JOURNAL OF WATER AND LAND DEVELOPMENT

e-ISSN 2083-4535

Polish Academy of Sciences (PAN) Institute of Technology and Life Sciences – National Research Institute (ITP – PIB)

JOURNAL OF WATER AND LAND DEVELOPMENT
DOI: 10.24425/jwld.2024.149111
2024, No. 60 (I–III): 91–99

Analysis of willingness to pay of farmers on irrigation networks maintenance fees in the Gonggang reservoir, Magetan

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RECEIVED 18.08.2023 ACCEPTED 05.12.2023 AVAILABLE ONLINE 29.02.2024

Abstract: Irrigation network maintenance is very important to ensure the function of irrigation run well. Therefore, maintenance fee is necessary to maintain the irrigation network. The problem is the maintenance cost of irrigation network is expensive, the second highest cost after rehabilitation costs. Thus, participation of farmers in irrigation network maintenance is essential. One of participation by farmers is in the form of regular fees. This study aims to determine the number of fees farmers are willing to pay to maintain irrigation networks through the willingness-to-pay approach. This study was conducted in the irrigation area of the Gonggang reservoir in Magetan District. The subject is farmers who use irrigation – the data collection technique used by observation, interview, questionnaire, and documentation. The data analysis technique used is the contingent valuation method with steps (1) determining the hypothetical market, (2) obtaining bids, (3) estimating average willingness to pay, (4) estimating bid curves, and (5) aggregating data. The result shows that the amount of farmers' willingness to pay the maintenance fees for irrigation networks at Gonggang reservoir irrigation area in Magetan District by using the contingent valuation method is IDR 90,621 (USD 5.45) for each hectare for each planting period with total willingness to pay in the population of IDR 116,188,708 (USD 7,951.59) for each planting period.

Keywords: contingent valuation method, farmer, irrigation networks, maintenance fees, willingness to pay (*WTP*)

INTRODUCTION

Water resources have an essential role in agriculture. Water is a critical input for agricultural production. Suppose agricultural lands lack water so that plant growth can be hampered and will reduce agricultural productivity. An irrigation network is needed to fulfil the water needs on agricultural land, primarily for crop plantation (Najimuddin, 2019). An irrigation network could contain canals used to regulate irrigation, starting from the provision, distribution, administration, utilisation, and deportation of the irrigation. The technical irrigation network is one type of irrigation network based on the water measuring method. The technical irrigation network is a separate irrigation network between the supply and disposal networks (Hariyanto, 2018). Technical irrigation lands usually have irrigation from reservoirs, dams, or lakes. Java is the island with Indonesia's most prominent technical irrigation land area. East Java Province is the province on Java Island with the most extensive irrigation land area (Kementerian Pertanian Republik Indonesia, 2018).

The irrigation land area decreases every year, indicating a decrease in the ability of the irrigation network to irrigate the land. Irrigation network damage in Indonesia is quite significant (Purwantini and Suhaeti, 2017), which makes irrigation short-lived (Bashir and Kyung, 2018). Irrigation network damage has an impact on the availability of water, which affects farm productivity. Rice is the most widely cultivated commodity in Indonesia because rice is the primary food crop in Indonesia. Magetan District is the third-ranked district with the most significant productivity in East Java Province. Magetan District has the most extensively irrigated land area among the three highest-productivity districts. One reservoir serving as an irrigation supplier in the Magetan District is Gonggang reservoir.

Gonggang reservoir is located in Janggan Village, Poncol Sub-District, Magetan District, East Java Province, Indonesia. The Gonggang reservoir construction aims to overcome water shortages on agricultural land and fulfil the community's water needs around the reservoir. The irrigation network condition in the irrigation area of the Gonggang reservoir is in good condition due to heavy damage.

One of the causes of irrigation network damage is poor maintenance. Irrigation network maintenance is activities to maintain the irrigation network so that it always functions correctly, intending to streamline operations and maintain sustainability. The main problem with irrigation networks is the high cost of managing and maintaining the irrigation networks (Rondhi, Mori and Kondo, 2015). According to the Regional Revenues and Expenditures Budget (Ind. Anggaran Pendapatan dan Belanja Daerah – APBD) of Magetan District for the development and management of irrigation networks, swamps, and other irrigation networks in 2019, it is known that the maintenance cost of irrigation network is the second highest cost after rehabilitation costs.

