), Dhemi Harlan2), Gemilang 1),
1) Dinas Penegelolaan Sumber Daya Air Provinsi Jawa Barat,
Jl. Braga No. 137 Bandung 40111, E-mail: m_gemilang@yahoo.com
2)FakultasTeknik Sipil dan Lingkungan, Institut Teknologi Bandung,
Jl. Ganesha No. 10 Bandung 40132
E-mail: suardi_n@yahoo.co.id, dhemi170@yahoo.com , m_gemilang@yahoo.com

Abstract

Public participation in an irrigation system has a very important role in the management of irrigation systems. Participation of farmers is one of the determinants of success of the operation and maintenance (O&M) of irrigation networks, this is because most farmers are aware of potential resources and needs as well as beneficiaries in the implementation of this activity.

This study aims to determine the level of farmer participation in the activities of Operation and Maintenance of irrigation system in Bogor Regency Sasak Irrigation Area. Data taken in this study were obtained from a survey in the form of interviews and questionnaires distributed to respondents farmer water users. The data contained in the independent variables (socio-economic and institutional) and the dependent variable (operation and maintenance) is processed by examining the path correlation and regression statistical analyses.

The results showed that socio-economic condition of farmers is not good and needs to get attention (62.76%), good condition farmer institutions (80.03%), and Operation and Maintenance of good condition (72.49%). There is a strong correlation between each independent variable to dependent variable. The existence of a strong regression between independent variables ($X_1$, $X_2$) to the dependent variable ($Y$) which follows the linear equation $Y = 24,133 + 0.408 X_1 + 0.416 X_2$, so that increase in value of the variable operation and maintenance can be estimated from the increase in the value of the socio-economic and institutional.

With this research are expected to be a strategic steps in the management of irrigation systems, especially in efforts to encourage community participation of farmers in irrigation water use effectively and efficiently, preventing the decline in function of irrigation and maintaining the sustainability of irrigation systems.

Keywords: Participation of Farmers, Farmer Water User (P3A), Irrigation System, Operation and Maintenance Activities.
1. Background

In order to improve food security and agricultural production it is necessary efforts for the management of irrigation systems can be grown to develop. Therefore we need a concerted and planned activities in irrigation management in the form of structural and non structural efforts

As increasingly complex time changes and magnitude of development challenges, the insight and orientation changes in development that not only emphasizes the purely technical approach but also emphasizes the development of humanity. Similarly, in solving the problems of irrigation management where the government budget constraints and the huge irrigation network management fund post-construction after the required role of community social capital in the form of active participation of society, especially the farmers as direct beneficiaries of the irrigation network.

Community participation of farmers in an irrigation system has a very important role in the management of irrigation systems. The participation of farming communities to improve the performance of irrigation networks, to maintain the function of irrigation and to maintain the sustainability of irrigation systems, so that farming can increase yields, which in turn can help maintain and improve food security and welfare for the society.

Participation of farmers is based on the willingness and ability of farmers to the spirit of partnership and self-reliance, participation can be realized in the form of donations of thought, ideas, time, energy, materials, and funds, which can be done individually or through water user farmer association (Perkumpulan Petani Pemakai Air /P3A).

2. Purpose and Objectives

The purpose of this study is to investigate the role of Farmer Water User Association (P3A) in operation and maintenance of irrigation networks.

The purpose of this study is:
1) Knowing the socio-economic and institutional conditions of farmers, so they will know about the independence of farmers
2) Knowing the ability of farmers to manage the tertiary irrigation network, which is the responsibility and authority of farmers.
3) Knowing the extent of participation of farmers in operation and maintenance of irrigation networks
4) Knowing the influence of socioeconomic and institutional peasant farmer to farmer participation in operation and maintenance of irrigation networks

3. Literature Review

3.1. Irrigation Systems

Irrigation is a process of supplying, setting, and disposal of irrigation water to support agriculture.

Irrigation systems include irrigation infrastructure, irrigation water, irrigation management, irrigation management institutions, and human resources.

Management of the irrigation network are activities which include operation, maintenance, and rehabilitation of irrigation in irrigated areas.

3.2. Water user farmer association (Perkumpulan Petani Pemakai Air /P3A)

Farmer water users are all farmers who have benefited directly from improved water management and irrigation networks, including irrigation pumps that includes the owner of the rice fields, rice cultivators, fish pond owners who receive irrigation water, and corporate bodies in the field of agricultural irrigation water use.

Water user farmer association is institutional irrigation management to water user farmer container in an area service / tertiary or village established democratically by the farmers' local water users including irrigation management institute.
3.3. farmer participation in irrigation management

Development and management of irrigation systems in order to realize the benefits of water in agriculture was held in a participatory and implementation is done with the participation of community-based farmer.

The participation of farming communities in development activities and management of primary and secondary irrigation networks implemented based on the principle:

a. voluntary, based on the results of deliberation and consensus;
b. Taking into account the needs, abilities, and economic conditions, social, cultural and farming communities;
c. not aim to seek profit.

