

MEASURING THE QUALITY OF RICEFIELD WATER MANAGEMENT BASED UPON THE PERCEPTION OF FARMER'S WATER ASSOCIATION MEMBERS IN CENKIR VILLAGE, BOJONEGORO DISTRICT EAST JAVA PROVINCE, INDONESIA

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ABSTRACT

Cengkir village stands out as a promising area for agricultural land conservation within Bojonegoro Municipality. Consequently, planning and developing water irrigation infrastructure in Cengkir village has become crucial to supporting agricultural activities. However, practical implementation of water irrigation often encounters numerous obstacles, mainly due to mismanagement and insufficient community participation. Therefore, understanding the farmers' perspectives on management and identifying key factors influencing it are essential for further improvement. Cengkir village offers a compelling case for exploration in this regard. This research aims to investigate farmers' views regarding agricultural irrigation management within the Association of Water User Farmers (Himpunan Petani Pemakai Air - HIPPA) in Cengkir Village.

Additionally, this study evaluates the relationship among factors influencing farmers' views on agricultural irrigation management. So, to understand the important factors from this perspective, this study employs the Likert Scale's weighting technique. The weighting technique is followed by a non-parametric Spearman Rank Correlation test to define the relationships among the variables and the influencing factors. The findings reveal that farmers' perceptions regarding irrigation management are at a standard level. Moreover, a high correlation exists among factors such as formal education level, motivation, needs, experience in rice cultivation, information knowledge, social environment, support from related departments, and land area, with the perspectives of HIPPA community members towards agricultural irrigation.

Keywords: *Agricultural irrigation management, perception, Association of Water User Farmers.*

1. INTRODUCTION

Water has a very crucial role in life. The demand for water for various purposes continues to increase over time, including in the agricultural irrigation sector. Most of the water is exploited for irrigation and is obtained from various sources, including surface water such as rivers, and underground water or groundwater. In terms of agriculture, good water management becomes crucial to be developed as irrigation infrastructure and water distribution are intended to meet needs (Wardani & Kurniati, 2022). However, due to the limitations on water resources, the conflict over the distribution of water increased. The situation is detrimental to the farmers who are highly dependent on the water supply (Ramadhan *et al.*, 2019).

Another important management part after water exploitation is the irrigation or water distribution system to the outlet (rice field plots). This system involves providing, distributing, managing, and regulating water to increase agricultural production. (Ali *et al.*, 2019). For this reason, improving irrigation systems such as canal construction is fundamental in supporting food production and ensuring water supply in irrigated areas, even in remote locations from surface water sources such as rivers. The efficiency of irrigation water delivery is influenced by knowledge of water requirements to achieve optimal water conditions according to crop needs. (Sulkifli, 2023). Especially for rice farming, managing exploitation and distribution in irrigation systems is a key element in ensuring national food security.

Cengkir Village is one area that conducts irrigation management systems with groundwater sources. The irrigation management system in Cengkir Village is carried out by a group of Water User Farmers Association (HIPPA) under the name Sumber Pangan. Many farmers in Cengkir Village are members of and depend on the HIPPA irrigation system. HIPPA Sumber Pangan is an organization of farmers at the village level, established to supervise and manage water use in agriculture to ensure smoothness and regularity in the irrigation system. HIPPA Sumber Pangan has an irrigation canal that runs through its territory and is more than 3 km long.

The local irrigation committee is responsible for the irrigation management of Embung Cengkir. Understanding how farmers assess agricultural irrigation management is crucial, given the magnitude of the benefits of implementing HIPPA activities. This farmer assessment is needed to evaluate the water distribution management system, especially related to farmers' perceptions of the procedures and procedures of how water distribution can fulfill farmers' needs.

Perception here refers to the process of evaluating the way messages or information are delivered to farmers so that the results of good perceptions from farmers will encourage each individual on an ongoing basis to participate in the distribution system actively, provide input and even participate in improving the quality of community-based irrigation management systems in Cengkir Village.

HIPPA members' perceptions of agricultural irrigation management were identified to illustrate whether or not the HIPPA system is sustainable for achieving system management objectives. The parameter used in this perception assessment is whether or not the farmer's response to the entire process and system rules implemented by HIPPA is positive. If the response received from farmers is favorable, then it indicates that the implementation of HIPPA activities will continue. However, if the responses received are adverse, then the implementation of these activities will not continue.