Therefore, irrigation network maintenance will only succeed if it is supported by farmers using water. The government has limited funds to handle irrigation operations and maintenance activities, so the government has launched a policy on irrigation network maintenance fees. Minister of Agriculture Regulation in 2012 stated that one of the essential functions of the farmer using irrigation association is to maintain a tertiary irrigation network to function appropriately and sustainably. A tertiary irrigation network is an irrigation network that operates to receive irrigation from tapping buildings in the secondary irrigation network and channel it to farmers' lands.

Participation of farmers in irrigation network maintenance is essential. One of the participation by farmer payments is in the form of regular expenses. The target of the irrigation networks maintenance fees policy was explained in the Government Regulation of Indonesia Republic Number 77 of 2001, including the realisation of funding sources for irrigation network maintenance. The benefits of irrigation network maintenance fees can be felt directly by farmers, increasing the responsibility of farmers using water towards irrigation network sustainability, improving the efficiency of funds use, and reducing the bureaucracy path with direct decision-making by farmers. Willingness to pay (*WTP*) analysis is carried out so that in determining irrigation network maintenance fees, the value of irrigation network maintenance fees can be by the farmer's *WTP*. The *WTP* is a variable that measures a population's *WTP* for an object (Khoiriyah and Toro, 2014). Farmers that use irrigation are expected to maintain the tertiary irrigation network so that there are no obstacles in water distribution to the farmer's agricultural land. The importance of irrigation network maintenance fees so that farmers can maintain irrigation networks fully autonomously, especially in tertiary networks.

Based on previous research by Biswas and Venkatachalam (2015), which analysed farmers' *WTP* to improve irrigation quality in the Malaprabha irrigation area, Karnataka, India. The selection of research locations is based on the study area. The willingness-to-pay analysis method is based on the contingent valuation (CVM) approach. The results showed that farmers would pay INR 219 per acre per year for irrigation operation and maintenance costs. This exceeds the stipulated cost of only 192 INR per acre per year. Other research results show that if irrigation water runs smoothly, farmers will be more willing to pay as a form of increase in producer surplus for irrigation water. In addition, research by Azzi, Calatrava and Bedrani (2018) analysed farmers' *WTP* for water availability in the West Mitidja irrigation area in North Algeria. The data obtained were analysed using the CVM approach and logistic regression analysis. The research results showed that 80% of farmers in the sample were willing to pay additional costs for irrigation water. The farmer's *WTP* value is 4.11 $DA \cdot m^{-3}$, which is 64% higher than the set cost. Factors influencing *WTP* are agricultural land ownership, access to water resources, cropping patterns, and risk level.

The existence of routine maintenance activities that can prevent damage to irrigation networks is optimal, and agricultural productivity will increase. Irrigation maintenance activities are also able to maintain sustainability. This study aims to determine the number of fees farmers are willing to pay for maintaining irrigation networks through the *WTP* approach in the irrigation area of the Gonggang reservoir.

MATERIALS AND METHODS

CHARACTERISTIC OF THE OBJECT OF RESEARCH

The Gonggang reservoir is in Janggan Village, Poncol Sub-district, Magetan District. The Gonggang reservoir (Photo 1) was built in 2006 with the primary purpose as the source of irrigation

Photo 1. Gonggang reservoir condition in 2021 (phot.: *C. Puspitasari*)

for agriculture in the southern part of Magetan District, which often experiences water drought. The potential of the Gonggang River was identified by the Development Project and Conservation of Bengawan Solo Water Source in 1995. The target to be achieved from the construction of the Gonggang reservoir includes the availability of raw water supply for the community, an increase in planting intensity on existing land, an increase in the supply of irrigation water for downstream rice fields with a technical irrigation system in the dry season and support the development of tourism and aquaculture land in Magetan District.

The most expansive irrigation area of the Gonggang reservoir with irrigation various network conditions according to the data of Magetan District decree Number 188/190/Kept/403.013/2019 can be seen in Table 1.

