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Determinants of Customer Compliance in Public Water Utilities: The Roles of Service Quality, Corporate Image, And Social Influence

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ABSTRACT: Water is a fundamental resource for human life, public health, and sustainable development. For public water utilities, long-term operational sustainability relies not only on physical infrastructure but also on governance quality and financial capacity, both of which are closely associated with customer compliance. This research examines the role of service quality, corporate image, and social influence in shaping customer compliance among household customers of Perumdam Tirta Darma Ayu. The study adopts a quantitative design using a four-point Likert-scale questionnaire distributed to household customers with a minimum subscription period of one year, selected through purposive sampling. Data were processed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0, encompassing both measurement model and structural model evaluations. The findings show that all constructs meet the required validity and reliability standards. Service quality demonstrates a positive and statistically significant effect on customer compliance (path coefficient = 0.544; p-value = 0.000; f^2 = 0.159). By contrast, corporate image and social influence do not exhibit significant effects. The model explains a limited proportion of variance in customer compliance (R^2 = 0.289) and shows modest predictive relevance (Q^2 = 0.135). Overall, customer compliance appears to be shaped primarily by direct service experiences, particularly those related to staff behavior, service accessibility, and responsiveness. These results suggest that efforts to improve compliance in public water utilities should concentrate on service quality enhancement, including staff capacity building, expanded service access, and more effective communication and customer relationship management systems.

KEYWORDS: customer compliance, service quality, corporate image, social influence, public water utilities, SEM-PLS.

I. INTRODUCTION

Water is a fundamental role in sustaining human life, maintaining ecosystem balance, and supporting social and economic activities. The availability of water in adequate quantity and quality has been widely recognized as a major constraint on socioeconomic development, making its management a strategic issue in sustainable development (Jung et al., 2023; Ejiohuo et al., 2025; Biswas et al., 2025). Therefore access to safe and sustainable drinking water contributes significantly to quality of life, public health, and economic growth and has become a priority within the global development agenda and the Sustainable Development Goals, particularly Goal 6 (Clean Water and Sanitation) in Indonesia (Adiprasetyo & Cahyadinata, 2020).

Globally, drinking water services are predominantly provided by public utilities, which bear social responsibilities while simultaneously being required to maintain economic performance and financial sustainability. The performance of water utilities is determined not only by physical infrastructure but also by the quality of governance and financial management capacity. Weak governance and limited cash flow have been shown to constrain infrastructure maintenance and renewal, thereby reducing service quality, particularly in developing countries (Garrick et al., 2017; Donkor, 2013; Kim et al., 2021). These findings confirm that the sustainability of water utilities depends on achieving a balance among social, economic, and institutional dimensions (Li & Wu, 2024).

One of the key prerequisites for the sustainability of water utilities is customer compliance, which encompasses not only timely bill payment but also behavioral adherence to service regulations. Payment non-compliance undermines cost recovery, weakens cash flow, and constrains investment in infrastructure development and maintenance, thereby increasing the risk of service quality deterioration in the medium and long term (Bakker, 2010; Whittington et al., 2015; Komives et al., 2021). Accordingly, indicators such as the collection ratio and payment timeliness serve as important measures of a water utility's capacity to sustain the continuity of essential public services (Donkor, 2013; Lilian & Barigayomwe, 2024).

In Indonesia, Regional Water Supply Companies (PDAMs) play a strategic role in ensuring equitable and sustainable access to clean water, with their operational sustainability being strongly influenced by levels of customer compliance (Suhaila et al., 2022; Lubis & Dharma, 2024). Customer compliance encompasses both financial and non-financial dimensions, including adherence to regulations prohibiting illegal connections, meter manipulation, and water theft, all of which require standardized and cooperative service interaction processes (Damázio et al., 2024). Within this context, Perumdam Tirta Darma Ayu, as a public water utility operating in a developing-country setting, continues to experience suboptimal customer compliance, which adversely affects cost recovery, increases water losses in the form of non-revenue water, and threatens the long-term sustainability of service operations.

