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Determining the satisfaction level of water user association service quality for supporting sustainable rural development

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ABSTRACT
In a riverbank area, a sustainable rural development is closely related to the success of a water user association (WUAs), which largely depends on the satisfaction of its members. Therefore, it is necessary to determine the satisfaction level of the members towards the service quality provided by a WUAs. This study was conducted at WUAs Subur Makmur, Indonesia. This WUAs was awarded the best WUAs at national level in 2012, and it has managed to maintain high income. This study aims at determining the satisfaction level of WUAs members in relation to its service quality. The data were collected from 88 respondents who live in five dusun (hamlets). They were selected purposively by considering the demographic characteristics, acquired land areas, and farmer types. The Spearman correlation analysis was used to analyze the relation between the WUAs services and the customer satisfaction. From the seven satisfaction indicators, the Product indicator has the highest correlation coefficient (0.585). Meanwhile, among the five service quality indicators, the Assurance indicator has the highest correlation coefficient (0.495) with the level of satisfaction of WUAs members. The results of this study will be beneficial as a reference for other WUAs in order to support sustainable rural development.

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Agricultural irrigation; Indonesia; river basin; service quality; water user association (WUAs)

1. Introduction
The main problems faced by agricultural villages around Bengawan Solo river basins are flooding during the rainy season due to river water overflow and drought during the dry season. These have caused local people to be unable to use the river water in the best possible way. In some villages, a pump technology, managed by water user associations (WUAs), has been used. During the rainy season, a pump is used to remove water from agricultural lands into the river. This has provided benefits for the agricultural sector to a large extent, and in turn, contributes to rural development. The establishment of WUAs as agricultural irrigation managers with the involvement of local people is supported by the government as set forth in the Regulation of the Minister of Forestry Number 79/Permentan/OT.140/12/2012 on the Guidelines for Water User Association Management and Empowerment. As for the arrangement and implementation of WUAs work systems, there has been a Government Regulation of the Republic of Indonesia Number 20 of 2006 on Agricultural Irrigation Management.

The management of pumps by WUAs is consistent with the shift in the agricultural irrigation management of developing countries from state-based to independent, local-community-based management. This shift is supported by international institutions like the World Bank for Agricultural Development (Vermillion and Sagardoy 1999) and is known as irrigation management transfer technology. This condition is for the most part accompanied with a change in the agricultural outputs and the emergence of decapitalisation (Macours and Swinnen 2002). Such shift is also the case in Indonesia, where the management of agricultural irrigation involves the community (known as Participatory Irrigation System Management), to support the improvement of land productivity and agricultural production by way of empowering WUAs. Such associations are named Himpunan Petani Pemakai Air (HIPPA) in East Java province, Indonesia.

In the performance of WUAs works, local people are given the autonomy to develop rules related to the statutes and bylaws. The rules are based on the agreement among community elements, and they are used as the guidelines for the work performance. In this way, WUAs becomes a powerful institution in the agricultural irrigation management (Araral 2005; Meinzen-Dick 2007). However, despite the existence of the rules, some WUAs still face failures in managing agricultural irrigation. There have been some cases in which the
agricultural irrigation management that was performed by involving local community failed to gain success or sustainability (cf. Zhovtonog, Dirksen, and Roest 2005). Some of the determinant factors of a WUAs success in managing agricultural irrigation are the WUAs administrator structure and behavior and the availability of member-generated funds.

For this reason, it is necessary to evaluate the performance of the existing WUAs agricultural irrigation administrators. This evaluation will allow for an understanding of performance principles to gain a picture on members’ level of satisfaction with the irrigation services received. Members’ satisfaction with the services will smoothen the fee payments and support the WUAs continuity as agricultural irrigation manager. This study covers two aspects: the analysis of the members’ level of satisfaction with WUAs services and the analysis of the problems faced in the provision of the services.

2. Literature review

2.1. Agricultural irrigation management

Water distribution for the agricultural irrigation of river basin villages that uses pump technologies is deemed benefiting sustainable agricultural development. According to Edquist (1985), to improve a development’s productivity, farmers must be involved in the application of such technologies. Ton and Jong (1990) further mentioned the following elements that link technologies and the farmers’ social position: (a) the farmers take an interest in the technologies; (b) the technologies must fit with the farmers’ organizational capacity; (c) the technologies must fit the farmers’ financial capacity; (d) the technologies must fit the farmers’ access to land, inputs, and technical supports; and (e) the technologies must suit the farmers’ knowledge on how to handle them (i.e. operate, perform maintenance to, and repair such technologies).

To meet all the above-mentioned elements, the Government formed farmer-membered WUAs. WUAs in Indonesia are social, economic, cultural, environment-friendly, and mutual-cooperation-based associations of user-farmers. Generally, WUAs as organizations are not driven by profits and are managed collectively by water users in a common hydrological sub-system (IWMI 2003). As members, farmers state their agreement to utilise resources for the operation and maintenance of irrigation and drainage systems. Assets such as physical infrastructure must be managed to avoid individual water resource usage that can potentially deplete the existing water resources (Bromley 1992; Ostrom 1990).

