

# ANALYSIS OF CUSTOMER SATISFACTION LEVELS FOR THE DEVELOPMENT OF WATER SUPPLY SYSTEMS (CASE STUDY OF SUKABUMI WATER SUPPLY SYSTEM)

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## ABSTRACT

*Drinking water is one of the basic human needs and is very important to improve the quality of human life and economic growth of the country. In 2020 Sukabumi City with a population of 346,325,000 people, the reliability of clean water is one of the determining indicators of population welfare. With the availability of water, the health and productivity of the community can be maintained, which in turn has a significant economic impact on the community. This study aims to measure the level of public satisfaction with the quality and level of service of drinking water providers in Sukabumi City. The data was collected from primary data, namely area observation and questionnaire distribution, while secondary data was obtained from location maps, document research and supervisory decision 63 A/PDAM/KPTS/2011 on Minimum Service Standard Regulations. The analysis method used is the Critical Performance Analysis (IPA) method which compares the actual score with the expectations of 5 main variables namely; Connection Quality, Payment, Service, quality, quantity, and accuracy of water meters. with a calculated decision limit value of 91.84% and Customer Satisfaction Index (CSI) to achieve SPAM customer satisfaction scores. The results of existing calculations show that Sukabumi customer satisfaction reached 86.87%, which means that they are "very satisfied" with the performance of PERUMDA AIR MINIMUM TIRTA BUMI WIBAWA CITY OF SUKABUMI. Thus with the current CSI Index the company may secure the long-term sustainability of its operations*

**Kata Kunci:** WSC, Importance Performance Analysis (IPA), Customer Satisfaction Index (CSI)

## INTRODUCTION

Sukabumi City is one of the City in West Java Province with a population of more than 350 thousand people in 2021 with a density of around 6,496 people/km<sup>2</sup>. The Sukabumi City Government through its regional public company, PDAM Tirta Bumi Wibawa, is a regionally-owned enterprise (BUMD) whose main task is to provide drinking water to the community. In providing its services, PDAM Tirta Bumi Wibawa Kota Sukabumi utilizes several raw water sources consisting of surface water, springs, and deep wells. Drinking Water is an essential requirement for humans and is vital in enhancing the overall well-being and economic progress of a society. This is especially significant in expediting the distribution of clean drinking water. The implementation of drinking water provision can be carried out by individuals or any group of communities, the central government, provincial government, district / city government according to the authority based on statutory provisions, as well as business entities (Presidential Regulation of the Republic of Indonesia No. 185 of 2014).

Drinking water provision is carried out in accordance with the Master Plan of the water supply system. The Drinking Water Master Plan (RIWSC) prepared by each district/city is only a reference for the development of drinking water. The implementation of public services in regions or in cities is the duty and responsibility of districts and cities, but the central government and provincial government are responsible for ensuring that it organizes drinking water services that meet the targets of quantity and quality and continuity. The research was conducted by Identification of existing conditions, analysis of the impact of various programs to help develop WSC and comparing it with the performance report of BUMD managing PDAM BPPWSC for the period 2022-2024. The review includes financial aspects, service aspects, operational aspects and human resource aspects through the Balanced Scorecard approach. Moreover, it suggested the use of recommendations to improve management efficiency. Research results should provide input to the government regarding performance. WSC is designed to consider WSC Management policy in Sukabumi.

Access to potable water is a key factor in shaping the welfare of a society, with the potential to enhance public health and stimulate productivity among community members, thereby fostering economic advancement. (Wintyaswan & Soetopo, 2023)

Based on data from October 2022, PDAM Tirta Bumi Wibawa Kota Sukabumi has a service coverage of 14.95%. Apart from the amount of service coverage, there are 4 sub-districts that have an average service below 8 hours. The sub-district that has service up to 24 hours is Gunung Puyuh sub-district which is also supported by the largest and best service percentage. And the problem that occurs in PDAM Sukabumi city is the quality of water that does not meet the needs of the

community.

Due to problems with the water quality that has been obtained at WSC in Sukabumi, the results that need to be sought in this study are an analysis of the level of customer satisfaction for the development of WSC in Sukabumi.