Low customer compliance is influenced not only by economic factors but also by perceived service quality, corporate image, and social influences. Dissatisfaction with service reliability, continuity of supply, staff responsiveness, and the quality of service interactions tends to encourage irregular payment behavior and technical violations of service regulations (Donkor, 2013; Ohwo & Agusomu, 2018; Mohanty & Rout, 2024). Customer-oriented service quality measurement in water utilities serves as an important instrument for identifying service deficiencies and improving operational performance, which in turn shapes customer attitudes and behaviors toward service providers (Vilarinho et al., 2024). Beyond service delivery, perceptions of tariff fairness, trust, and billing system effectiveness play a critical role in influencing customer willingness to comply, rendering sanction-based approaches alone often ineffective (Whittington et al., 2015; Jensen & Chindarkar, 2017; Bui et al., 2022). A weak corporate image can erode trust and weaken customer–provider relationships (Nguyen & Leblanc, 2001), while social influence, manifested through social norms and collective environmental behaviors, also shapes both financial and behavioral compliance tendencies (Cialdini & Goldstein, 2004).

In this context, service quality, corporate image, and social influence have been identified as important determinants of customer compliance. However, empirical studies that integrate these three factors while conceptualizing compliance as both financial and non-financial behavior within the context of public water utilities in developing countries remain limited. Therefore, this study aims to empirically examine the effects of service quality, corporate image, and social influence on customer compliance, using public water utilities in Indonesia as a representative context.

II. RESEARCH METHODS

This research adopts a quantitative design to examine the relationships between service quality, corporate image, social influence, and customer compliance within a public water utility setting. A quantitative approach is appropriate for this study because it allows the testing of causal relationships among latent constructs using structured measurements and inferential statistical techniques (Creswell & Creswell, 2022; Bougie & Sekaran, 2020).

A. Research Model, Variables and Indicators

The proposed research model, illustrated in Figure 1, consists of one endogenous variable, customer compliance, and three exogenous variables, namely service quality, corporate image, and social influence. Each construct is operationalized through a set of indicators derived from relevant theoretical frameworks and empirical studies.

1. Customer Compliance

   Customer compliance encompasses both conscious and unconscious behaviors related to adherence to procedures, rules, and roles established by service providers (Damázio et al., 2024). Such behaviors are reflected in non-deviant attitudes, the absence of service refusal, and customers' willingness to cooperate in supporting service objectives. From this perspective, customer compliance represents a combination of technical compliance, behavioral control, and the quality of interpersonal interactions within service delivery.

   Within water utility services, compliance is manifested through both financial and non-financial behaviors. Financial compliance is primarily reflected in the timely payment of water bills (Jensen & Chindarkar, 2017). Non-financial compliance, on the other hand, relates to adherence to service rules and operational provisions, including water-use restrictions and compliance during service disruptions or specific operational conditions (Hyllestad et al., 2019; Warner et al., 2024).

   In this study, the measurement of customer compliance follows Indramayu Regency Regulation Number 8 of 2019, which distinguishes compliance into transactional and administrative dimensions. Transactional compliance refers to customers' fulfillment of their obligation to pay water bills on time (CC1). Administrative compliance covers adherence to service procedures and requirements (CC2), as well as compliance with prohibitions against technical and administrative violations such as illegal connections, meter manipulation, unauthorized tapping, and unapproved water distribution (CC3). Anchoring

the measurement in this regulatory framework ensures that customer compliance is assessed not only perceptually but also normatively and institutionally.

2. Service Quality

   Service quality is the first exogenous variable and is measured using the SERVQUAL framework, which conceptualizes service quality as a multidimensional construct comprising tangibles, reliability, responsiveness, assurance, and empathy. This model has been extensively applied in the context of public drinking water services to capture customers' evaluations of service performance in both developing and developed countries (Mukokoma & van Dijk, 2011; Damayanti, 2021).