In the case of Cengkir Village, HIPPA management actors are entrusted to several

people who are not farmers. Meanwhile, all HIPPA farmer members supervise, monitor, and evaluate the HIPPA management system. All farmer members of HIPPA are responsible for determining the quality of irrigation management. All farmer members of HIPPA are responsible for determining the quality of irrigation management. Thus, the involvement of farmers as members of HIPPA has a crucial role in improving the quality of irrigation system management.

One of the main objectives of HIPPA management related to the role of farmers is to increase the level of involvement, ownership, and responsibility of farmers towards HIPPA is directed at strengthening the ability of HIPPA with the aim of increasing the efficiency, effectiveness, and sustainability of the irrigation system as a whole. (Susilowati, 2019). The realization of how irrigation management is implemented in the field. Simply put, the future sustainability of the program depends on how farmers perceive and follow the HIPPA program.

By detailing the information above, this research aims to understand the views of community members who are members of HIPPA regarding agricultural irrigation management, as well as to analyze the factors that influence their views on agricultural irrigation management in Cengkir Village, Kepohbaru Subdistrict, Bojonegoro Regency.

2. RESEARCH METHODS

This research was conducted to determine the quality of HIPPA management based on the perceptions of its members in Cengkir Village through quantitative descriptive analysis methods and the Rank Spearman correlation test. According to Sugiyono (2017), a research method that uses a quantitative descriptive approach is intended to present a precise, factual, and structured description of the phenomena, events, symptoms, and events being observed. Meanwhile, the Rank Spearman correlation test approach is used to determine the factors that cause failure in a program. Referring to the theory of applying the principles proposed by George C. Edwards III in Agustino (2016), it is stated that the implementation of a program policy is

influenced by four crucial elements: communication, resource allocation, attitude or inclination, and organizational structure.

Meanwhile, perception is how a person organizes and understands memory impressions to give meaning to their environment. According to research conducted by Yunita and Dyah in 2015, as cited by Yuliawan in 2018, the level of perceived ease will have an impact on a person's actions. The simpler the perceived ease of using a system, the more likely the individual is to use information technology.

The data in this study were collected through questionnaires, interviews, observations, and documents. This research involves the process of collecting information directly through primary data methods and secondary data surveys. So to obtain a sample of respondents who can describe the population of this study, the Taro Yamane formula is used (Machali, 2021).

$$n = \frac{N}{1+Ne^2}$$

Based on the Taro Yamane formula, this study can collect a sample of 125 farmers.

From the calculation as follows:

Population (N): 182

Limit of accuracy (e): 5%

Sample size (n):

$$\begin{aligned} n &= \frac{N}{1+Ne^2} \\ n &= \frac{182}{1+182(0,05)^2} \\ n &= \frac{182}{1,46} = 124,7 \text{ rounded } 125 \end{aligned}$$

HIPPA members' perceptions of agricultural irrigation management were studied during data processing. A quantitative descriptive analysis technique was used. The X variable was intended for HIPPA members and the Y variable was intended for agricultural irrigation management administrators. In this study, Spearman Rank correlation statistics were used to test the hypothesis. The non-parametric statistical data analysis known as Spearman correlation aims to determine the correlation coefficient of two variables arranged in pairs. The Spearman correlation

coefficient is a metric that describes the relationship between variables, conceptually supports the relationship, and statistically will be calculated the level through this coefficient (Megayani, 2022).

Quantitative descriptive data analysis was used to achieve the first and second objectives. The second objective included applying a non-parametric correlation test using Rank Spearman with the help of SPSS version 25.0 (Statistical Programs For Social Science). The Rank Spearman correlation formula used refers to the work of Siegel (2011), which has been applied:

$$r_s = 1 - \frac{6 \sum(d_i)^2}{n^3 - n}$$

The rules for making a decision include:

1. If t-count < t-table, it means reject H1 at $(\alpha) = 0.05$. This means that there is no real relationship between the two variables tested.
2. If t-count \geq t-table, it means accept H1 at $(\alpha) = 0.05$. This means that there is a significant relationship between the two variables tested.