### Water Supply System (WSC)

WSC, which is based on the regulations of Government Regulation No. 16 of 2005 and Technical Standards from the Directorate General of Human Settlements on Urban or Rural Clean Water Development, is an integrated system from raw water intake, treatment (if any) to distribution that is managed within the scope of urban or rural areas. In developing WSC in the region, there are several things that can be considered, namely (Juwita, et al., 2014)

- a) Raw water, designated as such for the purpose of domestic consumption, is sourced from surface water bodies, underground aquifers, and/or precipitation, provided it adheres to specific quality criteria suitable for drinking purposes.
- b) The purpose of WSC development is to construct, enhance, or refine both the physical (technical) and non-physical (institutional, management, financial, community role, and legal) systems as a cohesive unit in order to facilitate the supply of clean drinking water to the community for improved well-being.
- c) Community is a group of people who have the same interests located in an area with the same jurisdiction.
- d) WSC development arrangements are organized in an integrated manner with the development of sanitation facilities and infrastructure related to drinking water.
- e) The achievement of effective management and provision of high-quality drinking water at reasonable prices.

Furthermore, the form of WSC that will be developed in the region is one that fulfills the following:

- a) WSC can be carried out through piping network systems and/or non-piping networks
- b) WSC with a piping network as intended is a form of WSC that includes raw water units, production water units, distribution units, service units, and management units
- c) WSC that is not a pipeline network as intended is a form of WSC that includes shallow wells, hand pump wells, rainwater harvesting basins, water terminals, water tank cars, bottled water installations, or construction of spring protection.
- d) WSC must be managed properly and sustainably.

Water demand is where water will be used for the main human needs (domestic needs) and other activities related to water (non-domestic needs), for example irrigation needs, drinking water, livestock, hotels, public facilities, and others. Domestic clean water demand is the amount of clean water required by a household (18/PRT/M/2007).

So that the total water demand is the sum of household water needs, public facilities, leaks, and hydrants. Non-household needs (non-domestic needs) are needs other than for household purposes and public tap connections. As for what is included in non-domestic needs, namely the provision of water for places of worship, hospitals, schools, dormitories, social facilities and also for commercial purposes, such as hotels, industry, trade, ports, and for public services (Permana & Kusdinar, 2022).

### **Water Quality**

Quality is one of the important indicators for the Company to be able to exist During fierce competition within the industry, quality is described as the sum of the attributes of a product that enable it to meet specific requirements. The concept of service quality pertains to striving to fulfill customers' needs and wants, ensuring the precision of their fulfillment in order to align with customer expectations. Kotler and Keller (2016) define quality as the totality of features and characteristics of a product or service that reflects its ability to meet or exceed expectations. Meanwhile, according to Tjiptono and Chandra (2016), service quality is a dynamic condition related to service products, human resources, and the environment that meets or exceeds expectations (Novia, et al., 2020).

Service plays a crucial role in meeting the diverse needs of the community across various service sectors, both explicitly and implicitly. It encompasses the provision of goods and services that are essential for individuals to fulfill their requirements. The overall evaluation of service quality is based on the comparison between the expectations of consumers and the actual performance of the service provided.

### **Customer Satisfaction**

According to Irawan (2021) Customer satisfaction refers to the sentiment experienced by a customer in response to the products or services they have utilized. Tjiptono (2014), Customer satisfaction is perceived as an emotion that emerges from evaluating the overall experience of utilizing a product or service.