Table 1. The widest irrigation area of the Gonggang reservoir with various irrigation networks condition in 2018

Irrigation area name	Land area (ha)	Irrigation networks condition (m)		
		good	lightly damaged	heavily damaged
Tlatak	626	2,000	9,500	30,235
Bowong	156	600	1,500	3,997
Trojiwo	65	800	3,400	4,400
Genilangit	60	900	500	2,985
Dologan	50	350	300	3,000
Sukun	46	1,000	500	3,800
Segondang	28	350	200	850
Sbr. Krendo	10	234	–	266

Source: Magetan District Decree (2019).

The APBD of Magetan District for developing and managing irrigation networks, swamps, and other irrigation networks can be seen in Table 2.

Farmers who use water from the Gonggang reservoir are members of Gabungan Himpunan Petani Pemakai Air (GHIPPA) or Association of Association of Water User Farmer Groups, which was formed on June 10, 2020. The water distribution system depends on the request of the farmers. Farmers propose water requests to the Gonggang reservoir Technical Implementation Unit; then, it will be forwarded to the association of the Bengawan Solo River area. After the letter is dropped, the reservoir operation officer will open the water flow to the plot of the farmers' field. Farmers usually do not propose water requests from November to February because that is the rainy season. Farmers will have started proposing water demand in mid-May to October. The cropping pattern carried out by the local community is rice-rice-corn with a monoculture system.

DATA COLLECTION AND SAMPLING METHOD

The research was conducted in the irrigation area of the Gonggang reservoir, Magetan District. This location was selected purposively considering that East Java Province is a province with

Table 2. The Regional Revenues and Expenditures Budget of Magetan District for development and management of irrigation networks, swamps and other irrigation networks in 2019

Program	Total (IDR)[1)]
Irrigation Network Development Planning	100,000,000
Floodgate Rehabilitation	400,000,000
Optimising the Function of the Irrigation Network that has been built	100,000,000
Empowerment of Farmers that Using Irrigation	25,000,000
Maintenance of Irrigation Network Infrastructure	2,550,000,000
Increasing Community Participation in the Management of Rivers, Lakes, and Other Water Resources	100,000,000
DAM and Irrigation Infrastructure Rehabilitation	4,650,000,000
Routine Maintenance of Irrigation Networks in the Irrigation Area of The Jejeruk Reservoir	350,000,000
Routine Maintenance of Irrigation Networks in the Irrigation Area of The Bringin Reservoir	350,000,000
Routine Maintenance of Irrigation Networks in the Irrigation Area of The Gandong Reservoir	350,000,000
Routine Maintenance of Irrigation Networks in the Irrigation Area of The Gonggang reservoir	350,000,000
Routine Maintenance of Irrigation Networks in the Irrigation Area of Taji-Purwodadi	450,000,000
General Costs and Assistance of DAK in the Irrigation Sector	200,000,000

[1)] USD1 = IDR 14,612.
Source: Peraturan (2020).

the most extensive irrigation land area in Indonesia. Magetan District is one of the districts in East Java Province that has many irrigation networks, and the Gonggang reservoir irrigation area is one of the largest irrigation areas in Magetan District, which has not implemented the irrigation network maintenance fees policy due to the farmers using irrigation association has just been formed. The sampling technique used is purposive sampling because the selected sample had criteria suitable for the phenomenon. The requirements for the sample in this study are rice farmers that use irrigation from The Gonggang reservoir. This study used 114 respondents.

This paper aims to determine the number of fees that farmers are willing to pay for maintaining irrigation networks through the *WTP* approach. The following materials have been used to identify and analyse farmers' *WTP* in the research area: the Gonggang reservoir irrigation map, an analysis tool SPSS, a questionnaire containing the identity of the respondent, a general description of farming, land ownership, and farmers' *WTP*.

DATA ANALYSIS METHOD

In this study, to determine the value of a farmer's *WTP*[1] for irrigation network maintenance fees, the contingent valuation method (CVM) was used. The CVM is a procedure that attempts

[1] All values refer to *WTP* are expressed in IDR in this paper; USD1 = IDR 14,612.

to estimate the value of a public good. The CVM significantly impacts environmental economics because it opens up the possibility of measuring the benefits of degrading a public good with the public voting directly (Carson and Hanemann, 2005). This research uses the CVM method because it is based on previous research such as Arimurty (2015), Biswas and Venkatachalam (2015), and Azzi Calatrava and Bedrani (2018) also used CVM analysis. The advantages of the CVM include flexibility in assessing policies on a broad scale, and the data of the CVM can be compared with research results obtained by other methods. It can make consistent conclusions if the hypothesis is tested correctly with high data validity (Muhammad, 2011). The procedure for determining the *WTP* of farmers using the CVM is described by McFadden and Train (2017). It is briefly shown below.