In some regions in Indonesia, water management institutions go by different names. For example, in East Java, they are known as HIPPA, in Bali as Subak, while in West Java as MitraCai. WUAs can be divided into four, namely (a) water user association; (b) union of water user associations, (c) main water user association, and (d) federation of water user associations. The guidelines for WUAs management and empowerment are set out in the Regulation of the Minister of Agriculture and Forestry Number 79/OT.140/12/2012. In this paper, the term WUAs is used as it is the closest one with the name HIPPA.

As mention above, in East Java province, an agricultural irrigation water management institution is called HIPPA. HIPPA distributes water to the agricultural land within its territory. The World Bank mentions five principles for the establishment of a WUAs: (a) a sufficient, reliable water supply must be available; (b) the WUAs must be governed on the basis of hydraulics; (c) the WUAs leader and administrators are chosen on a democratic basis by the members, without any intervention by the local government; (d) the water load is set volumetrically, and (e) the WUAs reserves the right to raise fund in the form of member’s contribution (Wang, Chen, and Yang 2010).

A WUAs is an organization that autonomously manages agricultural irrigation. According to Gorton, Kahl, and Rosen (2009), the main factors that determine the success of WUAs are the following: (a) socioeconomic factors; (b) WUAs administrator structure and behaviors; (c) irrigation technologies for distributing water and solving problems such as flooding; and (d) costs. Considering the work done by the administrators, it is acceptable for the administrators to receive incentives from some of the funds collected from the members. This is in line with the opinion of Small and Carruthers (1991), who stated that internally, agricultural irrigation financing is derived from farmers’ contribution as a compensation for the water used. This condition raises strong accountability, improving the performance of water distribution to farmer-owned agricultural lands. The involvement of local people (villagers) in the management of the irrigation system can cut the cost incurred by the government and support the sustainability of the irrigation system of the region (Abdelgalil and Bushara 2017). Ostrom (1990, 1992) argues that the irrigation management that involves local people may as well be better than the state’s management.

WUAs can improve farmers’ welfare at least in three manners. First, the water distribution service can be improved as local farmers receive the distributed water effectively and gain better information on the need for water (Dinar, Rosegrant, and Meinzen-Dick 1997).
Second, members or farmers are more concerned if the irrigation system and the irrigation network improvement are managed by WUAs. Third, a good network maintenance positively impacts on agricultural productivity and farmers’ income (Dinar, Rosegrant, and Meinzen-Dick 1997; Yercan, Dorsan, and Ul 2004). As a result, local irrigation systems will be able to be managed better and contribute to the rural development and villagers’ livelihoods.

2.2. Service quality and satisfaction members of WUAs

WUAs members have varied levels of satisfaction with the services received. Members’ satisfaction or dissatisfaction is a response to what members perceive between their expectations and the actual performance of the service providers. Members’ satisfaction serves as a representation of the measurement of performance and consumers’ needs. Such measurement is necessary to determine the effect of service quality on members’ satisfaction of the agricultural irrigation services received.

2.2.1. WUAs service quality

According to Parasuraman, Zeithaml, and Berry (1985), a service quality refers to the evaluation of and attitude towards the whole services received. Furthermore, it is also said that a service quality refers to an organization’s ability to meet the customers’ wants. If the expectation is beyond the performance, the service quality is perceived as unsatisfactory (Lewis and Mitchell 1990; Parasuraman, Zeithaml, and Berry 1985). When interacting, both a consumer and a service provider play roles in a relationship that is based on the interpersonal interaction between a customer and an organization. The service quality is intrinsically influenced by the perspectives of a service provider and a customer in an interaction. In addition, the incorporation of a quality dimension into the service quality analysis will significantly increase the average performance of utilities (Kumar and Managi 2010).

According to Zeithaml, Parasuraman, and Berry (1990), service quality indicators are as follows: (a) tangible, which is reflected in the evidence of the organization’s ability to show its presence with all of its physical facilities, equipment, appearance of the organizations management, among others, to its members; (b) reliability, which is the organization’s ability to provide services as are promised; (c) responsiveness, which is a response in the form of the willingness to provide services correctly and promptly; (d) assurance, which is the assurance given by an organization to build members’ trust; and (e) empathy, which is an organization’s attempt to pay attention to and understand customers’ wants.

2.2.2. WUA members satisfaction

Farmers as WUAs members have the right to agricultural irrigation services for their rice crop. However, they also have the obligation to pay contribution and obey the rules set in the articles of association of the WUAs. The services rendered by WUAs as the agricultural irrigation managers are certainly subject to members’ responses. Studies on satisfaction with a service have been carried out in various fields. Beatson, Lings, and Gudergan (2008) found that satisfaction in employees are demonstrated through deep loyalty and commitment.