Rangkuti (2013) defines customer satisfaction as the outcome of a customer's evaluation concerning the discrepancy between their initial expectations and the real performance they experience post-consumption. A critical aspect influencing customer satisfaction encompasses their perceptions of service quality, which revolve around five key dimensions including responsiveness, reliability, empathy, assurance, and tangibility. So satisfaction, apart from being influenced by perceptions of service quality, is also determined by quality, quantity, product, price and factors that are personal and momentary in nature (Nugroho, 2015)

According to the various definitions provided by the experts, satisfaction can be defined as the customer's reaction to the evaluation of expectations against perceived performance. This reaction can range from dissatisfaction to satisfaction, and ultimately to very satisfaction. Customers experience dissatisfaction when the perceived performance falls short of their

initial expectations. Conversely, satisfaction is felt when the perceived performance aligns with the initial expectations. Finally, very satisfaction occurs when the perceived performance surpasses the initial expectations

### **The Importance of Conducting CSI in Water Supply System Companies**

The Customer Satisfaction Index (CSI) has emerged as a crucial metric for water supply system companies to evaluate and enhance their service delivery (Eom, Choi, Yoon, & Lee, 2020). Numerous studies have highlighted the importance of measuring and improving customer satisfaction in this sector (Eom, Choi, Yoon, & Lee, (2020), Kassa, Chernet, Kelemework, Zewde, & Woldemedhin, (2017), Fattahi, Kherikhah, Sadeghian, Zandi, & Fayyaz, (2011), Zenker, Petersen, & Aholt, (2009))

Kassa, et al (2017) emphasize the significance of the CSI in the water supply industry, stating that "customer satisfaction is a key determinant of long-term success and sustainability for water utilities". They conducted a study in Southern Ethiopia, where they found that factors such as water quality, supply reliability, and customer service had a direct impact on customer satisfaction levels.

Sherry et al (2019) examined the water supply company in Tanzania. Their research highlighted the critical role of the CSI in identifying areas for improvement, such as billing transparency, communication with customers, and responsiveness to complaints.

Caldas, et al (2019) conducted a comparative study of customer satisfaction to the Portuguese local government's municipal performance. Their findings revealed that municipal with higher CSI scores also exhibited better performance thus the municipal will likelt be more sustainable than the municipal with lower CSI score

Murrar, et al., (2024) explored the relationship between customer satisfaction and willingness to pay for water services. Their research demonstrated that customers with higher satisfaction levels were more likely to accept price increases for improved service quality. Thus, once again this findings proofs the importance of the CSI in informing pricing strategies and investment decisions for water utilities.

Furthermore, Boyle, et al., (2022) investigated the impact of digital technologies on customer satisfaction in the water supply sector. They found that the integration of technologies such as smart meters, online billing, and mobile applications positively influenced customer satisfaction by enhancing transparency, communication, and convenience. They emphasize the importance of digital transformation initiatives to improve the overall customer experience and satisfaction levels.

From the studies above, it can be conclude that the

CSI serves as a valuable tool for assessing service quality, identifying areas for improvement, fostering customer loyalty, guiding pricing and investment decisions, and driving operational efficiency. As the water supply industry continues to evolve, monitoring and enhancing customer satisfaction through the CSI will remain a critical strategy for ensuring long-term sustainability and meeting the ever-changing expectations of customers.

Therefore, in order to achieve long-term sustainability and fulfill customer expectations regarding the services offered by *PERUMDA AIR MINUM TIRTA BUMI WIBAWA* in Sukabumi, it is essential to conduct a study that could analyzes the current level of Customer Satisfaction Index (CSI)

## METHOD

### Research Location

This research was conducted in Sukabumi, West Java province, specifically in Cikole and Gunung Puyuh sub-districts.



Figure 1. Research Location

### Data Collection Techniques

In this study, the data were grouped into two types, namely:

#### a. Primary Data

Primary data is data obtained by making direct observations about the situation in the field. The primary data in this study are:

- Area observation with data collection techniques carried out through observation accompanied by recording the state or behavior of the target object.
- Data obtained by asking opinions to the object of research, namely customers directly. Customers were asked to fill out a questionnaire regarding the quality of WSC services in Sukabumi.

#### b. Secondary Data

Secondary data is obtained from location maps, journals, theses related to research and literature studies.

## Sampling

The sampling technique in this study used Probability Sampling with Simple Random Sampling technique. In this study, the number of samples determined using the Slovin formula;

$$n = \frac{N}{(1 + N \cdot e^2)}$$

## RESULT AND DISCUSSION

### Questionnaire Data

This research was carried out which aims to determine the satisfaction of WSC customers in Sukabumi. For this research the author successfully gathered 100 respondent/customer. The Customer characteristics based on the research results are divided into 4 groups, namely Gender, Education, Occupation.