3. RESULTS AND DISCUSSION

Farmers in Cengkir Village who participated in the HIPPA program were the respondents of this study. Most respondents were aged between 16 and 54 years (86.4%). Most respondents had a low level of education (less than 9 years), or 76.00%. This low level of education can be attributed to the perceived high cost of formal education for the farming community. Farming families also face the challenge of not being able to continue their schooling.

In general, respondents involved in rice farming have farming experience for 2 to 93 individuals or about 47.69% of the total respondents involved in farming activities. According to research conducted by Balinda (2012), the longer farmers are involved in farming activities, the more experience they gain. Meanwhile, HIPPA Sumber Pangan has been in existence since 2008, so farmers have been involved in HIPPA for almost 16 years. However, some farmers in Cengkir Village are still not officially registered as HIPPA members.

3.1 Perception of HIPPA Members towards Irrigation Management

According to Suharman (2005), Perception is a step in interpreting or deciphering any information passing through the human sensory system. It is the ability to recognize sensory recordings, identify patterns, and pay attention to the three important aspects of perception connected with human cognitive processes. Analysis of the five parameters of farmers' perceptions of irrigation governance can be found in Table 1.

Table 1. HIPPA members' perceptions of agricultural irrigation management.

No	Questionnaire	Number (Soul)	Result (Score)
1	Very good	10	50
2	Good	10	40
3	Standart	26	78
4	Bad	45	90
5	Very Bad	34	34
Total		125	292

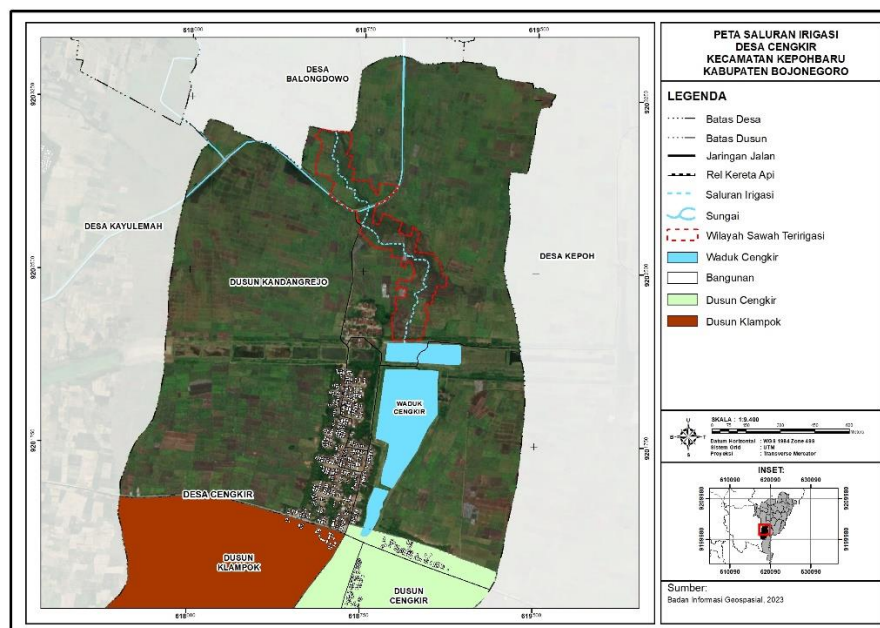


Figure 1. Irrigation channel of Cengkir village, Kepohbaru sub-district, Bojonegoro district

With reference to the information in Table 1, it can be concluded that 26 farmers (58.40%) have a view that is in accordance with the standards related to irrigation water management. This finding proves that irrigation management benefits farmers: increased agricultural production and active assistance.

3.2 Factors Associated with HIPPA Members' Perceptions of Irrigation Management

Statistical tests were carried out for factors related to perception, which can be seen as follows.

3.2.1 The relationship between formal education (X_1) and HIPPA members' perceptions of agricultural irrigation management (Y)

Based on the results of statistical tests conducted by researchers related to the relationship between formal education and views on agricultural irrigation management have been the focus of attention. There is a significant correlation between formal education and the views held by people who are members of HIPPA. This fact is proven through the results of the Spearman Rank correlation analysis conducted at a significance level of 0.001, with a confidence level of 99%; in addition, the t-count value of around 3.522

shows a higher level of significance than the t-table value of around 2.359. This illustrates the acceptance of the alternative hypothesis (H1).