Several previous studies have shown the relation between service quality and customer satisfaction in water supply services. The research of Al-Ghuraiz and Enshassi (2005) in the Gaza Strip concluded that the dissatisfaction of the majority of respondents to water supply services was due to pollution and frequent water supply disruptions. Similarly, Garces-Restrepo, Vermillion, and Muoz (2007) found several cases where WUA services did not meet customers’ expectations. Some of the examples were the poor implementation of the services and unclear roles and responsibilities of WUAs. Venot, Andreini, and Pinkstaff showed the corruption case of water resources development in Ghana. The study by Orne-Gliemann (2008) at Thabina Irrigation Scheme, Limpopo, South Africa, a concluded that there is no clear picture of farmers’ actions and perceptions of water management by WUAs.

To measure WUAs members level of satisfaction with the services received, the Customer Satisfaction Index is used. Some countries have set customer satisfaction indices. The measurement of consumer satisfaction in Indonesia, especially the satisfaction with public services, is specified in the Decision of the Minister of Efficient Utilization of State Apparatus No. Kep/25/M.PAN/2/2004. The main indicators of customer satisfaction according to Lupiyoadi (2001) are process, product, contribution or cost, place-channel, promotion, brand position, physical evidence, and participant. In this study, to measure the levels of WUAs members satisfaction, the following indicators were used: (a) process, which is the procedure and standards for providing services, receiving complaints, solving problems, among others; (b) product, which is the condition of water as well as the infrastructure (e.g. river water volume, pump, irrigation network, and so forth) supporting the smoothness of water distribution; (c) contribution, which is the main source of funds for WUAs operations, along with some matters regarding contribution setting, policies for members...
with difficulties paying due to harvest failure, and methods of contribution collection; (d) **place-channel**, which is a network used for communication between member and administrator and between one administrator and another, institution facility for improving communication, convenience to conduct communication, and more; (e) promotion indicator, namely media, which is a communication channel for delivering information to members in need faster; (f) **brand position**, which is about the organization’s advantages; (g) **physical evidence**, which is the organization’s representation in the form of infrastructure (e.g. facilities) and management (e.g. financial position, office, administrators’ accountability reports, and so forth); and (h) participant indicator, which is measured with the existence of training as a resolution for water distribution service improvement under the right strategies.

### 3. Method

#### 3.1. Study area

This study was conducted in several **dusun** (hamlets), namely Klotok, Gisik, Landean, Lingit, and Karanganyar, in Klotok Village, Plumpang District, Tuban Regency. The agricultural irrigation of that region was managed by WUAs ‘Subur Makmur’ of Klotok Village, which housed 2013 farmers and covered a territory area of 631 hectares. This WUAs managed irrigation by way of pumping to plots of rice crop land. On average, the farmers of this village could plant rice twice in a year, namely during planting period I from June to September and planting period II from October to December or January. During the rainy season from December to January or February, the agricultural land in areas near the river is usually inundated. Rainy season may come earlier or later. The areas far from the river are usually planted with horticultural crops (e.g. soybean, melon, watermelon, etc.) and maize.

The agricultural irrigation management must be done in accordance with the Regulation of Klotok Village, Plumpang District, Turban Regency Number 2 of 2009 on the Establishment of Special Rules of Water User Association. The regulation sets forth the following: (a) WUAs membership, which consists of owner-farmers, renter-farmers, and cultivator-farmers representing water-using government agencies, and companies using irrigation water (for fisheries, factories, and more); (b) procedures for choosing management team, which consists of Chairmen I and II, Secretaries I and II, Treasuries I and II, Water Management Engineering and Mechanical Engineering Coordinator, chief of sub-tertiary block, head of sector, head of group, diesel operator, and driver; (c) the member contribution is set at 14% of the total yield during the dry season and 12% during the rainy season; (d) the use of revenue or net profit to cover operating costs, maintenance fees, administrative fees, social fund, and other agreed expenses; (e) distribution of revenue or net profits, namely 20% for management service, 10% for administration, 15% for organizational cash, 50% for physical maintenance (irrigation network, pump, and other infrastructure), and of the 20% share for management service (8% is distributed to the core management, while the remaining 12% is distributed to the work groups); (f) medication expenses for administrators in the event of illness or accidents when they are performing their tasks; and (g) miscellaneous matters.

WUAs ‘Subur Makmur’ is a successful WUA, and in 2012 it was named the winner at a nationwide WUAs competition held from 27 May to 1 June 2012 in Batam. At this competition, WUAs from 21 Indonesian provinces competed each other. It managed to preserve its title as an advanced, profitable WUA that is able to contribute to village development to date. One of the indicators of success in WUAs management is financial capacity. In Table 1, the recapitulation of financial statement of WUAs ‘Subur Makmur’ of Klotok Village for the harvest period II of 2018 is presented.

According to Table 2, WUAs ‘Subur Makmur’ generated a considerable revenue at Rp1,961,473,163. From that amount, this WUAs conferred service of honor contributions to (a) village government officials (village representatives and village apparatus), (b) village government employees, modin (mosque officials), market staff, waker (work representative) and security guard of village, (c) village agency LPMD (Village People Empowerment Agency), heads of RW (citizen association), heads of RT (neighborhood association), farmers’ group administrators, Posluhdes (village counseling post) administrators, PPKBD (village family planning assistant), head of work unit for LINMAS (village security), Karang Taruna (youth organization), PKK (Family Welfare Empowerment) administrators, Posyandu (maternal and baby clinic) administrators, teen Posyandu; (d) relevant institutions/people (district government, the Police, Koramil (Military Rayon Command), Babinkamtibmas (community police officer), Babinsa (village military officer), Agriculture Branch Office, people interested in integrated pest control, village midwives, interns); and (e) community or religious leaders. These WUAs contributions as service of honor for village developers are detailed in Table 2.