Constructing a hypothetical market

The questionnaire clearly describes the activity scenario so that the respondents understand the public goods in question and community involvement in the planned activity. A hypothetical market is formed by providing information about the benefits of public goods, the value lost if these public goods are not maintained, and information about the damage done to these public goods (Matondang and Suseno, 2020). In this study, the market hypothesis was formed from the problem that the Magetan District has much irrigation with the irrigation network condition being damaged. Irrigation networks that have been damaged need to be repaired by the government. The government is limited in funds to handle irrigation operations and maintenance activities, so the participation of farmers who use irrigation is essential. The farmers who use irrigation associations are expected to assist the government in maintaining irrigation networks to improve the level of irrigation services. One of the participation by farmers is in the form of regular fees. After the respondents read the activity scenario, the respondents will be asked about the maximum amount that they are willing to pay for irrigation network maintenance fees. Based on the information from the statement, the respondent will get an overview of the hypothetical situation to improve the quality of the irrigation network (Ladiyance and Yuliana, 2014).

Obtaining bids

Respondents were asked how much they would pay for irrigation network maintenance fees. This study uses the direct open-ended question method for obtaining bids. This method is implemented by asking the respondent directly about the maximum value of *WTP* (Tresnadi, 2000). The advantage of this method is that there is no starting point bias because there is no indication of the initial bid price. The direct open-ended question method is used to get the respondent's *WTP* value correctly without limiting it to a particular value. Other bid value determination methods have methodological problems, such as the bidding game method, which is prone to starting point bias, and the payment card method, which is prone to range bias (Damschroder *et al.*, 2007).

Estimating average of willingness to pay

After the value of the willingness to pay (*WTP*) bid is obtained, the average of *WTP* is calculated. The result of the *WTP* average reflects that the result is correct and close to the result of the *WTP* average chosen by the respondents (Hasbiah, Rochaeni and Sutopo, 2018). The following formula can calculate the average of *WTP*.

$$EWTP = \sum\nolimits_{i=1}^{n} WTPi \cdot Pf_i \tag{1}$$

where: *EWTP* = estimated average of willingness to pay (*WTP*), *WTPi* = the value of *WTP*, Pf_i = relative frequency, *n* = number of respondents, *i* = *i*-th respondent.

Estimating bid curves

The *WTP* curve is obtained by using the cumulative number of respondents who choose the value of *WTP*. The *WTP* curve relationship connects the *WTP* value with the cumulative number of respondents willing to pay (Fajria, Dyah and Djeimy, 2020).

Aggregating data

Aggregating data changes the average value of the respondent's *WTP* to the total data (Madaidy and Juwana, 2019). The formula used in this study is as follows.

$$TWTP = \sum\nolimits_{i=1}^{n} WTP \cdot N \tag{2}$$

where: *TWTP* = total of *WTP*, *WTP* = value of willingness to pay, *N* = population.

RESULTS AND DISCUSSION

CHARACTERISTICS OF RESPONDENTS

Respondents in this study are farmers who use irrigation from the Gonggang reservoir. The total number of respondents who became the object of this study is 114 respondents. The majority of respondents in this study were farmers aged 49–56 years old. The average farmer is 54 years old, categorised in the productive period. Farmers in productive age have a pretty good physique to support their farming activities (Susanti, Listiana and Widayat, 2016). Farmers in the productive age are also quicker to adopt innovations. Most farmers in this study had six years of education or complete primary school education. This fact shows that the farmer's formal education level is still categorised as low. Farmer's formal education is still low and has a slow potential to solve problems (Satra and Alamsyah, 2019). The majority of farmers in this study were farmers with land areas ranging from 0.15 to 0.35 ha. The average of arable lands for famer in Indonesia is very small, about 0.0927 ha (BPS, 2018). The smallest agricultural land is 0.0302 ha, and the largest is 2 ha. It shows that there are still many smallholder farmers in the research location. The majority of farmers in this study were farmers with farm production ranging from 200 to 900 kg and from 1000 to 1700 kg. The average farmer's farm production is 1530 kg.