4. Methodology

The research method used is survey method is to obtain data from a particular place naturally, where the researchers conducted the treatment in collecting data with questionnaires, tests or interviews.

Data obtained from the survey results are analyzed in order to provide useful information by following these steps:

a. Analysis of percentage
b. Scale Measurements / Determination score
c. The transformation of ordinal data into interval
d. Correlation Analysis
e. Regression Analysis

In this study researchers set variables that will be researched, studied and drawn the conclusion, namely:

a. Independent variable namely Socio-Economic Aspects (X1) and Institutional Aspects (X2)
b. Independent variable Aspects of Operation and Maintenance. (Y)

5. Overview Study Areas

5.1. Study Locations

Location of study is Sasak Irrigation Area located in Bogor regency of West Java province with a total area of 1088 hectares, including 2 (two) districts namely:

**• Sub Ciseeng (7 villages):**
Village Ciseeng, Cibentang Village, Village Cihowe, Kuripan Village, Village Putat Nutug, Cibeuteung Muara Village, Village Babakan

**• Sub Parung:**
Cogreg Village and Village Bojong Indah

Figure 1. Study Location Map

*sumber: Bidang Rekayasa Teknik Dinas PSDA Provinsi Jawa Barat*
5.2. Issues

From the observation, common problems that occur in irrigated areas sasak a result of lack of good implementation of Operation and maintenance, so the farmer community involvement is needed to help solve the problem.

Some common problems, such as:

a. Sedimentation is high enough on the channel and the presence of avalanches.
b. Buildings are not working and Water Damage

c. Shortage of water due to silting of channels, non-functioning of the building due to the calculation of water and water needs that do not pay attention to the needs of water for fish ponds, where the number of fields which switch the function to be a fish pond in number is closer to 50% of the total area.

6. Discussion and Analysis

Respondents in this study are farmers who are members of eight groups of farmers (P3A) which is in Bogor Regency Irrigation Area Sasak.

6.1 Distribution of Respondents by Age Group

Distribution of respondents by age group was dominated by productive age, this indicates that the human resources of farmers are still quite capable of managing irrigation farmers in the area of authority and able to be actively involved in irrigation management in primary and secondary level.

![Figure 2. Distribution of Respondents by Age Group](image)

Classification of productive age:
- 15-30: very productive
- 33-45: productive
- 46-55: productive enough
- > 55: less productive

6.2 Distribution of Respondents by Education Level

Distribution of respondents by educational level is described by the following graph:

![Figure 3. Distribution of Respondents by Education Level](image)

Farmers in the study area has a low education level. This will be an impact on:
- Farmers will be difficult to accept new methods or technology relating to agricultural business development.
- Farmers will be difficult to compete in the farming business.
- Farmers will be the one who always harmed associated with marketing agricultural products.
- Farmers will find it hard to accept and implement programs and government policies in agriculture and irrigation.

6.3 Distribution of Respondents According to According to Land and Land Ownership

Minimum land area that can support farmers are pretty well over 1 ha, while the land area of between 0.5 to 1 Ha categorized as moderate (but still not sufficient in an optimal) and under 0.5 ha are less able to support farmers with better.

**Figure 4. Distribution of Respondents According to Land**

![Pie chart showing distribution of respondents by land area: 67% < 0.5 Ha, 31% 0.5 - 1.0 Ha, 2% > 1.0 Ha.]

The result showed that most farmers (67%) work on land below 0.5 ha, this data shows that farmers earn less when viewed from a sufficient land area.

While the ownership of land, the graph obtained as follows:

**Figure 5. Distribution of Respondents by Ownership of Land**

![Pie chart showing distribution of respondents by land ownership: 44% owner, 38% tenant, 18% cultivators.]

The amount of land ownership (44%) have a relationship with a high percentage of land area below 0.5 ha. Most of the land with the status of the owners has an area below 0.5 ha.

Greater percentage of land tenants (38%) of workers (18%), this is due to the many fields that leased and converted to fish ponds as economically profitable.

6.3 Distribution of Respondents According to Crop Yields and Production Costs

Distribution of Respondents according Crop Yields and Production Costs illustrated by the following graph:
These data indicate that most farmers harvest the rice is less than expected, and will result in the low income of farmers.

This data is a positive indication that the study area, farmers are not too burdened with the cost of production, it can mean also that farmers are not too difficult to get seed, fertilizer and other necessary expenses until the harvest.

6.3 Analysis of Each Variable

The results obtained by analysis of ordinal data of each variable is as follows:

a. Economic conditions were poor and farmers need to get attention (63.56%);
b. Social conditions were poor and farmers need to get attention (61.58%);
c. Condition Independence Institute farmer / P3A Good (82.04%);
d. Institutions Performance Condition farmer / P3A good (78.55%);
e. Network Operating Conditions in tertiary less and require attention (68.36%);
f. Network Operating Conditions in Primary/Secondary good (72.73%);
g. Network Operating Conditions in Primary/Secondary good (71.35%);
h. Rearing Condition in Tertiary Network poorly and need attention (62.90%);
i. Condition Maintenance in the Primary Network/Secondary is Very Good (79.90%);
j. Around the Network Maintenance Condition good (73.37%).

