



## RESEARCH PAPER

## OPEN ACCESS

## The community perception analysis toward clean water supply and its impact toward environment in ipa pdam of marabahan kota, barito kuala regency

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### Abstract

The issue of water supply is one of the main urban issues. The condition of water production of IPA PDAM Marabahan Kota got many complaints from citizens and customers. Based on the residents' recognition that the PDAM water they used tended to taste sour, murky, and sometimes yellowish. This study aimed to analyze public perception on PDAM of Marabahan Kota toward water supply of Marabahan Sub-district at present, to analyze public perception on water supply management in IPA PDAM of Marabahan Kota, to analyze public perception toward obstacles and problems of water supply in IPA PDAM of Marabahan Kota, to analyze public perception on the impact of water supply management on the environment in IPA PDAM of Marabahan Kota. The results showed that the community gave a positive response toward water supply by PDAM of Marabahan Kota. The water supply management conducted by PDAM of Marabahan Kota has not been optimal yet. Obstacles and problems gained was that the water quality provided by PDAM of Marabahan Kota was still below the standard quality of Permenkes RI No. 416/MENKES/PER/ IX /1990 on Standard of Water and Clean Water Quality and Permenkes RI No 492/MENKES /PER /IV/2010 on Water Quality Requirement and South Kalimantan Governor Regulation No.05 Year 2007 on River Water Quality Standard due to lack of maintenance and monitoring of quality and installation. The management of water supply by PDAM of Marabahan Kota was considered not having a negative impact on the environment as it was in accordance with the applicable Processing and Management Standards.

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## Introduction

The issue of water supply is one of the main urban issues. The availability of clean water for urban areas is closely related to the problems of utilization, maintenance, and sustainability of water resources in the surrounding area (Tjahjati, 2005). In order that drinking water management to be implemented well and properly, management is required with a professional management system in terms of planning, production capacity, distribution system, and supervision. This is to ensure the need for clean water can be met for the needs of the community. Marabahan condition at this time is that the distribution of clean water is not evenly distributed. The distribution of water supply services by the government, namely PDAM, has not been sufficient for the entire community in Barito Kuala Regency.

The condition of water production of IPA PDAM Marabahan Kota got many complaints from citizens and customers. Based on the residents' recognition that the PDAM water they used tended to taste sour, murky, and sometimes yellowish. Based on the result of laboratory test on water quality of IPA PDAM of Marabahan Kota it was got a test result where dissolved solid (TDS) content in raw water equal to 26.48 mg/L after processing stage increased to 45.42mg/L. The value of TDS after arriving at the consumer level increased again to 51.2mg/L. Similarly, the parameters of acidity level where the pH of raw water was 5.8 after processing the pH decreased to 4 and pH at customer level was 4.1. This was of course underlying the desire of citizens for water quality production of IPA PDAM in Marabahan Kota to be increased so it was worth to be consumed (LHU, 2015).

The capacity of human resources and capacity of the available production capacity system was still limited and needed to be continuously improved. Therefore, there should be an integrated strategic planning that can be used by the management as a reference for decision making in investment development to provide the best service to the community. This was done by improving and increasing the capacity of Water Processing Installation (IPA) service on existing units.

The purpose of this research was as follows: 1) to analyze the public perception at PDAM of Marabahan Kota toward water supply of Marabahan District at this time; 2) to analyze public perception on the management of water supply in IPA PDAM of Marabahan Kota; 3) to analyze the public perception on the obstacles and problems of water supply in IPA PDAM of Marabahan Kota; and 4) to analyze the public perception on the impact of water supply management on the environment in IPA PDAM of Marabahan Kota.

## Material and methods

### *Time and Place*

This research was conducted sequentially in March to December 2017. The research was conducted in Marabahan Sub-District, Marabahan District, Barito Kuala Regency.

### *Objects and Research Tools*

The object of research in this activity was the society of Marabahan Kota Sub-District, Marabahan District, Barito Kuala Regency, South Kalimantan. Equipment used in this activity was location map, Questionnaire, Camera for documentation, and Stationery.