Based on the results of the above analysis, highly educated people generally have a much better understanding of agricultural irrigation management, this is because highly educated farmers are more open to opinions and ideas than other farmers. So they are easier to accept and implement innovations in agricultural irrigation management.

Farmers in the study area generally have a low level of education. This lack of education makes it difficult for farmers to understand the concept of irrigation management and hinders the acceptance of innovations. According to research conducted by Ardiansyah, Sumaryo, and Helvi in 2014, there is a positive correlation between a farmer's education level and his perception of innovation. The higher the education of a farmer, the more positive their perception of the possibility of adopting innovations.

3.2.2 The relationship between motivation (X₂) and HIPPA members' perceptions of agricultural irrigation management (Y)

The results of the statistical tests that researchers conducted were related to the relationship between motivation and community perceptions of HIPPA members on agricultural irrigation management. There is a significant correlation between farmers' motivation and perception, as evident in the Spearman Rank correlation analysis results with a significance level of 0.003 and a 99% confidence level. The t-calculated value of 3.135, which exceeds the t-table of 2.359, indicates acceptance of H1. This indicates the presence of an innovation in the context.

Based on the findings from the research conducted in the field, farmers feel encouraged to participate in HIPPA because extension agents regularly consult them so that farmers have information about agricultural irrigation management. The higher the motivation level of the community members of HIPPA along with the increase, the perception of farmers towards agricultural irrigation management also increased positively.

3.2.3 The relationship between needs (X₃) and HIPPA members' perceptions of agricultural irrigation management (Y)

Based on the results of statistical tests that researchers conducted, namely related to the relationship between the needs and perceptions of community members of HIPPA on agricultural irrigation management. There is a strong correlation between the needs and perceptions of HIPPA members. This is evidenced by the Spearman Rank correlation analysis test at a significance level of 0.000 with a 99% confidence level. t-count score of 4.240 shows a number that exceeds the t-table value of 2.359. This indicates that the alternative hypothesis (H1) is acceptable.

Farmers expect that by joining HIPPA, rice production will increase, and income will increase because farmers' physical needs (clothing, food, shelter) can be met adequately. Responding to the needs of farmers is closely related to the views of farmers. The higher the needs, the more farmers' expertise in managing irrigation systems will increase.

3.2.4 Relationship between age (X₄) and HIPPA members' perception of agricultural irrigation management (Y)

With reference to the statistical data that has been examined by the researcher, namely related to the relationship between age and views on irrigation management in the context of agriculture has become an increasing focus of research. From the test results, it can be concluded that there is no significant relationship between age and farmers' views. This finding is supported by the correlation evaluation using the Spearman Rank method, where the statistical significance reaches 0.774 at the 95% confidence level. In addition, the t-count value of 0.286 outperforms the t-table value of 1.658, indicating that there is no significant difference, indicating the rejection of hypothesis H1. A person's age affects their physical activity and mental maturity.

Middle-aged respondents have the highest level of adoption of creative works due to supporting physical strength and mental maturity. When viewed from farmers' knowledge of water management, the average age of respondents was middle-aged with little knowledge of water management. This does not

affect the opinion of farmers regardless of the age of the respondent and the opinion remains positive. The relationship between maturity and farmers' perception of irrigation management, as reflected in Table 2 through cross-tabulation analysis, became the focus of the study.

Table 2. Relationship between age and HIPPA members' perception of agricultural irrigation management

Perception	Age			Total (People)
	Young	Mediu m	Old	
Low	0	13	13	26
Medium	0	40	11	51
High	0	37	11	48
Total	0	90	35	125

Table 2 presents the grouping of data related to the age variable and the variable of community perception of HIPPA members towards agricultural irrigation management. The age variable is categorized into the productive age range, while farmers' perceptions of irrigation management are classified in the moderate category. However, farmers who are in the middle-aged group tend to be more open to innovation, both in terms of farming techniques and irrigation management for agricultural activities.