   The tangibles dimension includes indicators related to parking comfort (SQ1), comfort of service and waiting areas (SQ2), staff appearance (SQ3), reliability of payment applications (SQ4), ease of access to digital payment platforms (SQ5), and clarity of service information (SQ6). Reliability is measured through indicators reflecting the appropriateness of service procedures (SQ7), timeliness (SQ8), water quality (SQ9), continuity of water flow (SQ10), accuracy in problem resolution (SQ11), and billing accuracy (SQ12). Responsiveness is captured through the speed of staff responses to complaints (SQ13). Assurance is reflected in staff friendliness and politeness (SQ14), staff competence (SQ15), and transaction security (SQ16). Empathy is assessed through ease of communication with staff (SQ17), accessibility of service offices (SQ18), and ease of contacting staff when needed (SQ19).

   Prior studies consistently show that higher perceived service quality enhances customer satisfaction and trust, which subsequently encourage compliance with service obligations, including timely bill payment (Sualihu et al., 2017; Jensen & Chindarkar, 2019; Vásquez, 2015; Mohanty & Rout, 2024). Improvements in operational service quality, such as supply continuity and system efficiency, have also been associated with higher billing ratios and improved financial performance of water utilities (Murrar et al., 2024).

3. Corporate Image

   Corporate image reflects the collective perception held by the public regarding a service provider's credibility, reliability, and service orientation. These perceptions are formed through customers' direct experiences, service performance evaluations, corporate communication, and media exposure, and play a strategic role in shaping institutional reputation and legitimacy (Fombrun, 2018).

   In brand management literature, corporate image is understood as a multidimensional construct comprising the strength and favorability of brand associations (Keller & Swaminathan, 2020). Strong associations are developed through consistent service delivery and repeated positive exposure, making the organization easily recognizable and perceived as reliable. Favorability, in turn, reflects customers' positive evaluations of these associations, particularly in terms of credibility, service quality, and the organization's concern for its customers (Foroudi et al., 2016).

   In this study, the strength dimension is operationalized through perceptions that the company is a leading clean water service provider (CI1) and that it consistently enforces regulations and sanctions (CI2). Favorability is measured through customers' perceptions of appreciation for compliant behavior (CI3) and the company's reliability in providing clean water services to the community (CI4). Such perceptions are expected to contribute to public trust and customer compliance with service obligations (Ardhana et al., 2024).

4. Social Influence

   Social influence refers to the extent to which individuals' behaviors are shaped by social norms, peer pressure, and observations of others' actions. This influence may occur directly through persuasion or indirectly through social expectations and observational learning (Delamater et al., 2018).

   Social norms operate through descriptive norms, which describe commonly observed behaviors, and injunctive norms, which define socially approved behaviors. Both mechanisms encourage individuals to align their actions with prevailing social standards (Saracevic & Schlegelmilch, 2021; Ramli, 2021). Peer pressure further shapes behavior when individuals adjust their actions to maintain social acceptance, while observational learning becomes particularly salient in uncertain situations, such as when new customers follow the compliance patterns of existing users.

   In this study, social influence is measured through perceptions that regulatory compliance represents a shared moral obligation (SI1), the presence of social pressure or sanctions against rule violations (SI2), and customers' tendencies to comply when observing similar behavior in their community (SI3). Social influence is therefore conceptualized as a non-financial mechanism that may contribute to sustainable customer compliance (Lilian & Barigayomwe, 2024; Jang & Lee, 2021).