### *Research Variable*

The research variables of clean water supply of IPA PDAM of Marabahan Kota are as follows:  
Clean water supply in IPA PDAM of Marabahan Kota: recognize by identifying how the system of water supply in IPA PDAM Marabahan Kotaran so far.

Management of clean water supply in IPA PDAM of Marabahan Kota: recognize by identifying how clean water supply management system in IPA PDAM of Marabahan Kota ran so far by using questionnaires consisted of administration, governance, supervision, and human resources.

Obstacles and Problems of clean water supply at IPA PDAM of Marabahan Kota: recognize by identifying obstacles and problems that existed in clean water supply in IPA PDAM of Marabahan Kota, using questions in questionnaires consisted of PDAM water quality, obstacles and problems that raised.

Impact of clean water supply management system in IPA PDAM of Marabahan Kota: recognize by identifying the impact that appeared from water supply management activities in IPA PDAM of Marabahan Kota, using questions in questionnaire consisted of positive and negative impacts that appeared in water supply activities.

*Data Collection Method*

Data collection was conducted through the following data sources:

*Primary Data*

The data taken was the sample data of respondents from a population that was the community in Marabahan Kota Sub-District, Marabahan District. The formula to calculate the desired number of samples was (Wirdanaf, 2006).

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

By: N = number of sample population  
a = error estimate

In this study, N was the number of population samples, namely the number of head of family (KK) in Marabahan Kota Sub-District, namely 4,008 KK of the number of customers through the Home Connection (SR) as many as 3,989 units, for Public Faucet (KU) 13 units and General Hydrant (HU) 6 units. The value of the degree of precision was 10%, which meant the expected level of study trust was 90%. Thus, the samples taken were:

$$n = 4,008$$

$$4,008 (0.1)^2 + 1$$

$$n = 97 \text{ samples}$$

Based on the number of sample population it was obtained as many as 97 samples.

*Secondary Data*

Secondary data needed in this research was data related to research obtained from government agency such as location map, general condition, livelihood, sourced from Sub-District, District, and related institution.

The institution related to clean water activities was PDAM. Data collection was in accordance with the list of needs.

*Distribution of Respondents Samples*

Based on the method of collection conducted on a number of respondents, the distribution of samples was done evenly on the number of families in Marabahan Kota with the desired number of samples of 97 families in 4 RW Marabahan Kota Sub-District, so the calculation was as follows:

$$n = 97/4 = 24.25 = 25 \text{ samples KK/RW}$$

*Data Analysis*

This research used data analysis of perception value (NP) based on measurement of public perception (respondent) on clean water supply effort, done by data analysis according to Ali (1987); as follows:

$$NP = \frac{n}{N} \times 100\%$$

Where:

- NP (%) = Perception Value
- N = Scores obtained
- N = Maximum score

Then it was set the class interval and criteria in Table 1 as follows:

**Table 1.** Class Interval and Perception Value Criteria.

No	Interval (%)	Criteria	Description
1	≥ 70%	Positive Perception	Useful
2	< 70%	Negative Perception	Less useful

The perception value (NP) of the society toward IPA PDAM of Marabahan Kota: to recognize the perception value of the society where the perception value would be good (positive) if the respondent perceived both to the number of questions in the questionnaire submitted at least 70% of respondents (NP ≥ 70%).

**Result and discussion**

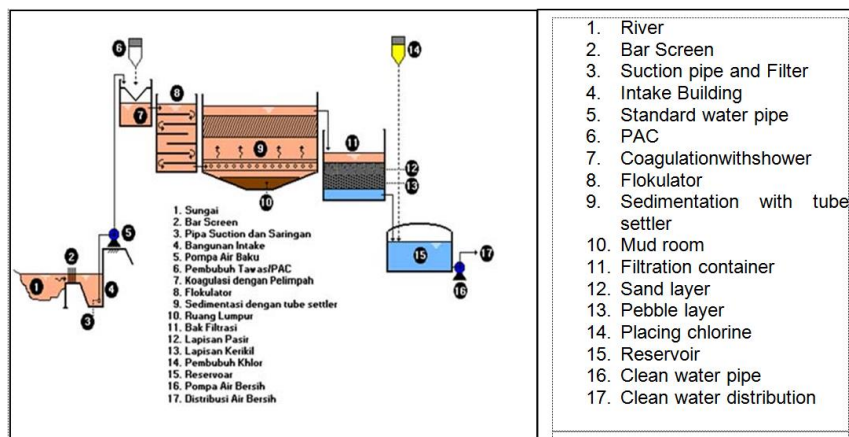
*Water Quality of IPA PDAM of Marabahan Kota*

The results of the measurement of water quality intake of PDAM Marabahan Kota can be seen in Table 2 below.