3.2.5 Relationship between length of farming (X_5) and HIPPA members' perceptions of agricultural irrigation management (Y)

The results of the statistical tests that researchers conducted were related to the relationship between the length of farming and the perception of community members of HIPPA towards agricultural irrigation management. There is a significant correlation between farming duration and farmers' perceptions, as seen in the results of the Spearman Rank correlation analysis test with a significance level of 0.000 and a 99% confidence level; H1 can be accepted because the t-count value reaches 3.852, exceeding the t-table value of 2.359.

According to the evaluation results, farming experience generally varies widely among farmers, with notable differences between one farmer and another. However,

through HIPPA, farmers are expected to learn, understand, and gain experience in rice farming with other farmers through discussion forums organized at least three times per month, especially focusing on issues related to HIPPA activities and existing agricultural irrigation management. Therefore, the longer a farmer is involved in agriculture, the better his understanding of agricultural irrigation management will be.

3.2.6 The relationship between the number of dependents in the family (X_6) and the perception of HIPPA members about the management of agricultural irrigation (Y)

Based on the results of statistical tests that researchers conducted, namely regarding the relationship between the number of dependent family members and community views on the management of agricultural irrigation by HIPPA members, the focus of this study is From the results of the examination, it can be concluded that there is no significant relationship between the number of dependents in the family and community perceptions of HIPPA members. This is confirmed by the results of the Spearman Rank correlation analysis with a significance level of 0.52 and a confidence level of 95%. With the t-count reaching -1.961, which exceeds the t-table value of 1.658, it can be concluded that the first hypothesis (H1) should be rejected. This conclusion indicates that there is no significant correlation between the number of dependents in the family and community perceptions of agricultural irrigation management by HIPPA members.

The relationship between the number of dependent family members and HIPPA members' views on agricultural irrigation management was investigated through the cross-tabulation method. The findings of the analysis related to agricultural irrigation management can be accessed in Table 3. Table 3 presents the grouping of data based on the number of dependents in the family and community perceptions of agricultural irrigation management, the two variables that were the focus of the research on HIPPA members. Family dependents were classified as moderate, as were community perceptions of agricultural irrigation management. However, it should be noted that data on the number of

family dependents tends to be patchy, resulting in a lack of variation in the information obtained. Most farmer family members, including children who are still in school and college, tend to prioritise family obligations, so their activities are more focused on family matters and children's education.

Table 3. Relationship between the number of dependents in the family and the perception of HIPPA members towards agricultural irrigation management

Perception	Number of dependents in the family			Total
	Low	Medium	High	
Low	6	11	7	24
Medium	18	23	11	52
High	16	22	11	49
Total	40	56	29	125

Table 3 presents the grouping of data based on the number of dependents in the family and community perceptions of agricultural irrigation management, the two variables that were the focus of the research on HIPPA members. Family dependents were classified as moderate, as were community perceptions of agricultural irrigation management. However, it should be noted that data on the number of family dependents tends to be patchy, resulting in a lack of variation in the information obtained. Most farmer family members, including children who are still in school and college, tend to prioritise family obligations, so their activities are more focused on family matters and children's education.

3.2.7 The relationship between information knowledge (X₇) and HIPPA members' perceptions of agricultural irrigation management (Y)

Based on the results of statistical tests conducted by researchers related to the relationship between information knowledge and community perceptions of HIPPA members on agricultural irrigation management. There is a strong correlation between information knowledge and community perceptions of HIPPA members. This is evident through the results of the Spearman Rank correlation analysis test at a significance level of 0.002 and a confidence level of 99%. The highest t-count

value reached 3.434, exceeding the t-table value of 2.359, indicating acceptance of the alternative hypothesis (H₁).

This comes from the high level of understanding of the farmers. Education is very important for the community, because if the community does not have the desire to grow and develop, then the community will be late and it takes a long time in terms of thinking, knowledge, insight and development in other fields. The purpose of HIPPA that farmers know is to be able to solve problems and reduce conflicts related to water distribution. The higher the level of knowledge and information of HIPPA members, the better the perception of HIPPA members towards the agricultural irrigation management program.