According to Table 3, the accountability reports of WUAs ‘Subur Makmur’ administrators, in 2018, this WA’s asset in the form of cash saved at Bank Rakyat...
Indonesia (BRI) as well as inventory goods for pump operationalization amounted Rp5,997,839,113. It owned sufficient inventory goods. It could operate round the clock both during the rainy season and during the dry season. In the dry season, the pump is used to distribute water to agricultural lands, while in the rainy season, it is used for removing water from agricultural lands to Bengawan Solo River.

3.2. Data collection and analysis

Qualitative and quantitative data were used in this study. The data collection was carried out in several ways. First, some discussions were held informally with some key informants, such as WUAs administrators, WUAs members of each work group, members of farmers’ groups, and more. In this way, the data on WUAs descriptions, factors supporting irrigation water distribution, problems encountered in water distribution during dry and rainy seasons, land service locations, infrastructure condition (irrigation network, pump, and so forth), and service-rendering administrators were obtained. The documents with information on the WUAs operating activities contained in accountability reports and other notes held by WUAs administrators were collected. Second, to analyze the effect of service quality on the performance satisfaction of agricultural irrigation administrators, a survey was conducted in 2018. This survey was conducted on 88 respondents, who were WUAs customers and members. Respondents were selected using purposive and snowball techniques based on the characteristics of WUAs member-farmers as contained in the articles of association.

Third, to measure the effect of service quality on members’ level of satisfaction with the services received from the WUAs, a Likert Scale with five points, ranging from ‘not satisfied at all’, ‘not satisfied’, ‘partially satisfied’, ‘satisfied’, and ‘very satisfied’ with the services received, was used. The service quality indicators used were adopted from Zeithaml, Parasuraman, and Berry (1990, 42), namely (a) tangibility, (b) reliability, (c) responsiveness, (d) assurance, and (e) empathy (individualized attention was given by the company to customers). Meanwhile, the satisfaction dimensions consisted of process, product, price/contribution, place-channel, promotion, physical evidence, and participants. Fourth, to analyze the effect of service quality on WUAs members satisfaction, the Rank Spearman correlation analysis was carried out. This analysis was chosen to figure out

| Table 1. Financial statement of WUAs ‘Subur Makmur’ for harvest period II of 2018. |
| No | Description | Revenue (in Rp) | Expenses (in Rp) | Balance (in Rp) |
|----|-------------|-----------------|------------------|-----------------|
| 1  | Initial Balance in HP (harvest period). I. 2017 | 1,766,553,363 | 1,766,553,363 | 0 |
| 2  | Yield for HP.II.2018 | 1,990,808,100 | 3,757,361,463 | 0 |
| 3  | Bank Interests | 5,032,154 | 3,762,393,617 | 0 |
| 4  | Taxes and Administration | 1,059,931 | 3,761,333,686 | 0 |
| 5  | Flood Mitigation | 17,024,500 | 3,749,309,186 | 0 |
| 6  | Operating Costs | 267,979,883 | 3,476,329,303 | 0 |
| 7  | Return 50% of Net Profit | 339,110,879 | 3,105,972,380 | 0 |
| 8  | Revenue 5% of profit | 211,944,300 | 3,195,126,037 | 0 |
| Total | 4,272,503,913 | 2,311,030,750 | 1,961,473,163 |

Sources: Accountability Report of WUAs Administrators, Harvest Period I, 2018.

| Table 2. WUAs contribution to village developers. |
| No | Service Contribution | Total (in Rp) |
|----|----------------------|---------------|
| 1  | BPD (Village Representative and Supervisor Agency) | 34,091,121.00 |
| 2  | Village Employees (13 people) | 3,050,000.00 |
| 3  | Village Agencies | 31,100,000.00 |
| 4  | Relevant Agencies | 4,050,000.00 |
| 5  | Community Leaders | 1,400,000.00 |
| Total | 39,600,000.00 |

Source: Accountability Report of WUAs Administrators, Harvest Period I, 2018.

| Table 3. Correlation guide. |
| Category | Level of significance |
|----------|-----------------------|
| 0.00–0.199 | Very Low |
| 0.20–0.399 | Low |
| 0.40–0.599 | Medium |
| 0.60–0.799 | Strong |
| 0.80–1.000 | Very Strong |
the relationship between two variables based on the Likert Scale data. The analysis was conducted based on the following formula:

\[ \rho = 1 - \frac{6 \sum_{i=1}^{n} b_i^2}{n(n^2 - 1)} \]

where \( \rho \) is a Spearman Rank correlation coefficient; \( b_i \) is the rank difference between data; and \( n \) is the number of data.