The average farmer's farm production tends to be below because dry land is more commonly found than paddy land in the research location. Dry land is generally marginal land and has a low potential for productivity. Most farmers in this study know irrigation network maintenance fees are neutral. Neutral is the middle value between knowing and not knowing. Most farmers in this study had land in the same village as the farmer's house. Land in the same village as the farmer's home will be easier to reach and manage. Farmers whose land is far from the farmer's house can reduce the intensity of their farming management, such as monitoring plant growth, managing irrigation, and protecting plants from pests or diseases (Mahananto *et al*., 2009). The majority of farmers in this study were farmers who owned their land. Other land ownership includes rent and crooked land, which is the salary of local village officials.

ANALYSIS OF FARMER'S WILLINGNESS TO PAY FOR IRRIGATION NETWORK MAINTENANCE FEES

This research focuses more on irrigation network maintenance fees, which are measured, based on the community's willingness to contribute because irrigation network maintenance fees at the research location still need to be applied routinely, and irrigation water fees still need to be implemented in the community. Therefore, the actual irrigation network maintenance fee or irrigation fee at the research location is IDR 0, or the routine fee system still needs to be implemented. However, farmers are willing to implement a regular contribution system. In this study, the CVM was used to analyse the farmer's *WTP* for irrigation network maintenance fees in the irrigation area of the Gonggang reservoir. The results of the implementation of the CVM are shown below.

Constructing a hypothetical market

The process of forming a hypothetical market is by asking the respondents to read or hear a statement about the current condition of the irrigation network, which is partially damaged. The respondents were also asked to read or hear a statement regarding the solution of the problems. The solution to the problems is to participate in the irrigation network maintenance to improve the quality of irrigation service. One of participation by farmers is in the form of regular fees.

Obtaining bids

The bid value is obtained by conducting a survey. The survey aims to obtain the maximum value of respondents' *WTP* for irrigation network maintenance fees (Surhayani and Anwar, 2011). The method used in this study is the direct open-ended question method. The direct open-ended question method was implemented by asking the respondents directly about the maximum value of *WTP*. All respondents are willing to pay a certain amount for irrigation network maintenance fees. Respondents who choose a high value of *WTP* can already judge the benefits of irrigation network maintenance fees that impact their agriculture. Respondents who choose a low *WTP* value consider the irrigation network a government asset and water a public good. The distribution of *WTP* values in this study can be seen in Table 3.

As seen in Table 3, most respondents chose the value of *WTP* IDR 100,000.00 per hectare per planting period, with a percentage of 21.93% of the total respondents. Farmers in the research location are accustomed to paying fees. However, they are only limited to repairing the damage to the irrigation network if the government responds after some time and the farmers are willing to pay for irrigation network maintenance fees if applied. Farmers are willing to pay because they feel that they need water with challenging environmental conditions, feel rewarded from a social and economic perspective, and are satisfied with institutional services (Sukayat, Setiawan and Supriyadi, 2019).

Table 3. Distribution of willingness to pay (*WTP*) values per hectare

Value of *WTP* (IDR)[1)]	Frequency (person)	Total of *WTP* (IDR)[1)]	Percentage
13.333	1	13,333	0.88
20.000	6	120,000	5.26
25.000	1	25,000	0.88
26.667	2	53,334	1.75
28.000	1	28,000	0.88
30.000	2	60,000	1.75
31.250	1	31,250	0.88
32.000	1	32,000	0.88
33.333	1	33,333	0.88
33.337	1	33,337	0.88
40.000	3	120,000	2.63
50.000	6	300,000	5.26
55.555	1	55,555	0.88
60.000	3	180,000	2.63
62.500	7	437,500	6.14
66.667	3	200,001	2.63
70.000	2	140,000	1.75
71.429	1	71,429	0.88
75.000	3	225,000	2.63
80.000	6	480,000	5.26
85.000	3	255,000	2.63
100.000	**25**	**2,500,000**	**21.93**
111.111	1	111,111	0.88
120.000	1	120,000	0.88
125.000	11	1,375,000	9.65
133.333	2	266,666	1.75
142.857	4	571,428	3.51
150.000	5	750,000	4.39
160.000	3	480,000	2.63
166.667	3	500,001	2.63
175.000	1	175,000	0.88
187.500	1	187,500	0.88
200.000	2	400,000	1.75
Total	**114**	**10,330,778**	**100**

[1)] USD1 = IDR 14,612.
Source: own study.