**Table 2.** The Result of Measurement of Water Quality Intake PDAM of Marabahan Kota Year 2016.

No.	Parameters	Measurement Result		River Water Quality Standard (South Kalimantan Governor Regulation No. 05 Year 2007)	Unit
		April	May		
1.	Temperature	29,1	28,5	-	Celsius
2.	DHL	21,9	20,6	-	Umnos/cm
3.	TDS	11,1	8,6	-	mg/L
4.	TSS	29	63	-	mg/L
5.	pH	5,2	7,57	6-9	-
6.	BOD	3,72	11,62	2	mg/L
7.	COD	11,92	29,56	10	mg/L
8.	DO	6,24	5,94	6	mg/L
9.	Total Fosfat-P	0.13	0.190	0.2	mg/L
10.	NO <sub>3</sub> -N	0.2786	0.1863	10	mg/L
11.	NH <sub>3</sub> -N	0.0826	0.0846	0.5	mg/L
12.	As	<0.002	<0.002	0.005	mg/L
13.	Cd	<0.0043	<0.0043	0.1	mg/L
14.	Fe	1.3590	1.8770	0.3	mg/L
15.	Pb	<0.0069	<0.0069	0.3	mg/L
16.	Mn	0.0471	0.0940	0.1	mg/L
17.	Hg	<0.0016	<0.0016	0.001	mg/L
18.	Zn	0.0445	0.0265	0.05	mg/L
19.	CN	<0.002	<0.002	-	mg/L
20.	NO <sub>2</sub> -N	0.0205	0.0164	0.06	mg/L
21.	Cl Free	<0.002	<0.002	0.03	mg/L
22.	H <sub>2</sub> S	0.002	0.048	0.002	mg/L
23.	Fat	<5.0	<5.0	1000	µg/L
24.	Detergent	149.40	36.80	200	µg/L
25.	Phenol	<5.0	<5.0	1	µg/L
26.	E. Coli	88	494	100	Jml/100 ml
27.	Coli Form	68	500	1000	Jml/100 ml

Source : BLH of Barito Kuala Regency, 2016.



**Fig. 1.** Chart of Processing activities of IPA PDAM of Marabahan Kota.

*Public Perception on Clean Water Supply at PDAM of Marabahan Kota*

The result of analysis of perception value of customer of Marabahan Kotatoward clean water supply given by Government in Marabahan Kota can be seen in Table 3 below:

**Table 3.** Perception Value of PDAM Customer toward Water Supply.

Provision of Clean Water	Number of Respondents	Perception Value (%)	Table of Class Interval	Criteria of Perception Value
Yes	44	88%	≥ 70%	Positive (Profitable)
No	6	12%	<70%	Negative (Less Profitable)
Total	50	100%		

Source :Primary Data, 2017.

Based on Table 3 it can be seen that the positive value of community perception that subscribed to PDAM toward clean water supply is 88% bigger than the negative perception of community who subscribed to PDAM (12). This meant that clean water supply by the Government (PDAM) got positive or favorable response from the community. This was clearly beneficial for the community, because the availability of clean water was met and in accordance with a decent life. The demands of clean lifestyle also made the need of clean water became obligatory to be consumed; besides also clean water was needed by community because it affected health. With the provision of clean water by the government then a decent life would be met.

*Public Perception toward Clean Water Supply Management at IPA PDAM of Marabahan Kota*

Clean water supply by PDAM of Marabahan Kota has been running for a long time in providing clean water for the community. In this case there should be a direct interview to PDAM of Marabahan Kota on how the management was done in meeting the needs of clean water.