Based on the results of the answers that have been obtained from the research questionnaire with a total of 100 respondents, it shows that the majority of customers are male with 56 people equivalent to 56% while female respondents are 44 people or equivalent to 44%.

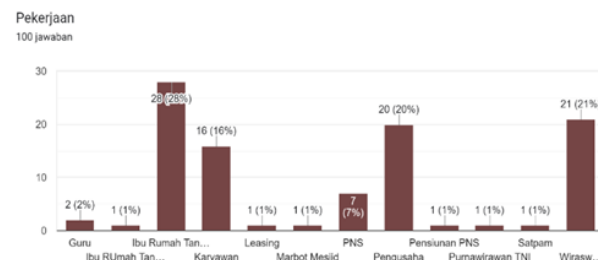


Figure 2. Jobs of Respondent

Based on the results of the answers that have been obtained from the questionnaire, the majority of customer jobs are as teachers 2 people with a percentage of 2%, housewives 29 people with a percentage of 29%, employees 16 people with a percentage of 16%, leasing 1 person with a percentage of 1%, mosque marbot 1 person with a percentage of 1%, civil servants 7 people with a percentage of 7%, entrepreneurs 20 people with a percentage of 20%, retired civil servants 1 person with a percentage of 1%, retired TNI 1 person with a percentage of 1%, security guard 1 person with a percentage of 1%, and self-employed 21 people with a percentage of 21%. With this result, the total percentage of 100 people is 100%.

Based on the results of the answers that have been obtained from the questionnaire, the majority of customers' last education is elementary school 1 person with a percentage of 1%, junior high school 29 people with a percentage of 29%, high school 48

people with a percentage of 48%, and others (S1, S2, S3 etc.) 22 people with a percentage of 22%.

### Questionnaire Result

**Table 1.** Questionnaire Result

No.	Question	Total Score		% Compliance
		x	y	
<b>Housing Connection</b>				
1	Requirements for reconnection services only require payment of the last water account arrears and a photocopy of ID card.	455	480	94,8
2	Procedures for new connection services are straightforward and easy to understand.	460	484	95
3	If you want to get a new connection, you must fulfill the requirements such as filling out a form, photocopy of ID card.	450	467	96,4
4	If the customer wants to temporarily close the connection and reopen the connection, the procedure is easy without being complicated.	455	474	95,9
<b>Payment</b>				
5	Water account fees are paid monthly according to usage.	427	466	91,6
6	Every service fee is still within reasonable limits	429	467	91,9
7	The costs incurred by customers are in accordance with the results of the services obtained	429	466	92,1
8	When customers have paid all service fees in full, they must immediately get the appropriate service	428	467	91,7
<b>Complaint/Services</b>				
9	Officers are always on time in serving customers such as providing answers to customer complaints	458	466	98,3
10	Operator expertise in doing the job well	458	471	97,2
11	Officers responsible for service delivery	451	468	96,4
12	Service to customers does not distinguish social status	454	472	96,2

No.	Question	Total Score		% Compliance
		x	y	
13	Staff are friendly and polite to customers	456	465	98,1
14	Operator skills in treating water	463	467	99,1
15	the officer is always on time when there is an appointment with the customer	459	475	96,6
16	Officers can establish effective communication with customers	453	476	95,2
17	Service can respond when there are suggestions and criticisms from customers	449	466	96,3
18	The service has a sense of discipline, especially in carrying out the work that is the responsibility of the service.	452	474	95,3
<b>Quality</b>				
19	Water received is odorless	379	477	79,4
20	The taste of the water received is of good quality	380	484	78,5
21	The water can be used for cooking purposes because it is clear and odorless.	338	484	69,8
22	The service room is clean and tidy	433	474	91,3
23	Water received does not contain chemical substances	410	483	84,8
<b>Quantitiy</b>				
24	Required water needs are met by the provider	410	478	85,7
25	Customers' water needs are in line with those provided by the provider	409	472	86,6
26	Customer's water supply is in line with what the provider provides	414	479	86,4
<b>Water Meter</b>				
27	Officers provide tera meter services, namely testing water meters that doubt their accuracy properly and quickly.	454	469	96,8
28	Water meter damage repair	454	484	93,8