6.4 Analysis of Relationships Between Variables

From the results obtained by analysis of correlation between each variable:

a. Socio-economic and institutional
   - Correlation coefficient of 0.286, then the relations between the two aspects of the weak or strong.
   - The coefficient is positive which means that if the social aspects of economic increases, the institute will increase
- Value of significance is 0.35>0.05, meaning there is no significant relationship between socio-economic and institutional variables

b. Socio-Economic and Operations & Maintenance

- Correlation coefficient of 0.527, then the relations between the two aspects close or strong.
- The coefficient value is positive which means that if the social aspects of economic increases, the aspect of Operations & Maintenance will increase.
- The significance value is 0.000 <0.05, meaning there is a significant relationship between socioeconomic variables and Operations & Maintenance.

c. Institutional with Operations & Maintenance

- Correlation coefficient of 0.532, the relations between the two aspects of tight or strong.
- The coefficient value is positive, which means a positive relationship, meaning that if the institutional aspects of increasing the aspect Operations & Maintenance will increase.
- Significance values were 0.00 <0.05, meaning there is a significant relationship between institutional variables and Operations & Maintenance.

From the results obtained by the regression analysis was also strong between dependent variables and independent variables that follow the linear equation \( Y = 24.133 + 0.408 X_1 + 0.416 X_2 \)

7. Conclusion

From the results of the study, analysis and discussion, it can be concluded as follows:

a. Community study of farmers in the location of productive age but is generally less educated. From the socio-economic aspects of farmers in the region has not been independent, but from the aspect of performance is good enough farmer institutions.

b. The ability of farmers in managing irrigation at the tertiary level is not good and needs to get attention.

c. Level of public participation in the operation and maintenance of irrigation networks less and require attention.

d. There is a strong correlation between each independent variable (Socio-Economic and Institutional) to the dependent variable (Operation and Maintenance) and there is a strong correlation doubles together two independent variables on the dependent variable.

e. There is a strong regression between dependent variables and independent variables that follow the linear equation \( Y = 24.133 + 0.408 X_1 + 0.416 X_2 \), so that increase in value of the variable operation and maintenance can be predicted from the increase in value of socio-economic variables and institutional variables.

8. Suggestion

From the results of studies and research, as described, can be given suggestions as follows:

a. In an effort to improve the lot of farmers it is necessary to improve socio-economic conditions of farmers. Improved Economic Conditions done by increasing incomes of farmers through development activities and management of irrigation systems that encourage integration with the activities of diversification and modernization of farming. Improvement of Social Conditions done by doing the building and community empowerment for farmers to increase capacity and skills.

b. In an effort to improve and enhance the ability of farmers in managing irrigation at the tertiary level can be done by improving the socio-economic aspects and aspects of the operation and maintenance at the tertiary level.

c. Given the strong correlation and regression between socio-economic variables and institutional variables on Operation and Maintenance, and then to increase the participation of farmers on
operation and maintenance activities can be done by repairing and improving the conditions of each variable with the following order of priorities:

1) Operation Aspects:
   - Improve the ability of farmers to be able to be independent in managing the irrigation network at the tertiary level is the responsibility and authority of farmers.
   - Implement an effective irrigation system and efficient
   - Encouraging farmers to be actively involved in operations at primary and secondary network so that the operating system can be implemented without any dependency on government.

2) Maintenance Aspects
   - Encourage the ability of farmers to be able to properly maintain the irrigation network.
   - Raising awareness and sense of belonging (sense of belonging) farmers to maintain, secure and maintain all irrigation assets for the mutual benefit so that the irrigation system can be used continuously, sustainable so that it can be utilized optimally for the welfare of society.

3) institutional aspects
   - Improving the legal status of institutional P3A
   - Encourage institutional performance to be more active, independent and can help solve problems faced by farmers.
   - Making P3A as a place of business together for the welfare of farmers.

4) Social aspect can be done by increasing the level of understanding of farmers’ low educational backgrounds, to stimulate the youth to make an effort in agriculture, and foster cultural unity and mutual assistance among farmers.

5) Economic aspects, is done by helping to increase agricultural production by providing appropriate farming techniques in the location of agriculture, agricultural business multicultural, farmers cut production costs, and provide a stable and reasonable prices for agricultural products.

d. To improve the participation of farmers it is necessary to attempt to improve coordination and cooperation among groups P3A so much easier in the achievement of common goals by intensifying meetings between P3A also be done with assistance activities, motivation, technical guidance, education, training and credit facilities given by the government.

e. Use the sustainability of irrigation management, particularly in operations and maintenance of irrigation networks, the need for building a planned, programmed and sustainable, involving all stakeholders, public agencies concerned with irrigation, and involve the participation of farming communities.

f. Need to do further study on water demand in irrigation area Sasak considering the many rice fields are turned into fish cultivation, so that the operations and maintenance can be performed optimally
REFERENCES