**Table 4.** Employee Perception toward Clean Water Supply Management at PDAM of Marabahan Kota.

Management of Clean Water	Number of Respondents	Perception Value (%)	Table of Class Interval	Criteria of Perception Value
Yes	4	27 %	≥ 70 %	Positive (Profitable)
No	11	73%	<70%	Negative (Less Profitable)
Total	15	100%		

Source: Primary Data, 2017.

Table 4 above explains the extent to which the management of the PDAM in providing clean water to the customers. Based on the answers given by the employee, it is seen that 27% positive and 73% negative. The negative value of employee perception showed that the management done by the PDAM was less profitable, in other words the management was still less than optimal, this could be seen from some respondent answers that answer "no" to some questions asked in questionnaire for example " Is there a training of employees related to the provision of clean water? ", as well as other questions concerning the quality of clean water. It is necessary to conduct training according to duties and individual officers/employees so that the management of PDAM increases so that customer satisfaction of Marabahan PDAM improves.

*Public Perception toward Obstacles and Problems of Clean Water Supply in IPA PDAM of Marabahan Kota*

Related to what has been done by the PDAM, it needs to be recognized the perception of customers and non- customers about obstacles of the provision of clean water in Marabahan Kota, as evidence of what employees said about the management done by the PDAM and management improvement benchmark in the future.

The following is the interview data obtained. The data can be seen in Table 5.

**Table 5.** Obstacles on Clean Water Supply of PDAM Subscribers.

Obstacles of Clean Water Supply	Number of Respondents	Perception Value (%)	Table of Class Interval	Criteria of Perception Value
Yes	15	30 %	≥ 70 %	Positive (Profitable)
No	35	70%	<70%	Negative (Less Profitable)
Total	50	100%		

Source: Primary Data, 2017.

Based on Table 5 the interview toward PDAM customers on water supply obstacles has the following results: 70% of customer perceptions were negative and 30% were positive. In other words, based on the questionnaire question, the water quality of PDAM used was still smelly, tasteless, colorful, and turbid, as well as water quality during the rainy and dry seasons. As for the availability of clean water was sufficient for the needs of daily activities, it was seen from the perceptual value of 30% customers stated positive.

Perception value above can be used as correction materials for water quality improvement in accordance with the quality standard for consumption, although it has not yet known the value of water quality standards from PDAM of Marabahan Kota. We can assume that the quality of water provided already or even may decrease from water quality standard of drinking and household needs in accordance with the Regulation of Health Minister of the Republic of Indonesia Number: 416/MENKES/PER/IX/1990 on Standard Quality of Clean Water and Drinking Water and Regulation of Health Minister of the Republic of Indonesia Number 492/MENKES/PER/IV/2010 on Requirements of Water Quality. With reference to the mentioned regulations it is necessary to do checking in order to make improvements. Improvement can be started from checking of PDAM water raw material coming from Barito River whether still above the standard, or checking of coagulant material, and checking of technology used

in clean water supply process with reference to South Kalimantan Governor Regulation No.05 Year 2007 concerning River Water Quality Standard.

Here are the results of interviews of non PDAM customers to find out the obstacles of clean water supply by using digging water sources or wells. The results can be seen in Table 6.

**Table 6.** Obstacles of Clean Water Supply of Non-PDAM customers.

Obstacles of Clean Water Supply	Number of Respondents	Perception Value (%)	Table of Class Interval	Criteria of Perception Value
Yes	19	40 %	≥ 70 %	Positive (Profitable)
No	28	60 %	<70%	Negative (Less Profitable)
Total	47	100%		

Source: Primary Data, 2017.

Based on Table 6 above it can be seen the perception value of non-customer 60% positive and 40% Negative. The quality of the well water used was not good, the community stated that the well water used by the community smelled and tasted, colored and murky. In addition, the community was also constrained in the dry season because the quality of the well water would get worse, although the availability of well water was considered to be still sufficient.