The results of the service performance level of WSC in Sukabumi with an average percentage score with a value of 91.84%. The limit of decision making is in accordance with the calculated value of 91.84% with the following explanation:

- a. If the level of suitability of the question is smaller than 91.84%, then service improvement or Action (A) will be carried out.
- b. If the level of conformity of the question is greater than 91.84%, the service will be maintained or Hold (H)

### Customer Satisfaction Index (CSI)

Customer Satisfaction Index (CSI) is an analysis conducted to find goals and get the value of customer satisfaction for the development of WSC in Sukabumi. Looking for CSI calculations can be obtained from the value of the customer satisfaction index and can be calculated by the first stage, namely determining the Mean Importance Score (MIS) or Expectations and Mean Satisfaction Score (MSS) or reality on each question, Weight Factor (WF), Weight Score (WS), Weight Total (WT), and calculating the Customer Satisfaction Index (CSI).

**Table 2.** Customer Satisfaction Index Criteria

No	Indeks (%)	Criteria
1	80% > CSI ≤ 100%	Very satisfied
2	60% > CSI ≤ 80%	Satisfied
3	40% > CSI ≤ 60%	Average
4	20% > CSI ≤ 40%	Less Satisfied
5	0% > CSI ≤ 20%	Not Satisfied

The following are the results of the scale used to determine the overall satisfaction level of WSC customers in Sukabumi which refers to the determination of the range of customer satisfaction level values in the following table.

**Table 3.** Results of the scale used to determine the overall satisfaction level of WSC customers in Sukabumi

Variable	Total Score			
	MIS	MSS	WF	WS
1	4,8	4,55	3,62	16,48
2	4,84	4,6	3,65	16,80
3	4,67	4,5	3,52	16,80
4	4,74	4,55	3,52	15,85
5	4,66	4,27	3,52	16,27
6	4,67	4,29	3,52	15,01
7	4,66	4,29	3,52	15,11
8	4,67	4,28	3,52	15,08
9	4,66	4,58	3,52	16,10
10	4,71	4,58	3,55	16,27
11	4,68	4,51	3,53	15,92
12	4,72	4,54	3,56	16,17
13	4,65	4,56	3,51	16,00
14	4,67	4,63	3,52	16,31
15	4,75	4,59	3,58	16,45
16	4,76	4,53	3,59	16,27

Variable	Total Score			
	MIS	MSS	WF	WS
17	4,66	4,49	3,52	15,79
18	4,74	4,52	3,58	16,16
19	4,77	3,79	3,6	13,64
20	4,84	3,8	3,65	13,88
21	4,84	3,38	3,65	12,34
22	4,74	4,33	3,58	15,48
23	4,83	4,1	3,64	14,94
24	4,78	4,1	3,61	14,79
25	4,72	4,09	3,56	14,56
26	4,79	4,14	3,62	14,96
27	4,69	4,54	3,54	16,06
28	4,84	4,54	3,65	16,58
<b>Total A</b>	<b>132,55</b>	<b>121,67</b>		
<b>WT</b>				<b>434,36</b>
<b>CSI</b>			<b>86,87%</b>	

### CONCLUSION

Based on the results of the research that has been carried out, it can be seen that the level of satisfaction analyzed using the CSI method shows the index of customer satisfaction results with the services provided by PDAM or WSC which includes variables such as house connections, payments, complaints or services, quality, quantity, and water meters are in the "Very Satisfied" category with a score of 86.87% It is important to note that among the five variables assessed, those pertaining to water quantity and quality exhibit the lowest average satisfaction score index. Consequently, there is a pressing need to enhance and improve both aspects. Particular emphasis should be placed on maintaining water quality to ensure it remains clear and free of odor. By implementing these improvements, *PERUMDA AIR MINUM TIRTA BUANA* in Sukabumi can secure the long-term sustainability of its operations

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