

Study on Optimization of Irrigation and Drainage Systems in Jombatan Village

Muhammmad Arif Hakim¹, Mohamad Nasirudin^{2*}, Canggih Nailil Maghfiroh³

^{1,2,3}Agricultural Engineering Biosystems, Universitas KH. A. Wahab Hasbullah

Email: nasirudinmohamad@unwaha.ac.id

ABSTRACT

The development and management of irrigation infrastructure from a historical perspective is closely related to national food security. In infrastructure management, irrigation must meet the needs of farmers. Every plant needs sufficient water to increase agricultural productivity and farmer's welfare. Meeting water needs requires adequate irrigation and drainage channels in each area. One of them is Jombatan Village, which is a village located in Kesamben District, Jombang Regency. Optimising the performance of irrigation and drainage channels in Jombatan Village requires a concrete step. This irrigation and drainage literature review discuss optimising the performance of irrigation and drainage channels. All irrigation and drainage canal buildings have the same conditions; namely, the walls of the buildings are overgrown by plants and moss, some of the walls of the canal buildings are damaged due to the lack of strength of the building structure. The effectiveness of irrigation and drainage channels in Jombatan Village is still not optimal because infrastructure maintenance is still lacking, and community knowledge is still lacking

Keyword : *Irrigation, Drainage, Optimal.*

INTRODUCTION

Jombatan Village is one of 14 villages in the Kesamben District located 3 km west of Kesamben District; Jombatan Village is an area that borders the Brantas River and has an area of 964,817 hectares. Based on BPS data (2019), it is known that 25% of the people in Jombatan Village are farmers. In terms of irrigation water needs, the community relies on the Melik river (Hartanti & Farida, 2021). This river will flow tertiary water to the rice fields. It must be balanced with adequate infrastructure and channel maintenance to drain river water (Arifin et al, 2021). The infrastructure facilities in question are canal buildings, sluice gates, garbage filters, and disposal systems. It is known that many problems occur along the irrigation and drainage channels, such as much domestic waste from the community being dumped along the irrigation canal, causing blockages. In addition, there is a lot of soil sediment at the bottom of the river and a lack of building maintenance. According to (Sadad, 2020), the factors that affect channel efficiency are the growth of grass and piles of sedimentation and garbage in irrigation canals and drainage, obstructing water flow (Prasetyo & Qomariyah, 2021).

It is necessary to optimise irrigation and drainage channels by measuring the condition of infrastructure and the level of channel efficiency. According to (Hidayat et al., 2021), the low level of efficiency in irrigation canals is caused by the age factor of the canals. The results of field monitoring show that many canal walls are damaged, sediment deposition, wild plants, and exploitation are not following the techniques carried out by the surrounding community. Therefore, the authors are interested in the discussion. It is hoped that at the end of the day, the irrigation and drainage channels can work optimally to meet the water needs of each paddy field.

METHOD

This research uses descriptive qualitative research. The approach used in this research is the type of sample approach. This research was conducted in June 2021 in Jombatan Village, Kesamben District, Jombang Regency. The questionnaire collection system is done door to door. Interviews and distributing questionnaires to 35 respondents in the village. Determination of this sample using a purposive sampling

by taking 30 respondents from farmers and five respondents from Jombatan Village irrigation administrators. The tools used in the data collection process are stationary equipment, notebooks and cellphone cameras—the researcher collecting data using interview, observation, documentation and questionnaire methods. The data analysis technique uses the Likert scale method, with the assessment of the criteria for the highest score of 5 and the lowest weight being given a score of 1, which will later become an analysis to determine the conditions in the field.

RESULT AND DISCUSSION

Data collection was obtained from a questionnaire that was formulated based on theories and experts opinion and it was filled in by respondents that will be used as information. The respondents involved were 35 people, namely 30 farmer groups and 5 people from the Village Water User Farmers Association (HIPPA). Measurement of the response using a Likert scale scoring 5 = agree, score 4 = agree, score 3 = neutral, score 2 = disagree, score 1 = strongly disagree.

Result

Knowledge of Irrigation

The results of the response from farmer groups and HIPPA is that knowledge about irrigation systems along with the total score and percentage of irrigation knowledge can be seen in table 1. Based on table 1 shows that 2% of community knowledge is very high, 21% is high and 12% is moderate. . It can be concluded that the community as a whole is aware of the importance of knowing the irrigation system.