Afterwards, based on the calculation result, the correlation was determined by referring to the following correlation coefficient interpretation guide (Sugiyono 2009, 231).

Then, the testing critical value was determined. This research used an error level (\( \alpha \)) of 5%, meaning that a \( p \)-value that is smaller than \( \alpha \) indicates a significant relationship (i.e. \( H_0 \) is rejected, and \( H_1 \) is accepted). Furthermore, simple interpretation was conducted by making a comparison with the rho table. Based on the table, \( n \) was at an error level of 5%. If the rho count is greater than the rho table at 5%, there is a significant relationship. The Spearman rank correlation analysis was done with the SPSS 17 software.

4. Results and discussion

4.1. Respondents’ characteristics

Table 4 shows that 77 (87%) of the respondents were WUAs members and 11 (13%) were members doubling as WUAs administrators. As members, they received agricultural irrigation service. The farmers were classified into three: owner-farmers (34.1%), renter-farmers (45.5%), and cultivator-farmers (20.4%). Owner-farmers were those who cultivated their own lands while usually having other responsibilities, such as becoming members of WUAs management, village government officials, and non-farming responsibilities like mediating producers and consumers in the sale of agricultural products. Renter-farmers rented narrow agricultural lands, 0.1–0.3 hectares wide on average. The rent per year for every hectare stood at Rp30,000,000. With Rp3,000,000, a farmer could rent a 0.1-hectare piece of land. Renters usually doubled as farming labors. Cultivar-farmers were those who cultivated the lands of others under a profit-sharing system. The system was based on their agreements. One form of this system was maro, in which the agricultural product is split into two equal shares if the whole production cost (labor and farming input) is incurred by cultivator-farmers. Cultivator-farmers usually doubled as farming labors, who work on the cultivated land every morning and late afternoon.

### Table 4. Respondents’ characteristics (\( N = 88 \)).

| Characteristics          | Categories | Frequency | Percentage (%) |
|--------------------------|------------|-----------|----------------|
| Memberships              | Farmers as members | 77 | 87         |
|                          | Farmers as members and WUAs administrators | 11 | 13         |
| Farmer position          | Owner-Farmer | 30 | 34.1       |
|                          | Renter-Farmer | 40 | 45.5       |
|                          | Cultivator-Farmer | 18 | 20.4       |
| Area of acquired agricultural land | 0.18–0.297 (in hectare) | 4 | 4.5      |
|                          | 0.298–1.415 (in hectare) | 49 | 55.7       |
|                          | 1.416–2.533 (in hectare) | 14 | 15.9       |
|                          | 2.534–3.651 (in hectare) | 7 | 7.9        |
|                          | 3.652–4.769 (in hectare) | 4 | 4.6        |
|                          | 4.77–5.887 (in hectare) | 0 | 0          |
|                          | 5.888–7.005 (in hectare) | 3 | 3.4        |
|                          | 7.006–8.113 (in hectare) | 1 | 1.1        |
| Age                      | 20–35 years old | 14 | 16         |
|                          | 36–50 years old | 51 | 58         |
|                          | >50 years old | 23 | 26         |
| Educational background   | Out of school | 5 | 5.7        |
| Gender                   | Males | 82 | 93         |
|                          | Females | 6 | 7         |
| Domicile                 | Klotok | 25 | 28.4       |
|                          | Gisik | 18 | 20.4       |
|                          | Landean | 15 | 17.1       |
|                          | Lingit | 20 | 22.7       |
|                          | Karanganyar | 10 | 11.4       |

Source: Survey Data, 2018.

For that the below Table 4 is about characteristic respondents.

Most of the WUAs members (74%) were aged 20–50 years, while those over 50 only made up 26% of all members. This shows that in general, WUAs members were within the productive age range who were active in the agricultural sector. The respondents were predominantly males (82%), and the minority of them (7%) were females. Female farmers were mostly widowed owner-farmers. They were considered farmers as they managed agricultural lands on their own.

Respondents who owned farmland of category 1 (0.18–0.297 hectare) numbered 4. Usually those who owned land of that category doubled as farming labors. Respondents who owned farmland of category 2 (0.298–1.415 hectare) numbered 49, while those who owned farmland of category 3 (1.416–2.533 hectares) numbered 14. Respondents who owned farmland of category 4 (2.534–3.651 hectares) and category 5 (3.652–4.769 hectares) numbered 4 each. No respondent owned farmland of category 6 (4.77–5.887 hectares). Meanwhile, the numbers of respondents owning farmland of category 7 (5.888–7.005 hectares) and category 8 (7.006–8.113 hectares) were 3 and 1, respectively.

In terms of educational backgrounds, the majority of the respondents (94%) pursued formal education, and 8 (9.1% of all respondents) received formal education.
from higher education institutions. They were young villagers who completed higher education in cities and returned to their home village. They typically inherited farmland and houses from their parents, had more than one occupation, and actively participated in the village organizational activities. For instance, they had non-farming jobs in village, worked as administrators, or became civil servants or private employees, for example, teachers, in the village.