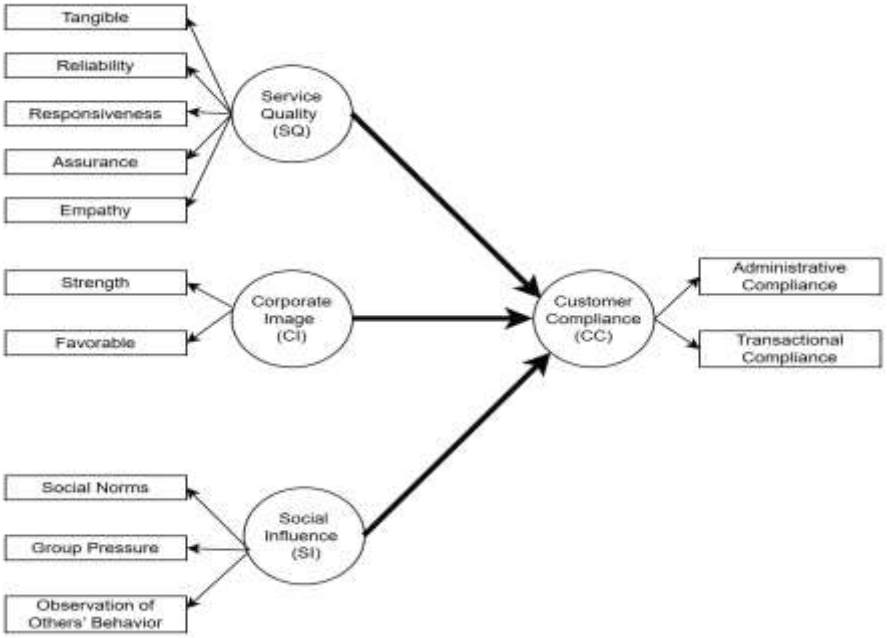

Figure 1. Research Model

Based on this conceptual framework and prior empirical evidence, the following hypotheses are formulated:

- **H1:** Service quality has a positive and significant effect on customer compliance.
- **H2:** Corporate image has a positive and significant effect on customer compliance.
- **H3:** Social influence has a positive and significant effect on customer compliance.

B. Data Collection Tehniques

Data were collected through a structured questionnaire employing a four-point Likert scale ranging from Strongly Disagree to Strongly Agree (Joshi et al., 2015). The respondents consisted of household customers of Perumdam Tirta Darma Ayu with a minimum subscription period of one year. Purposive sampling was applied to ensure that respondents possessed sufficient experience with the service to provide informed evaluations (Etikan et al., 2015). The required sample size was determined using power analysis with G*Power to ensure adequate statistical power for hypothesis testing (Faul et al., 2009; Hair et al., 2022).

C. Data Processing Method

Data analysis was conducted using Partial Least Squares–Structural Equation Modeling (PLS-SEM), which is suitable for predictive research involving complex models and does not require strict assumptions of data normality (Hair et al., 2022). This method is particularly appropriate for applied research in the water utility sector, where structural complexity and field data limitations are common (Sarstedt et al., 2021).

The analysis followed two main stages. First, the measurement model was evaluated to assess convergent validity, reliability, and discriminant validity using outer loadings, Average Variance Extracted (AVE), Composite Reliability, Cronbach's Alpha, and the Heterotrait–Monotrait Ratio (HTMT). Second, the structural model was assessed through collinearity testing using Variance Inflation Factor (VIF) values, hypothesis testing via bootstrapping procedures, and evaluation of explanatory power (R^2), effect size (f^2), and predictive relevance (Q^2).

III. RESULT AND DISCUSSION

This study employs the SEM-PLS method using SmartPLS 4.0 to analyze the effects of Service Quality, Corporate Image, and Social Influence on Customer Compliance among customers of Perumdam Tirta Darma Ayu. The SEM-PLS analysis begins with the evaluation of the measurement model (outer model). The outer model is assessed through tests of convergent validity, reliability, and discriminant validity. This evaluation aims to ensure that the indicators used are valid and reliable in measuring the latent constructs under study. In other words, this stage confirms that the research instrument is appropriate, consistent, and suitable for use prior to analyzing the relationships among variables.

The results of the convergent validity assessment are presented in Table 1. Table 1 summarizes the convergent validity results based on outer loading values and Average Variance Extracted (AVE). All indicators across the four constructs exhibit outer loading

values of ≥ 0.40 and AVE values greater than 0.50. These results indicate that each indicator adequately represents the latent construct it is intended to measure (Hair et al., 2022).

The Service Quality construct comprises the largest number of indicators (20) and exhibits a relatively high and consistent range of outer loading values. This finding indicates that service quality is perceived by customers as a complex and multidimensional construct. The Customer Compliance construct also demonstrates strong measurement properties, as reflected by the highest AVE value (0.680), indicating that customer compliance is robustly measured through its indicators.

