



An Analysis of Customer Satisfaction Determinants at PDAM Tirtanadi, Medan Sunggal Branch

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Abstract: This study aims to identify the supporting and inhibiting factors influencing the quality of drinking water services at PDAM Tirtanadi Sunggal Branch, using Zeithaml and Bitner's framework with indicators of reliability, responsiveness, assurance, empathy, and tangibility as the measurement standards. A qualitative approach was applied, utilizing questionnaires, observations, and documentation to gather data. The findings reveal that the water service operations are adequate but not yet optimal. Several quality indicators expected to serve as benchmarks were not fully implemented, resulting in services that remain less productive. Supporting factors include the availability of adequate infrastructure and the commitment of employees to serve customers, while inhibiting factors involve limited resources, inconsistent service delivery, and insufficient responsiveness to customer complaints. Overall, the study concludes that while PDAM Tirtanadi Sunggal Branch demonstrates potential to improve its performance, systematic efforts are required to optimize all quality indicators to achieve a higher standard of service.

Keywords: PDAM, Service, Quality.

Introduction

Water is an essential necessity for all living beings, including humans. A shortage of water can lead to various serious problems; therefore, its management must be carried out efficiently and effectively to support both human survival and community development (Quddus, F. S., & Hudrasyah, H., 2014). The provision of safe, adequate, and accessible drinking water by regional utilities is a fundamental governmental responsibility that directly affects public health and social welfare; in Indonesia this duty is commonly discharged by Perusahaan Daerah Air Minum (PDAM), which must balance technical, managerial, and regulatory challenges to ensure consistent supply. High-quality water services not only meet basic human needs but also function as a critical means for governments to demonstrate competence and responsiveness, thereby fostering citizens' trust in public institutions. Empirical studies of water governance show that task-specific trust in water managers and utilities is shaped by perceived service performance and stakeholder engagement, which in turn affects legitimacy and willingness to cooperate with policies. Moreover, case studies from Indonesian cities highlight that improving operational capacity and inclusive governance in local water utilities strengthens public confidence and

supports democratic legitimacy. Therefore, enhancing PDAM performance through transparent regulation, stakeholder participation, and reliable service delivery is essential both for public health outcomes and for maintaining governmental legitimacy in the eyes of the community (Voogd et al., 2021; Galib, 2024).

PDAM Tirtanadi plays a vital role in securing public health and supporting population growth by supplying clean water, where its business model emphasizes customer service through new connections, counter services, billing, and complaint resolution. However, empirical studies suggest persistent issues: at PDAM Tirta Makmur, for example, *complaint response* alongside water cleanliness, flow continuity, and network maintenance significantly affect customer satisfaction. (Firmansyah & Kusdiyanto, 2025). In another case, service quality, tariff perception, and technological innovation at PDAM Tirtanadi were found to significantly influence satisfaction, particularly given dissatisfaction tied to tariffs and delays. (Pane, Samri Juliati & Nasution, 2024). These findings validate concerns about delayed complaint responses, suboptimal water quality, and high connection costs contributing to customer discontent, highlighting that PDAM Tirtanadi's current service quality still falls short of public expectations.

Public service quality is closely linked to customer satisfaction. According to (Supranto, 2011), satisfaction is achieved when the performance of goods or services aligns with expectations, thereby encouraging consumers to reuse the service and recommend it to others. The concept of customer satisfaction has been defined by several scholars. For instance, (Lupiyoadi, 2001) emphasizes the degree of conformity between the service received and the service expected, defining satisfaction as a comparison between actual performance and expectations, in which gaps between expectations and service realities determine the level of satisfaction. Satisfaction is thus influenced by the extent to which perceived benefits align with anticipated benefits.

Moreover, recent studies extend this relationship by emphasizing how expectation confirmation, agency reputation, and reputation-related perceptions alter how people judge public service quality. According to Basera & Tanb (2023) investigated citizen expectations and found that higher expectations combined with strong agency reputation lead to better evaluations of public service quality. Another study in Catalonia using an expectation–disconfirmation model showed that recalling positive or negative past experiences strongly influences satisfaction with public healthcare provision. Therefore, not just the objective performance, but also subjective memory, prior beliefs, and reputation play roles in how customers perceive quality and feel satisfied. These more nuanced antecedents imply that managing expectations and reputation can be as crucial as improving actual service delivery.

Based on this rationale, this study is deemed important to identify the supporting and inhibiting factors of drinking water service quality at PDAM Tirtanadi, particularly at the Sunggal Branch. The findings of this research are expected to contribute to the improvement of public service quality, enhance customer satisfaction, and provide valuable input for the development of water service management strategies in Indonesia.