The respondents, who were WUAs members, were spread in some regions. As many as 28.41% of the respondents were from Klotok, 20.45% were from Gisik, 17.05% were from Landean, 22.73% were from Lingit, and the remaining 11.36% were from Karanganyar.

4.2. Correlation between service quality and satisfaction

Indicators of service quality include the following: (a) tangibles; (b) reliability; (c) responsiveness; (d) assurance; and (e) empathy. Meanwhile, indicators of customer satisfaction are as follows: (a) process; (b) product; (c) contribution or cost; (d) place-channel; (e) promotion; (f) brand position; and (h) participant, which was measured based on the existence of training as a resolution to water distribution that followed an appropriate procedure. The results of the analysis of the effect of service quality on members’ satisfaction are presented in Table 5.

Based on the statistical test result shown in Table 5, the correlation between the satisfaction and the service quality has a coefficient of 0.017, which is smaller than $\alpha$ (0.05). This means that the satisfaction and the service quality are related. The relationship has a positive direction, meaning that the higher the service quality is, the higher the members’ satisfaction is with the services received. However, the correlation value is small, i.e. only 0.253. This means that the correlation between the satisfaction and the service quality is low. This could be due to the delay in the supply of water to agricultural land, particularly in the dry season. The delay could happen quite often for the high ground areas. In addition, in the rainy season, the disposal of water from agricultural land close to the river may take a longer time, and which made the rice plants damaged.

The correlation between the satisfaction and the indicators of service quality had varied correlation coefficients. In other words, the correlation between the satisfaction and one indicator is different from that between the satisfaction and another indicator. Table 6 presents the values of the correlation coefficients between the satisfaction and each of the indicators of the service quality. There are five main points regarding the data presented in Table 6, and these are explained in the following paragraphs.

First, Table 6 shows that the significance of the correlation between satisfaction and service quality for indicator Tangibles was at 0.182. This shows that there was a very low correlation between satisfaction and service quality. For the Tangibility indicator, the statistical result is $0.09 > \alpha(0.05)$ which means that there is no significant correlation between the service quality and the tangibility indicator. This provides us a picture that WUAs members were not too concerned with the conditions of the office building as well as other infrastructure which were related to the water distribution service for agricultural land. The correlation was positive, meaning that the higher the service quality for the indicator tangibles, the higher the satisfaction of the WUAs members.

Second, the statistical analysis results show that the coefficient of the correlation between satisfaction and service quality for the Reliability indicator was 0.381. The correlation was low. This means that WUAs members were not too concerned with how administrators provided service and overcame problems when their complaints were not addressed immediately. WUAs administrators would patiently deal with WUAs members who complained or even were filled with anger, thus no dispute was caused. This means that the faster the arising problems were solved, the more satisfied the members were. For example, there was a case when WUAs members complained to administrators that the water inundating their farmland did not subside. In the following year, the WUAs administrators made a repair to the irrigation network to discard the water pooling on the farmland to the river. Members were then showing their appreciation to the WUAs administrators for resolving the problem well.

Third, the statistical analysis results show that the value of the correlation between satisfaction and service quality for the Responsiveness indicator was 0.079. This shows that there was a very weak relationship between satisfaction and service quality for the Responsiveness indicator. The significance test also reveals

| Table 5. Correlation between satisfaction and service quality. |
|---------------------------------------------------------------|
|                                                              |
| Spearman’s rho  | Satisfaction  | Service Quality |
|                 | Correlation   |                 |
|                 | Coefficient   |                 |
|                 | Sig. (2-tailed)|                 |
| N               | 88            | 88              |
| Spearman’s rho  | Satisfaction  | Service Quality |
|                 | Correlation   |                 |
|                 | Coefficient   |                 |
|                 | Sig. (2-tailed)|                 |
| N               | 88            | 88              |

*Correlation is significant at the 0.05 level (2-tailed).
Table 6. Correlation between satisfaction and each indicator of service quality.

|                | Tangibles | Reliability | Responsiveness | Assurance | Empathy | Satisfaction |
|----------------|-----------|-------------|----------------|-----------|---------|--------------|
| Spearman’s rho | 1.000     | .479**      | .377**         | .120      | .421**  | .182         |
| Sig. (2-tailed)| .479**    | 1.000       | .366**         | .240*     | .484**  | .381**       |
| N              | 88        | 88          | 88             | 88        | 88      | 88           |
| Reliability    | .000      | .000        | .024           | .000      | .000    | .000         |
| N              | 88        | 88          | 88             | 88        | 88      | 88           |
| Responsiveness | .377**    | .366**      | 1.000          | .500**    | .516**  | .079         |
| Sig. (2-tailed)| .000      | .000        | .000           | .000      | .000    | .465         |
| N              | 88        | 88          | 88             | 88        | 88      | 88           |
| Assurance      | .120      | .240*       | .500**         | 1.000     | .405**  | .241*        |
| Sig. (2-tailed)| .264      | .024        | .000           | .000      | .000    | .024         |
| N              | 88        | 88          | 88             | 88        | 88      | 88           |
| Empathy        | .421**    | .484**      | .516**         | .405**    | 1.000   | .246*        |
| Sig. (2-tailed)| .000      | .000        | .000           | .000      | .021    |              |
| N              | 88        | 88          | 88             | 88        | 88      | 88           |
| Satisfaction   | .182      | .381**      | .079           | .241*     | .246*   | 1.000        |
| Sig. (2-tailed)| .090      | .000        | .465           | .024      | .021    |              |
| N              | 88        | 88          | 88             | 88        | 88      | 88           |