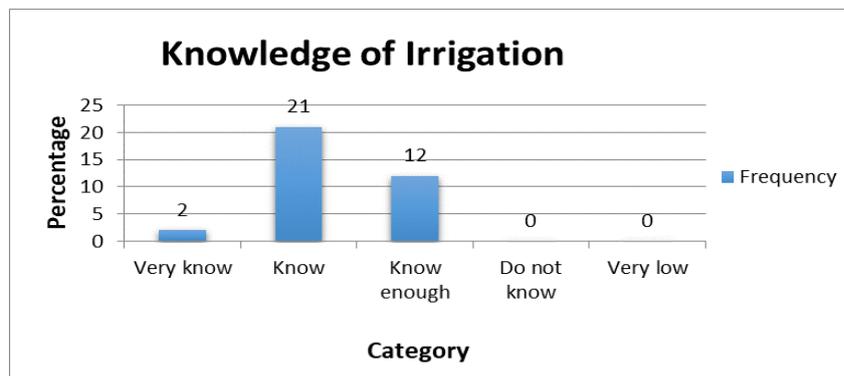


Figure 1. Knowledge of Irrigation

Knowledge Of Drainage

The analysis results of the drainage system knowledge show that 1% is very high, 24% is high and 10% is moderate. It can be concluded that the community as a whole is aware of the importance of understanding the drainage system.

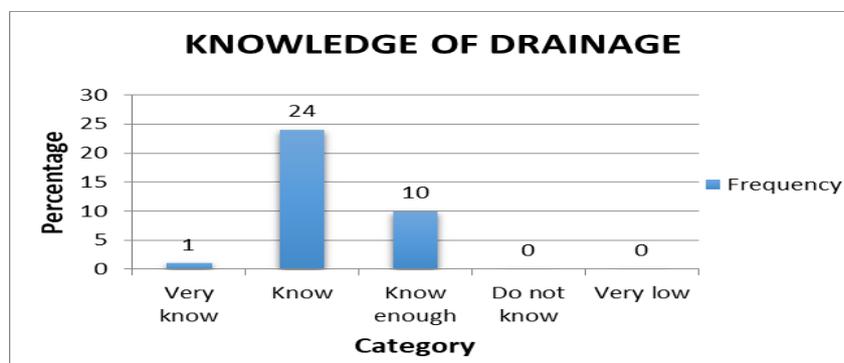


Figure 2. Knowledge Of Drainage

Condition of Buildings

The results of the analysis of building conditions show that 7% of the buildings are in good condition, while 18% and 10% of community respondents say that the condition of the buildings is

moderate and low. It can be concluded that the condition of the buildings in the village of jombatan is in poor condition.

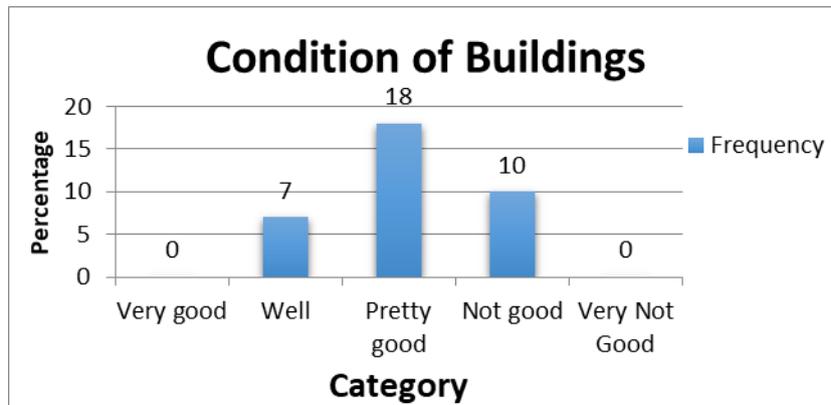


Figure 3. Public Perceptions of Building Conditions

Table 1. Condition Of Irrigation And Drainage Canals

No	Channel Type	Detail Information	Picture
1	Secondary Channel	Secondary canal in Jombatan Village uses a technical irrigation network. With permanent building conditions along the secondary channel. The results of the interview is that in the secondary canal there are plants on the walls of the secondary canal so that it can affect the mass of the building.	Jombatan Village secondary channel 
2	Tertiary Channel	Tertiary channels in Jombatan Village use a technical network, this is because many buildings are still semi-permanent. The results of field observations is that there are still many buildings in irrigation and drainage channels which are still made naturally or not yet permanent	Jombatan Village Tertiary Channel 
3	Open Drainage Channels	Interview results explain that the drainage or sewerage in Jombatan Village uses a mixed system where drainage and rainwater are mixed into the same channel. The drainage channel uses an open channel because the area is large enough, so it does not harm the environment. This drainage channel is used by the water management of the village of jombatan to irrigate the rice fields, he is of the view that it minimizes the water in the sewer or can be used again to irrigate the rice fields. In the condition of the building, some of the drainage channels are damaged in the canal walls and there are also plants growing.	Drainage Channel In Jombatan Village 