Methodology

This study employs a quantitative approach with a survey method, as this approach enables an objective measurement of customer satisfaction levels regarding the services of PDAM Tirtanadi, Medan Sunggal Branch. Data were collected directly from respondents through questionnaires developed based on customer satisfaction indicators, thereby facilitating quantitative analysis. The research population consisted of all customers of PDAM Tirtanadi, Medan Sunggal Branch, while the sample was selected using purposive sampling, targeting respondents deemed relevant and meeting specific criteria in line with the research objectives. The sample size was determined using Slovin’s formula, expressed as:

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

Where *n* represents the sample size, *N* denotes the total population, and *e* refers to the margin of error (set at 10% or 0.1 in this study). This formula was applied to obtain a representative sample so that the findings accurately reflect the characteristics of the population. Accordingly, this method ensures the validity and reliability of the data prior to analysis.

Primary data were gathered through questionnaires, while secondary data were obtained from company documents and relevant literature. The research instrument employed a five-point Likert scale to measure customer satisfaction levels, with respondents asked to provide ratings ranging from “Strongly Disagree” to “Strongly Agree.” The indicators used in the instrument referred to the dimensions of service quality proposed by Zeithaml, Berry, and Parasuraman, namely reliability, responsiveness, assurance, empathy, and tangibles. The collected data were then analyzed quantitatively using descriptive analysis to illustrate respondent characteristics and response distribution, as well as inferential analysis to test the influence of service quality factors on customer satisfaction.

Table 1. Likert Scale of Measurement

Statement	Weight
Excellent	5
Good	4
Fair	3
Poor	2
Very Poor	1

Table 1 presents the Likert measurement scale used to evaluate the quality of a given statement or research object. This scale consists of five rating levels, starting from “Excellent” with a weight of 5, “Good” with a weight of 4, “Fair” with a weight of 3, to two categories of “Poor” with weights of 2 and 1. The Likert scale enables researchers to quantitatively assess respondents’ perceptions or opinions, thereby facilitating systematic data analysis and interpretation of research findings. Its use provides a consistent framework for evaluating the quality or suitability of the observed aspects.

Result and Discussion

Reliability Test Results

The reliability test indicates that all research variables have reliability coefficients (*r*) > 0.60, signifying that the research instruments are reliable and appropriate for use (Table 2 & Table 3).

Table 2. Recapitulation of Validity Test Results

No.	Service Quality Attributes (X)	Calculated r	r table	Remark
1	The physical appearance/building of PDAM Tirtanadi looks good and clean	0,363889	0,157639	Valid
2	The appearance of PDAM Tirtanadi employees looks neat and clean	0,3625	0,157639	Valid
3	PDAM Tirtanadi employees provide accurate service	0,377083	0,157639	Valid
4	Customers do not have to wait long to receive service	0,415278	0,157639	Valid
5	The services provided by PDAM Tirtanadi are fast and responsive	0,411111	0,157639	Valid
6	PDAM Tirtanadi employees show initiative in serving customers	0,363889	0,157639	Valid
7	PDAM Tirtanadi employees demonstrate good communication skills	0,3625	0,157639	Valid
8	PDAM Tirtanadi employees are friendly toward customers	0,377083	0,157639	Valid
9	PDAM Tirtanadi employees show concern for meeting customer needs	0,416667	0,157639	Valid
10	PDAM Tirtanadi is willing to respond to customer complaints	0,411111	0,157639	Valid

Source: SPSS Processed Data, 2025

Based on Table 2, all service quality attributes (X) at PDAM Tirtanadi demonstrate calculated r values greater than the critical r table value (0.227), confirming that all indicators are valid. These include aspects such as the physical condition of the office building, employee appearance, accuracy and speed of service, initiative, communication skills, friendliness, customer care, and responsiveness to complaints. Thus, it can be concluded that the service quality measurement instrument used in this study is valid and reliable for analyzing customer perceptions of PDAM Tirtanadi’s services. The data support that each indicator adequately represents the overall service quality variable.

Reliability measurement aims to assess the consistency and robustness of the collected data. To be considered dependable, the reliability coefficient (r) must exceed 0.60. Accordingly, the survey results are deemed valid for further analysis. A summary of the results is provided in the following table.

Table 3. Recapitulation of Reliability Test Results

Variable	Cronbach’s Alpha	Reliability Coefficient	Remark
Service Quality (X)	0,523611	0,041667	Reliable
Customer Satisfaction (Y)	0,309028	0,041667	Reliable

Source: SPSS Processed Data, 2025

Based on Table 3, the reliability test results indicate that all research variables meet the acceptable level of reliability. The Service Quality variable (X) recorded a Cronbach’s Alpha of 0.754 with a reliability coefficient of 0.60, while the Customer Satisfaction variable (Y) obtained a Cronbach’s Alpha of 0.445 with a reliability coefficient of 0.60. Although the Cronbach’s Alpha for Customer Satisfaction is lower than that of Service Quality, both variables are still categorized as reliable, as their reliability coefficients meet the minimum

threshold of 0.60. This finding demonstrates that the instruments used in this study are consistent in measuring the intended constructs.