The results of the construct reliability assessment are presented in Table 2. Table 2 summarizes the reliability test results based on Cronbach's Alpha and Composite Reliability values. All constructs exhibit Composite Reliability values above 0.70, indicating that they meet the reliability criteria (Hair et al., 2022). The Service Quality construct demonstrates the highest reliability, suggesting that customers' perceptions of service quality are highly consistent. The Social Influence construct records the lowest Cronbach's Alpha value; however, it still falls within acceptable limits. This result suggests that social influence is comparatively weaker and less stable than the other constructs included in the model.

Table 1. Convergent Validity Test (Outer Loading and AVE)

Construct	Indikator	Outer Loading	AVE	Validity
Service Quality (SQ)	SQ1–SQ20	0,612 – 0,826	0,552	Valid
Corporate Image (CI)	CI1	0,837	0,673	Valid
	CI2	0,781		
	CI3	0,817		
	CI4	0,845		
Social Influence (SI)	SI1	0,854	0,561	Valid
	SI2	0,407		
	SI3	0,888		
Customer Compliance (CC)	CC1	0,839	0,680	Valid
	CC2	0,845		
	CC3	0,789		

Tabel 2. Construct Reliability Test

Construct	Cronbach's Alpha	Composite Reliability (ρa)	Composite Reliability (ρc)	Reliability
Service Quality	0,957	0,960	0,961	Reliabel
Corporate Image	0,839	0,843	0,892	Reliabel
Social Influence	0,622	0,752	0,778	Reliabel
Customer Compliance	0,764	0,768	0,864	Reliabel

Table 3 presents the results of the discriminant validity assessment. The table shows that all Heterotrait–Monotrait (HTMT) values are below the 0.90 threshold, indicating that each construct satisfies the discriminant validity criteria (Hair et al., 2022). These results confirm that Service Quality, Corporate Image, Social Influence, and Customer Compliance are empirically distinct constructs and do not measure the same concept or overlap with one another. Therefore, the measurement model is deemed valid and suitable for further analysis at the structural model stage.

Tabel 3. Uji Validitas Diskriminan (HTMT)

Construct Fair	HTMT Score	Validity
SQ – CC	< 0,90	Valid
CI – CC	< 0,90	Valid
SI – CC	< 0,90	Valid

After the outer model met the required criteria, the analysis proceeded with the evaluation of the structural model (inner model). The structural model evaluation was conducted to assess the relationships among latent variables through tests of

multicollinearity, path significance, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). This evaluation enabled the assessment of the strength, significance, and predictive capability of the research model.

Table 4 presents the results of the collinearity assessment. The table indicates that the Variance Inflation Factor (VIF) values for all structural paths are below the threshold of 5, suggesting the absence of multicollinearity issues (Hair et al., 2022). These results indicate that Service Quality, Corporate Image, and Social Influence are independent constructs, each contributing uniquely to the explanation of customer compliance.

Tabel 4. Collinearity Test

Jalur	VIF	Collinearity
SQ → CC	2,535	No collinearity
CI → CC	2,884	No collinearity
SI → CC	1,464	No collinearity

Table 5 presents the results of the path significance test obtained through the bootstrapping procedure, while Figure 2 illustrates the relationships among the latent variables. According to Hair et al. (2022), a relationship is considered statistically significant when the p-value is below the threshold of 0.05. Conversely, when the p-value exceeds this threshold, the relationship is regarded as statistically insignificant, and the corresponding hypothesis cannot be supported. The results indicate that only the Service Quality → Customer Compliance path is statistically significant, with a p-value below 0.05 and a path coefficient of 0.544. This finding demonstrates that service quality has a positive and moderately strong effect on customer compliance. Accordingly, Hypothesis H1 is accepted.

In contrast, the Corporate Image → Customer Compliance (p-value = 0.248) and Social Influence → Customer Compliance (p-value = 0.371) paths do not exhibit statistically significant effects. Therefore, Hypotheses H2 and H3 are rejected. These results suggest that customer compliance is primarily driven by direct service experiences rather than by corporate image or social pressure and norms.