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

0.465 > α(0.05), which confirms that there is no significant relation for this Responsiveness indicator. WUAs members were not concerned with how administrators or officers dealt with complaints and took measures to solve problems. To members, what mattered was that the plants’ water need was satisfied, and no problem related to farming business activities was caused. They would be angered if administrators showed inappropriate behaviors and attitudes.

Fourth, the correlation analysis results show that the correlation between satisfaction and service quality for indicator Assurance had a value of 0.241. This shows that the correlation between satisfaction and service quality in the indicator Assurance was low. The direction of the correlation was positive, and the statistical test value was 0.024 < α (0.05), meaning that the higher the service quality in the indicator Assurance, the higher the satisfaction of the WUAs members. This was indicated by WUAs administrators’ ability to overcome problems associated with agricultural activities, WUAs administrators’ transparency in the use of the budget as shown by the accountability reports produced from meetings attended by members, administrators, supervisors, and other stakeholders according to the articles of association, and dedicated notes taken by WUAs administrators regarding problems that caused harvest failures, for example, farmland being inundated during the rainy season, pests and diseases causing problems to rice crops, irrigation infrastructure repair, to name but few.

Fifth, the statistical analysis results show that the correlation between satisfaction and service quality for indicator Empathy had a value of 0.246. This shows that the correlation between satisfaction and service quality for the indicator Empathy was weak. The direction of the correlation was positive, and the statistical test value was 0.021 < α (0.05), meaning that there existed a relationship between satisfaction in the indicator Empathy and WUAs service quality. The more attention given by the administrators to the service provided for members, the higher the members’ satisfaction. The attention took the form of time allocated for administrators to hear members’ complaints, good attitudes, administrators’ presence in the control of agricultural activities, water distribution to agricultural land, and so forth.

Table 7. Weight and rank of WUAs members satisfaction.

| Satisfaction indicators | Rank | Items                                                                 | Statistical Test Values |
|-------------------------|------|----------------------------------------------------------------------|-------------------------|
| Process                 | 2    | Standard service procedure for receiving complaints and solving problems | 0.577                   |
| Product                 | 1    | Development of WUAs facilities and infrastructure for agricultural irrigation service provision | 0.585                   |
| Price                   | 4    | Contribution charged to members to cover WUAs operating expenses      | 0.358                   |
| Place-Channel           | 3    | Channels used for communication between a member and an administrator and another for the smoothness of agricultural irrigation service provision | 0.495                   |
| Promotion               | 7    | Information and communication media for providing information regarding WUAs activities and products produced | 0.285                   |
| Physical Evidence       | 5    | Appearance of facilities and infrastructure owned with regard to irrigation service | 0.394                   |
| Participants            | 6    | Skill training as problem resolution, application of rewarding         | 0.310                   |
4.3. WUAs members' satisfaction weight and rank

Table 7 shows the weight of the relationship between WUA members' satisfaction and WUAs service quality. Based on Table 7, some conclusions regarding the satisfaction of members as customers can be drawn as follows. **First**, the indicator Product had the highest correlation coefficient (0.585), and the correlation was strong. This suggests that members' main concern was the products, covering sufficient and timely water distribution, water condition, and facility and infrastructure (irrigation network, pump condition that enabled round-the-clock operation, and financial condition as shown in the accountability reports). **Second**, the indicator Process had a correlation coefficient of 0.577. This shows that the process from when a problem was raised to when it was solved was fast. Members were enabled to raise problems by phone or in person at the WUAs office, an administrator's house or other places. A work group assigned to supervise the farmland blocks made the process even faster. The administrators also tried to work seriously to make the distribution to proceed smoothly and to produce a high yield. Agricultural yield would influence the income and incentives WUAs administrators would gain. **Third**, the indicator place-channel had a correlation coefficient of 0.495, meaning that the quality of communication between WUAs members and WUAs administrators was not a big matter as they were from the same village. Administrators would hear members' complaints and protests patiently. As stated by an administrator, an administrator must be patient when dealing with members who were infuriated due to delay in water distribution or inundation of their farmland during the rainy season. **Fourth**, the indicator Price had a correlation coefficient of 0.358. This indicates that cost or contribution imposed to members was not a concern as the contribution rate supported by the available facilities and infrastructure made available for providing service members. **Fifth**, the variable physical evidence had a low correlation coefficient (0.394). This means that not all WUAs members were aware of WUAs facilities and infrastructure made available for providing service for members. **Sixth**, the indicator Participant had a correlation coefficient of 0.310. It suggests that in general, members did not understand the abilities and the skills possessed by administrators. The ones who knew the administrators' skills typically were the officers who performed their tasks, administrators, and local village apparatus. **Seventh**, the indicator Promotion had the lowest correlation value, namely 0.285. WUAs members were not too concerned whether promotion served as a medium of communication with administrators with regard to water management. The reason was that members and administrators were from the same village, and it was not hard for members to see administrators and inform them about a problem. Even all farmers, who were WUAs members, had mobile-phones enabling them to contact the administrators easily.