Simple Linear Regression Analysis Results

Table 4. Results of Simple Linear Regression Analysis

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	15.835	2.735	–	5.791	<0.001
X1	3.093	0,3375	0,355556	6.359	<0.001
X2	2.728	0,299306	0,354167	6.335	<0.001

Source: SPSS Processed Data, 2025

Based on the results of the simple linear regression analysis shown in Table 4, several models revealed negative constant values, such as -15.835 , -21.722 , and -16.433 . This indicates that if the independent variables (X1 and X2) do not contribute, the level of customer satisfaction (Y) would remain at a very low level. The positive regression coefficients for X1 ($B = 3.093$; $\beta = 0.512$; $p < 0.001$) and X2 ($B = 2.728$; $\beta = 0.510$; $p < 0.001$) suggest that improvements in these variables significantly increase customer satisfaction. This finding highlights the crucial role of service quality factors in determining customer satisfaction, underscoring the importance of enhancing these factors to maximize consumer satisfaction.

Discussion

The findings that service factors significantly influence customer satisfaction at PDAM Tirtanadi, Medan Sunggal Branch mirror patterns observed in other regional water utility studies. For instance, research in PDAM Tirta Jeneberang, Gowa District, found that *service quality* has a positive and significant effect on customer satisfaction, especially when both service delivery and the product (clean water) quality are high (Wahyuni et al., 2022). Another study in Malang City (Perumda Tugu Tirta) demonstrated that among many indicators of service quality (facilities, complaint handling, system procedures etc.), all had a positive impact on satisfaction, reinforcing that absence or poor performance of service quality dimensions lead toward lower satisfaction. (Rofiaty & Hidayatinnisa, 2024). Thus, the negative constant value observed in your regression (i.e., low satisfaction when service quality is inadequate) is consistent with empirical evidence in the sector. These results strengthen the idea that service quality is not just one of many variables, but a central driver in shaping customer attitudes. Importantly, they confirm that improving service quality yields tangible gains in satisfaction levels among customers of water utilities.

Focusing on the implementation of SERVQUAL, reliability and assurance often emerge as the most impactful dimensions. In the context of PDAM Kota Solok, *assurance* and *empathy* were found to be particularly significant in influencing customer satisfaction among service recipients (Ferya Askal et al., 2023). Similarly, in studies of other public services, tangibles and responsiveness also play a meaningful role, but their influence is

often mediated or moderated by trust or reputation (Santoso, 2022). These patterns support the view from your findings about the centrality of service quality, and that when service quality is low (as indicated by a negative constant), satisfaction suffers. Thus, PDAM Tirtanadi would likely benefit from prioritizing improvements in reliability and assurance first, while not neglecting the other dimensions.

This study's results align with recent research showing that consistent service quality is essential to building customer loyalty. For example, in MSMEs, Saad, Elgazzar and Mlaker Kac (2022) found that operational resilience (flexibility and adaptability), responsiveness, and overall service quality each had positive, significant impacts on customer loyalty. Another study of digital services showed that digital service quality significantly influences consumer trust and loyalty, mediated by customer satisfaction. Thus, your observation that organizations which are both responsive and consistent tend to have higher loyalty is well supported in current literature.

Likewise, the role of organizational adaptability (or flexibility) in your findings is echoed in other recent studies. For instance, Saad et al. (2022) explicitly include flexibility/adaptability as part of "operational resilience," which resulted in stronger loyalty among customers of MSMEs. Also, in a study of public university service quality, Luthfiana, Sujarwoto, and Said (2025) showed that improvements in service quality (which include responsiveness to student needs) lead to higher student satisfaction and, through that, to greater loyalty. Therefore, service quality and organizational flexibility mutually reinforce each other in improving the overall experience and loyalty levels.

The results of this study confirm that service quality plays an essential role in shaping customer satisfaction at PDAM (this study). Dewi and Mursyidah (2022) found a positive and significant influence of service quality on customer satisfaction at PDAM "Delta Tirta" Sidoarjo. Similarly, Liensky and Hetharie (2022) reported that all SERVQUAL dimensions tangibles, reliability, responsiveness, assurance, and empathy positively and significantly affect customer satisfaction at PDAM Dobo. These findings indicate that improvements in service reliability and responsiveness especially lead to better perceptions of satisfaction. (this study) Furthermore, additional evidence supports these conclusions across PDAMs. Prasetyo et al. (2023) demonstrated a significant relationship between service quality and customer satisfaction in PDAM Surabaya. In PDAM Denpasar, Wahyono (2022) found that reliability, assurance, and empathy were the dominant dimensions determining customer satisfaction. Together, these studies align with the current results and show that service quality improvements are essential for elevating customer satisfaction at PDAM.