Estimating average of willingness to pay

The average of *WTP* is a number that represents the data obtained (Hendarto, 2017). In the Table 4, the average of *WTP* is obtained by adding up the respondent's *WTP*, which has been multiplied by the relative frequency. The relative frequency is the proportion of occurrences of a value that emerges from the data

Table 4. Distribution and calculation of average willingness to pay (*WTP*)

Value of *WTP* (IDR)[1)]	Frequency (person)	Relative frequency	Amount (IDR)[1)]
13,333	1	0.008772	116.956
20,000	6	0.052632	1,052.632
25,000	1	0.008772	219.298
26,667	2	0.017544	467.842
28,000	1	0.008772	245.614
30,000	2	0.017544	526.316
31,250	1	0.008772	274.123
32,000	1	0.008772	280.702
33,333	1	0.008772	292.395
33,337	1	0.008772	292.430
40,000	3	0.026316	1,052.632
50,000	6	0.052632	2,631.579
55,555	1	0.008772	487.325
60,000	3	0.026316	1,578.947
62,500	7	0.061404	3,837.719
66,667	3	0.026316	1,754.395
70,000	2	0.017544	1,228.070
71,429	1	0.008772	626.570
75,000	3	0.026316	1,973.684
80,000	6	0.052632	4,210.526
85,000	3	0.026316	2,236.842
100,000	25	0.219298	21,929.820
111,111	1	0.008772	974.658
120,000	1	0.008772	1,052.632
125,000	11	0.096491	12,061.400
133,333	2	0.017544	2,339.175
142,857	4	0.035088	5,012.526
150,000	5	0.04386	6,578.947
160,000	3	0.026316	4,210.526
166,667	3	0.026316	4,385.974
175,000	1	0.008772	1,535.088
187,500	1	0.008772	1,644.737
200,000	2	0.017544	3,508.772
Total			90,620.850

[1)] USD1 = IDR 14,612.
Source: own study.

that has been collected. The average respondent's *WTP* is IDR 90,620.850 per hectare per planting period. The result of this study is higher than the research conducted by Arifah (2008); the higher value of the *WTP* average indicates that farmers in this study area are aware of the importance of irrigation network maintenance fees.

Estimating bid curves

The *WTP* curve describes the relationship between the value of *WTP* and the cumulative frequency of the respondents who are willing to pay. The cumulative frequency is used because it is assumed that respondents will also be willing to pay a value that is smaller than the value of the *WTP* that has been selected.

The *WTP* curve has a negative slope, which means the higher the value of *WTP*, the fewer the respondents are willing to pay, and vice versa. This follows research conducted by Priambodo (2014) that the slope of the *WTP* curve is negative. The *WTP* curve can also be known as a consumer surplus. Ningrum (2018) states that the consumers' surplus is an advantage received by respondents because the desired value of *WTP* is higher than the average of *WTP*. Meanwhile, the consumer surplus on irrigation network maintenance fees can be seen in Figure 1.

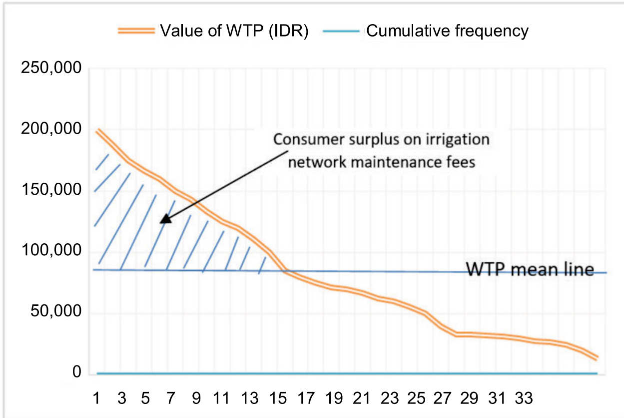

Fig. 1. Value of willingness to pay (*WTP*) distribution curve; source: own study

Aggregating data

The last step in the CVM is aggregating data. The aggregate data of *WTP* is calculated to determine the total economic financing of a public good (Annisa and Harini, 2017). In this study is the economic financing of irrigation networks in the irrigation area of the Gonggang reservoir. The aggregate *WTP* data is the total *WTP* value that the population in this study is willing to pay (Riana, Mukson and Wilujeng, 2019). The total *WTP* is obtained by adding up the *WTP* value, which has been multiplied by the population. To find out the population of this study by comparing the land area of the sample farmers with the total land area of the sample farmers, then multiply it by the total land area of the population. The total land area of the population in this study is 1,339 ha. The size of the aggregate data value can indicate whether farmers have been able to appreciate the benefits of the irrigation network maintenance fees. The sum of the data can be seen in Table 5.