Operational and Maintenance of Irrigation Channels and Drainage

The results of the analysis show that 7% have done operation and maintenance, while 25% have had enough maintenance and 3% have never done maintenance. So it can be concluded that the community has not 100% implemented operational procedures and maintenance of irrigation and drainage channels.

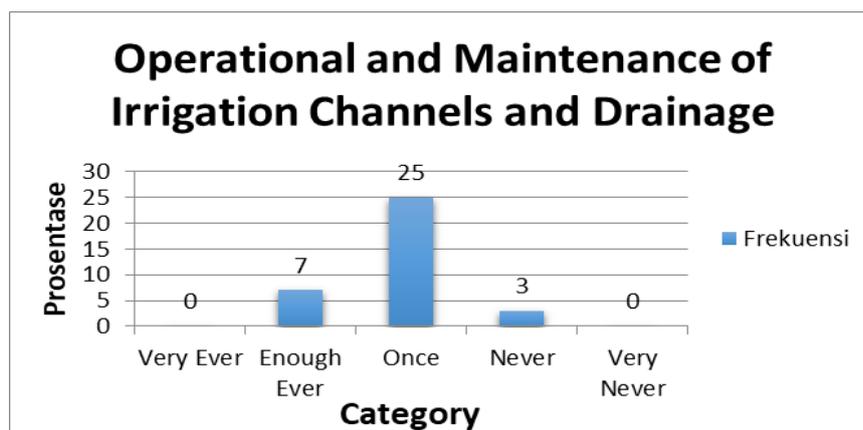


Figure 4. Operations and Maintenance of Irrigation Channels and Drainage

The Utilization of irrigation Canals and drainage

The results of the analysis show that 28% of the population have felt the benefits of having drainage channels, while 7% of people have not feel the benefits of having irrigation and drainage channels.

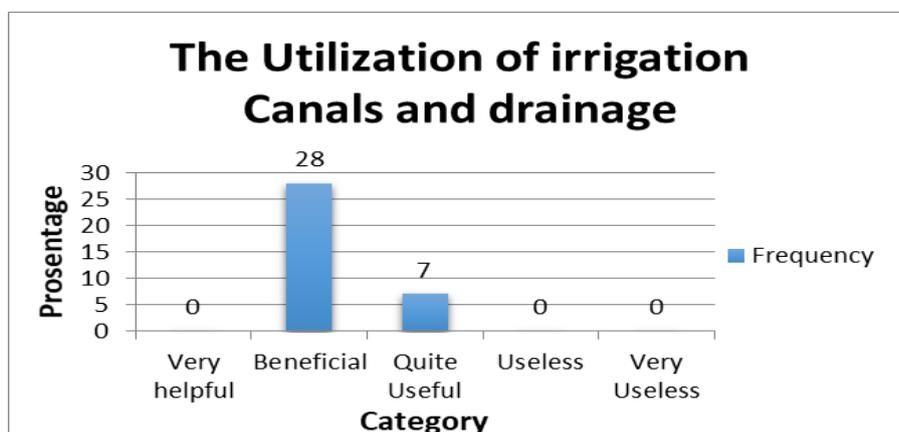


Figure 5. Utilization of Irrigation and Drainage Channels

Discussion

Conditions of Canal Irrigation and drainage

Canal buildings have the same conditions, namely, the walls of the buildings are overgrown with plants and moss, some of the walls of the canal buildings have been damaged due to the lack of strength of the building structure. These problems will have an impact on the construction of canals and water loss. Whereas the water needs during the pre-planting to post-harvest period must be fit with the needs of the plant so that optimal production results can be produced. According to (Kharisma, 2017), water needs include water supply problems, both surface water, and underground water. In the construction of irrigation projects, to obtain optimal production results, the provision of water must be fit with the the time needed for plants and the amount of water needed for agriculture so that irrigation water supply can be as efficient as possible.