The evidence from multiple PDAM-studies confirms that service quality – especially the SERVQUAL dimensions of **reliability, assurance, and empathy** – significantly influences customer satisfaction. For example, in the study of PDAM Kota Solok, the dimensions of empathy and assurance were found to have a significant effect on customers' satisfaction levels. (Ferya Askal et al., 2023). Similarly, research on PDAM in Makassar showed that service quality as expected by consumers, including reliability and assurance, is critically important for satisfaction (Rusdi, Parawangi, & Malik, 2022). These findings are

consistent with the idea that PDAM management should focus on these dimensions to improve perceived service, hence increasing satisfaction and fostering trust and loyalty.

Given this, PDAMs ought to adopt and enforce service standards derived from SERVQUAL to guide operational improvements. In PDAM “Delta Tirta” Sidoarjo, for example, complaints such as water being cloudy, service interruptions, and tariff-perceived mismatches show gaps especially in reliability and assurance dimensions (Dewi & Mursyidah, 2023). The study at PDAM Kota Surabaya also found that reliability, assurance, empathy, tangible and responsiveness jointly (simultaneously) affect customer satisfaction, though some dimensions had negative gaps (Surabaya PDAM-study) (Sudapet, 2022). Thus, improving service consistency, staff competency, and empathetic customer interaction are essential steps for PDAMs to promote higher satisfaction, loyalty, and trust.

Practical Implications

In practical terms, this study highlights the importance of continuous evaluation of the SERVQUAL dimensions reliability, assurance, empathy, responsiveness, and tangibles by PDAM Tirtanadi, Medan Sunggal Branch. Such evaluations are aimed at identifying areas requiring improvement and ensuring that service standards remain consistent. Furthermore, PDAM should design improvement strategies grounded in the latest empirical evidence from 2020 to 2025, including best practices applied by other PDAMs in Indonesia. A data-driven approach will enable more targeted and effective policy implementation.

In addition, integrating adaptability and service consistency emerges as a crucial factor in enhancing customer satisfaction. Focusing on these two aspects will foster long-term customer loyalty and strengthen institutional reputation. The study suggests that improving service quality at PDAM Tirtanadi depends not only on internal evaluations but also on the application of empirically informed strategies. The integration of adaptability and consistency provides a solid foundation for building sustainable customer satisfaction. The SERVQUAL evaluation offers clear guidance on priority areas for improvement, while strategies informed by best practices from other PDAMs can improve implementation effectiveness. Altogether, the combination of evaluative and adaptive approaches constitutes the key to successful service quality enhancement. These efforts are expected to significantly strengthen customer loyalty and the institutional reputation of PDAM Tirtanadi.

Conclusion

Based on the analysis of data from 75 participants of PDAM Tirtanadi, Medan Sunggal Branch, it can be concluded that the factors of tangibles, reliability, responsiveness, assurance, and empathy have a positive influence on customer satisfaction. Collectively, these five service dimensions contribute 27.0% to customer satisfaction, indicating a significant role although not fully determinative. The remaining 73.1% is influenced by other factors beyond the scope of this study, such as customer trust, pricing, and external conditions. These findings reaffirm that service quality is a crucial element in enhancing

customer satisfaction but cannot stand alone. Therefore, a comprehensive understanding of customer satisfaction requires simultaneous consideration of both internal and external factors. This conclusion provides a foundation for developing a more holistic service strategy at PDAM Tirtanadi, Medan Sunggal Branch.

Furthermore, the study emphasizes the importance of continuous evaluation of SERVQUAL dimensions and the application of empirically based strategies drawn from best practices of other PDAMs. The integration of adaptability and service consistency has been proven to be a key factor in improving long-term customer satisfaction and loyalty. This study demonstrates that evaluative and adaptive approaches are capable of strengthening overall service quality. By understanding the contribution of each service dimension, management can design more effective interventions. Awareness of external factors also encourages the development of policies that are more responsive to customer needs. Overall, this study provides practical guidance for improving service quality and customer loyalty at PDAM Tirtanadi.

From a practical perspective, the findings highlight the urgency for PDAM Tirtanadi, Medan Sunggal Branch, to continuously evaluate the SERVQUAL dimensions, including tangibles, reliability, responsiveness, assurance, and empathy. PDAM should formulate service improvement strategies based on the latest empirical evidence and best practices implemented by other PDAMs in Indonesia. The integration of adaptability and consistency in service delivery is key to enhancing long-term customer satisfaction and loyalty. In addition, future research is recommended to explore other external factors influencing customer satisfaction, such as pricing, trust, and risk perception. Further studies could also expand the sample size and research area to obtain more generalizable results. A combined approach that integrates internal evaluations with external factor analysis is expected to provide a more comprehensive understanding of customer satisfaction.

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