3.2.8 Relationship between Social Environment (X₈) and HIPPA members' perceptions of agricultural irrigation management (Y)

Based on the results of statistical tests that researchers conducted, which are related to the relationship between the social context and the way HIPPA members perceive agricultural irrigation management efforts, the relationship is the research focus. There is a significant relationship between the social context and the views held by people who are members of HIPPA. Based on the results of the Spearman Rank correlation analysis test with a very low significance level of 0.000 and a confidence level of 99%, the t-count value of 4.758 was obtained, exceeding the t-table value of 2.359. Based on the results of the research on the social environment, there are many social situations faced by farmers when farming, but through HIPPA, farmers have access to other farmers through discussions about HIPPA practices and agricultural irrigation at least three times a month, especially to learn about agricultural irrigation management. So, the higher the farmers' social environment background level, the higher their knowledge of managing agricultural water.

3.2.9 The relationship between support from related agencies (X₉) and HIPPA members' perceptions of agricultural irrigation management (Y)

Based on the results of statistical tests conducted by researchers related to the

relationship between assistance from related agencies and the views held by community members on irrigation regulation efforts in the agricultural sector, especially in the HIPPA environment. There is a significant relationship between support from relevant agencies and the views held by communities that are members of HIPPA, as evidenced by the results of the Spearman Rank correlation analysis test at a significance level of 0.000 with a 99% confidence level. The t-score of 6.301 shows a number that exceeds the critical threshold of the t-table value of around 2.359, indicating that H1 is accepted. The better the support the relevant agency provides, the more likely it is to influence farmers' views on irrigation water management.

3.2.10 Relationship between land size (X₁₀) and HIPPA members' perceptions of agricultural irrigation management (Y)

Based on the results of statistical tests conducted by the researcher on the relationship between land area extension and the views held

by HIPPA community members towards agricultural irrigation management. There is a strong correlation between land area and community perceptions of HIPPA members. This is evidenced by the results of the Spearman Rank correlation analysis test at a significance level of 0.000 with a 99% confidence level. The t-count of 9.899 shows a value that exceeds the t-table limit of 2.359, indicating acceptance of the alternative hypothesis (H1). Hence, it can be concluded that in line with the size of the farming area a person owns, his/her skills in managing water use also become more skillful.

Field conditions show that farmers in Cengkir Village, Kepohbaru Subdistrict, and Bojonegoro District have paddy fields of 0.18 to 2.16 ha. Solutions are needed to optimize and efficiently utilize land use in farmers' rice farming practices. The productivity that can be achieved is strongly influenced by the land area available. The dimension of land owned by farmers plays a key role in determining the extent of available leisure time and labor they can allocate to farming activities. As the farm area expands, farmers' leisure time decreases.

Table 4. The results of statistical testing of factors associated with the perception of farmers

No	Variable X	Variable Y	Correlation Coefficient (rs)	Sig. (2-tailed)	t-count
1	Formal Education Level (X ₁)		0,281**	0,001	3,522
2	Motivation (X ₂)		0,267**	0,003	3,135
3	Needs (X ₃)		0,332**	0,000	4,240
4	Age (X ₄)		0,026 ^{tn}	0,774	0,286
5	Length of time farming (X ₅)	Farmer	0,328**	0,000	3,852
6	Number of Family Dependents (X ₆)	perceptions towards	-0,175 ^{tn}	0,52	-1,961
7	Information Knowledge (X ₇)	irrigation	0,278**	0,002	3,434
8	Social Environment (X ₈)	management	0,354**	0,000	4,758
9	Related Service Support (X ₉)		0,458**	0,000	6,301
10	Land Area (X ₁₀)		0,654**	0,000	9,899

** : Significant at the level of confidence 99% (t table = 2,359)

• : Significant at the level of confidence 95% (t table = 1,658)

tn : Not significant at the level of confidence 95 %

4. CONCLUSIONS

Based on the analysis of the quality of irrigation management based on the perceptions of HIPPA members in Cengkir Village, it was found that the perception of food source HIPPA members towards agricultural irrigation management in Cengkir Village was included in the standard category. While the

aspects associated with perceptions related to the quality of HIPPA management include: formal education (X₁), motivation (X₂), needs (X₃), length of farming (X₅), Information Knowledge (X₇), Social Environment (X₈), support of related agencies (X₉) and Land Area (X₁₀). Meanwhile, age (X₄) and family dependents (X₆) are unrelated.

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