Where water is one of the main factors in the agricultural process. The construction of irrigation and drainage channels must comply with the guidelines on the construction of infrastructure facilities. This must be taken seriously by the relevant agencies regarding the problems that exist in the field. If the problem is not resolved properly, it will result in a decrease in agricultural production. So repairs and supervision by the relevant agencies must be tightened by the applicable laws and regulations. According to (Jombang Regent Regulation Number 4 of 2015 concerning the Main Duties and Functions of the Jombang Regency Irrigation Public Works Agency Chapter 2 Article 4), among others, development and improvement of primary and secondary irrigation systems in irrigation areas, supervision of water resource management in river areas, implementation of development and maintenance of drainage Facilities (PS), supervision and control of drainage and flood control (Hidayah, et al., 2020).

Effectiveness of drainage channels

Irrigation operational activities have been carried out by hipa management and farmer groups so that there is a distribution or schedule that has been determined by the UPTD. Each discharge given to irrigate rice fields in the Jombatan village area is 4 water discharges. Similarly, according to (Ludiana et al, 2017) that there are stages regarding the operation of irrigation, namely, the planning for the operation of the irrigation network is carried out every year which is useful for calculating the estimated demand for water supply, the implementation of monitoring and evaluation is carried out on the implementation and control activities.

The drainage operating system in Jombatan village still uses the manual method and has met the criteria for the required facilities and infrastructure, such as manual sluice gates, manual garbage filters, and manual sedimentation disposal systems. The manual sluice is opening and closing the sluice by raising the sluice with human power. Manual garbage filter by using wooden blocks at each sluice gate. Manual sedimentation is using a machine to remove sediment. According to (Regulation of the Minister of Public Works of the Republic of Indonesia number 12/Prt/M/2014 about the Implementation of Urban Drainage Systems) in the operation of infrastructure and facilities including manual sluice gates, manual garbage filters, pumps, polder systems and sediment disposal systems.

In the maintenance of irrigation and drainage which is carried out routinely, waste transportation in each irrigation and drainage canal is carried out once every 7 days. By lifting the garbage carried by the flow of water in the river. Garbage transportation is one of the way to clean irrigation and drainage channels in order to not hinder the flow of water which will later be channeled to a lower place. The problem of transporting waste is indeed still a very difficult problem to overcome due to the lack of public awareness in protecting the environment by still throwing garbage into existing irrigation and drainage channels. Maintenance of irrigation and drainage systems does not necessarily only become the responsibility of government agencies, but the participation of the community to jointly maintain drainage irrigation channels in their respective environments.

Periodic maintenance is one of the efforts made by the management of the HIPPA in the village of jombatan to maintain and repair irrigation and drainage buildings, that removing silt when the silt is very thick, usually according to field conditions. Repairs and maintenance have been carried out but not completely. As for the repairs carried out on the Melik River, namely around the hamlet of Jombatan 1. According to (Directorate General of Irrigation, 1997: V-1), several factors cause poor maintenance, it is Maintenance costs that are not sufficient or come not on time, there is no sense of belonging to the tertiary network, Responsible organization is not well organized.

Regular and periodic maintenance of irrigation and drainage channels needs to be done to keep the canals in good condition. According to (Directorate General of Irrigation, 1997: V-1) the maintenance is divided into three, there are routine maintenance work, periodic maintenance work, and special maintenance work. To improve the quality of production and the efficiency of water channels, both irrigation and drainage, the government must carry out maintenance activities and preserve the function of irrigation networks and drainage diverting productive land use by increasing community participation in the responsibility for the functioning of irrigation networks through cooperation system activities. in carrying out maintenance and care.

The condition of irrigation and drainage buildings in Jombatan Village is not optimal because there are many plants on the walls of the building and there are old buildings, there are also semi-permanent buildings that affect the irrigation and drainage system. Maintenance of irrigation and drainage is quite effective because it is following existing procedures, but the lack of government's role in implementing procedures for maintaining irrigation and drainage systems and public awareness is still lacking in the maintenance of irrigation and drainage.

CONCLUSION

Based on the results of the research and discussion described in the previous chapter, it can be concluded that the irrigation and drainage system management in Jombatan Village has been running but is still not optimal, This is obtained from the condition of the canal building that is old, there are plants on the channel wall and the building is still semi-permanent. The next factor is the lack of public and government awareness in maintaining irrigation and drainage channels, obtained from the amount of sedimentation and piles of garbage along the irrigation canal.

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