According to the community, the area of Marabahan Kota had a poor groundwater quality, it was seen that the water used was brownish and even sour and this came from the type of soil in Marabahan Kota dominated by sulfuric acid which released some compounds that caused the acidity and rusting of soil and water. This was a serious constraint for local communities to get clean water, and according to them there was not any socialization about the positive and negative impacts of clean water supply. This was in accordance with the public perception of water quality provided by the government and water management by PDAM where the water quality was not optimum/less satisfactory. Coupled with the non-customers' perceptions of the well water they consumed can be used as a reference for management

improving, because if the PDAM water was just similar to well water then it was likely that PDAM customers would stop subscribing.

*Public Perception toward the Impact of Clean Water Supply Management on the Environment in IPA PDAM of Marabahan Kota*

Not only do we see obstacles in the provision of clean water, the impact on the provision of clean water to the environment also needs to be known. Based on the interviews it was obtained the answers on the impact of clean water supply. The results can be seen in Table 7.

**Table 7.** Impact of Clean Water Supply toward Environment in Sub-district of Marabahan Kota.

Impact of Water Supply	Number of Respondents	Perception Value (%)	Table of Class Interval	Criteria of Perception Value
Yes	18	81%	≥ 70 %	Positive (Profitable)
No	79	19%	<70%	Negative (Less Profitable)
Total	97	100%		

Source: Primary Data, 2017.

Based on Table 7 above, the perception of both the customers and non-PDAM customers regarding the impact of clean water supply on the environment was positive, 81% said that there was no negative impact from the provision of clean water causing environmental damage. Clean water supply by PDAM solely for drinking water needs and household activities and other needs, and also based on community statement it was obtained that no one said there was a dangerous content of clean water provided by PDAM of Marabahan.

This was supported by having no cases of poisoning food and beverage and water-borne diseases such as Diarrhea and Gastro Enteritis, such as the top 10 disease data in the Health Center of Marabahan District (Table 8), that the type of water-borne diseases was in the 6th (6th) sequence. So far there has been no environmental damage or environmental pollution in the presence of water supply by the PDAM, but still there must be improvement of water quality and keep checking that the water quality to the community was maintained and in accordance with standard quality of clean water and drinking water qualities.



**Table 11.** 10 Most Diseases Appeared in Health Center of Marabahan District

No	Name of Disease	Total	Percentage
1	ISPA	5,382	25.05
2	Primary Hypertension	4,821	22.44
3	Rheumatoid Arthritis	4,339	20.19
4	Gastritis & Duodenitis	3,530	16.43
5	Allergy	3,530	4.81
6	Diarrhea and GE	1,035	3.50
7	Diabetes Mellitus	531	2.47
8	Other trauma	419	1.95
9	Hypotension	356	1.65
10	Asthma Bronchiale	321	1.5
Total		21,487	100

Source: Health Center of Marabahan District, 2016.

### Conclusion

Based on the research that has been done, it can be concluded that: The community responded positively toward clean water supply by PDAM of Marabahan Kota. The management of clean water supply conducted by PDAM of Marabahan Kota has not been optimal yet. Obstacles and problems obtained are the water quality provided by PDAM Marabahan Kota was still below the standard quality of Permenkes RI No. 416/MENKES /PER /IX/1990 on Standard of Clean Water and Drinking Water Quality and Permenkes RI No 492/MENKES/PER /IV/2010 on Water Quality Requirement and South Kalimantan Governor Regulation No.05 Year 2007 on River Water Quality Standard due to lack of maintenance and monitoring of quality and installation. The management of clean water supply by PDAM of Marabahan Kota was considered not to have a negative impact on the environment as it was in accordance with the applicable Processing and Management Standards.

### Suggestion

The things that can be suggested based on the above conclusions are:

Periodic check on the quality of clean water provided by PDAM of Marabahan Kota needs to be done.

There should be more support by the government from related parties to the provision of clean water so that the water distributed in accordance with the quality standard of the Health Minister of Republic of Indonesia No. 416/MENKES/PER/IX/1990 on the Standard of Clean Water and Drinking Water Quality

and Regulation of Health Minister of Republic of Indonesia Number: 492/MENKES/PER/IV/2010 concerning Water Quality Requirement and South Kalimantan Governor Regulation No.05 Year 2007 regarding River Water Quality Standard. There is a need for further research on the water quality standards provided by PDAM of Marabahan.

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