4.4. Service quality weight and rank

According to the statistical test results, the quality of the services provided by WUAs administrators in the indicators Assurance had a relatively high correlation coefficient (0.495), which could influence the satisfaction of WUAs members. Table 8 presents the Weight and Rank of Service Quality Variables.

According to Table 8, the following conclusions were drawn. **First**, the correlation coefficient of the indicator Assurance of the quality of services provided by WUAs administrators was the highest. There was a fairly high correlation with WUAs members satisfaction at a coefficient of 0.495. This was shown by WUAs management ability supported by the available facilities and infrastructure to overcome problems and benefit members. **Second**, the indicator empathy had a correlation coefficient of 0.481 and fell into moderate influence category. This suggests that there was no significant problem with the time and attention given by WUAs administrators to members when rendering services. **Third**, the statistical test value of the variable Responsiveness was 0.480

### Table 8. Weight and rank of service quality variables.

| Indicators  | Items                                                                 | Weight | Rank |
|-------------|-----------------------------------------------------------------------|--------|------|
| Tangibles   | Facility and infrastructure presence (office building, irrigation network, condition of WUAs office, other equipment for water pumping, etc.), appearance, etiquette of WUAs officers or administrators in providing services for members. | 0.235  | 5    |
| Reliability | Forms of cooperation between WUAs administrators and other stakeholders, forms of information for members, forms of problem-solving, etc. | 0.393  | 4    |
| Responsiveness | Response and attitude of WUAs administrators in providing services for members and solving problems. | 0.480  | 3    |
| Assurance   | Administrators’ ability to solve problems with the support of facilities and infrastructure, which convinced members about the service provision. | 0.495  | 1    |
| Empathy     | Availability of time, attention to complaints, and problem-solving.    | 0.481  | 2    |

Sources: Research data and Statistical Test Values.
and fell into the moderate category. This means that WUAs administrators showed good attitudes in responding to members’ complaints, so they did not cause disappointments. Fourth, the correlation coefficient of the indicator Reliability was 0.393, which was categorized as low. This indicates that WUAs administrators did not give members the information regarding the forms of cooperation established between WUAs administrators and other stakeholders in solving a problem and did not intensively provide information on water conditions and problems related to agricultural activities. Therefore, it was the members who actively raised problems to WUAs administrators. Fifth, the correlation coefficient of the indicator Tangibles was 0.235. This shows that the presence of the office building, facilities and infrastructure, and officers’ appearance did not significantly affect satisfaction as to members, what mattered most was the distribution of water to their agricultural lands as well as the absence of problems in the agricultural activities.

5. Conclusion

This study has shown that there is a relationship between service quality and WUAs members satisfaction with the service received. Even though the correlation coefficient is low, i.e. 0.253, the statistical test shows a significant value of 0.017. The correlation between the service quality and satisfaction varied based on the indicators, as follows: (a) the correlation between satisfaction and service quality for the indicator Tangibles had a coefficient of 0.182; (b) the correlation between satisfaction and service quality for the indicator Reliability had a coefficient of 0.381; (c) the correlation between satisfaction and service quality for the indicator Responsiveness had a coefficient of 0.079; (d) the correlation between satisfaction and service quality for the indicator Assurance had a value of 0.241; and (e) the correlation between satisfaction and service quality for the indicator Empathy was 0.246.

The biggest weight and highest rank of WUAs members level of satisfaction with the services were for the Product indicator (0.585). This means that to WUAs members, what mattered most was the work outcomes of the organization in the form of water distribution and the measures taken to overcome problems related to agricultural activities, as these will improve the rice production and profitability. They did not have a problem with the obligation to pay contribution as specified under the articles of association. The statistical test value of service quality for the indicator Assurance was 0.495. The quality of service was seen from WUAs administrators’ ability to solve problems with the aid of the available facilities and infrastructure (water pump that worked 24 h a day, sufficient irrigation network, sufficient finances to cover operating costs, and other facilities), convincing members with regard to water distribution for agricultural irrigation.

Based on the results of this study, there are two main recommendations given. First, the need to improve the quality of services provided to WUAs members through the improvement of irrigation network infrastructure. This will avoid delays in the supply of water to agricultural land in the dry season and facilitate the disposal of water into the river in the rainy season, so that the rice plants will not be submerged in water for a long time. Second, the need for closer cooperation between stakeholders so that the handling of problems related to the distribution and disposal of water becomes smooth, and that the problems related to farming activities will be able to be resolved quickly. This study is limited to one village located along a big river bank in East Java Province, Indonesia. The results of the study are applicable in this village, but might also be applicable in other villages located along a big river bank, particularly in a developing country. However, further studies need to be conducted by involving more river bank villages in different areas.

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