The total *WTP* for irrigation network maintenance fees in the irrigation area of the Gonggang reservoir is IDR 116,188,708 per planting season. The total *WTP* can be a potential financing that can be applied to maintain irrigation networks at the research location.

Table 5. Distribution of data and summation of data on willingness to pay (*WTP*)

Value of *WTP* (IDR)[1)]	Frequency (person)	Sample farmer's land size (ha)	Population land area (ha)	Amount of *WTP* (IDR)[1)]
13,333	1	0.75	13.82979	184,392.55
20,000	6	5.5	101.4184	2,028,368.80
25,000	1	0.8	14.75177	368,794.33
26,667	2	2.25	41.48936	1,106,396.80
28,000	1	1	18.43972	516,312.06
30,000	2	1.25	23.04965	691,489.36
31,250	1	0.8	14.75177	460,992.91
32,000	1	0.625	11.52482	368,794.33
33,333	1	0.15	2.765957	92,197.66
33,337	1	0.6	11.06383	368,834.89
40,000	3	1.7	31.34752	1,253,900.70
50,000	6	5.3	97.7305	4,886,524.80
55,555	1	0.9	16.59574	921,976.60
60,000	3	2.5	46.09929	2,765,957.40
62,500	7	2.9	53.47518	3,342,198.60
66,667	3	2.25	41.48936	2,765,971.30
70,000	2	1.4	25.8156	1,807,092.20
71,429	1	0.7	12.9078	921,991.35
75,000	3	2.3	42.41135	3,180,851.10
80,000	6	2.4	44.25532	3,540,425.50
85,000	3	0.85	15.67376	1,332,269.50
100,000	25	14.94	275.4894	27,548,936.00
111,111	1	0.9	16.59574	1,843,969.80
120,000	1	0.5	9.219858	1,106,383.00
125,000	11	6.4	118.0142	14,751,773.00
133,333	2	1.8	33.19149	4,425,520.90
142,857	4	2.8	51.63121	7,375,879.10
150,000	5	1.6	29.50355	4,425,531.90
160,000	3	0.75	13.82979	2,212,766.00
166,667	3	2.7	49.78723	8,297,888.90
175,000	1	1.5	27.65957	4,840,425.50
187,500	1	0.8	14.75177	2,765,957.40
200,000	2	1	18.43972	3,687,943.30
Total	**114**	**72.6**	**1,339**	**116,188,708**

[1)] USD1 = IDR 14,612.
Source: own study.

CONCLUSIONS

The respondents possessed varied levels of information on irrigation network maintenance fees. Respondent's level of knowledge about the importance of irrigation network maintenance fees can affect the value of respondent's willingness to pay (*WTP*). The result showed that the amount of farmer's *WTP* for irrigation network maintenance fees in the irrigation area of The Gonggang reservoir is IDR 90,620,850 per hectare per planting season, with a total of *WTP* IDR 116,188,708 per planting season. Based on the results of this research, there should be cooperation between related agencies and water-using farmers in the irrigation network maintenance program, especially in tertiary networks, in the form of willingness to pay irrigation network maintenance fees so that the valuable function of irrigation can be felt by farmers and the irrigation network can be maintained and the aims and objectives can be achieved. The construction of the Gonggang reservoir means an increase in planting intensity and farmers' income. In addition, the results of this analysis can be considered in determining fees for maintenance of irrigation networks in the Gonggang reservoir irrigation area in the future so that funding for irrigation network maintenance in the Gonggang reservoir irrigation area can be met.

ACKNOWLEDGEMENTS

The authors would like to express the gratitude to all the participants who have contributed to this research and also thank to the anonymous reviewers for their critical comments and suggestions to improve the manuscript.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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