Tabel 5. Path Significance Test (Bootstrapping)

Hypothesis	Path	p-value	Conclusion
H1	Service Quality → Customer Compliance	0,000	Diterima
H2	Corporate Image → Customer Compliance	0,248	Ditolak
H3	Social Influence → Customer Compliance	0,371	Ditolak

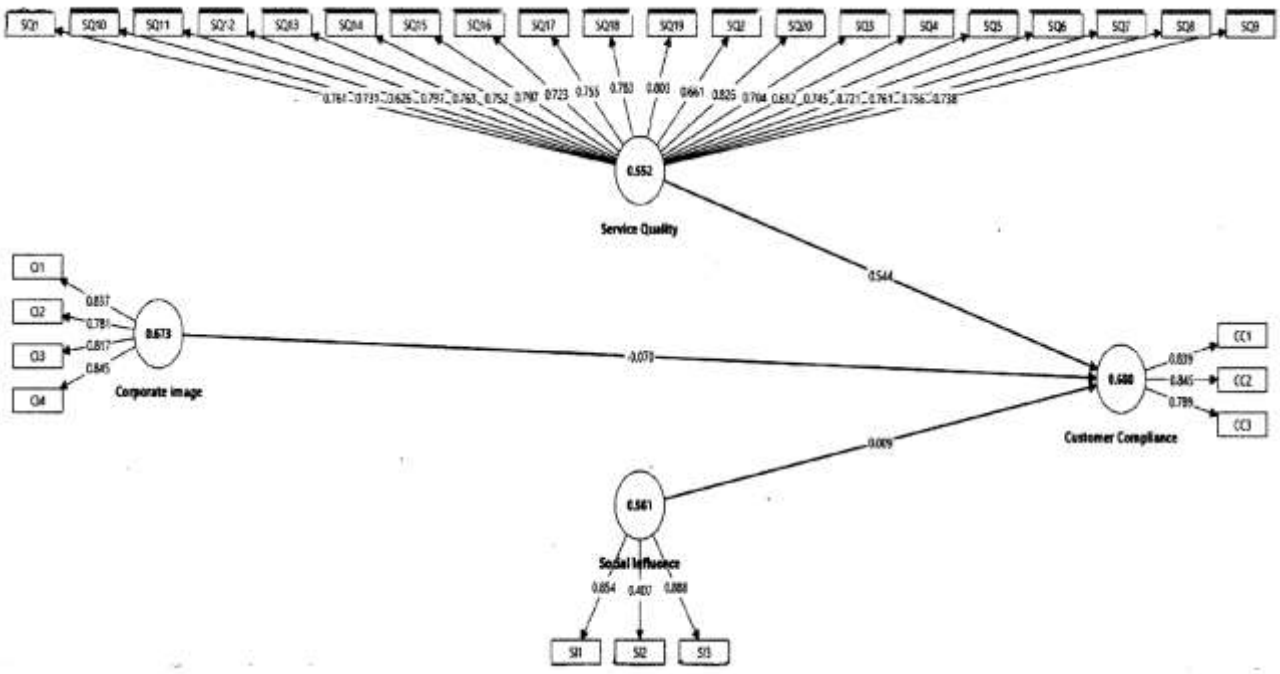

Figure 2. Influence between latent variables

Table 6 presents the coefficient of determination (R^2) for the endogenous construct of Customer Compliance, which is 0.289. According to Hair et al. (2022), an R^2 value below 0.50 is considered weak. This result indicates that the research model explains only 28.9% of the variance in customer compliance, while the remaining variation is attributable to factors outside the model, such as household economic conditions, tariff policies, billing systems, and customers' psychological characteristics. These findings suggest that customer compliance is a complex phenomenon that cannot be fully explained by only three explanatory variables.

Tabel 6. Koefisien Determinasi (R^2)

Konstruk Endogen	R^2	Kategori
Customer Compliance	0,289	Lemah

The effect size (f^2) test results in Table 7 confirm previous findings. The Service Quality → Customer Compliance path has an f^2 value of 0.159, which is in the moderate category, indicating that service quality makes a significant contribution to shaping customer compliance. Meanwhile, Corporate Image ($f^2 = 0.004$) and Social Influence ($f^2 = 0.001$) have very small contributions and are practically insignificant in shaping customer compliance in the context of this study. According to Hair et al. (2022), an f^2 value of less than 0.02 indicates no influence of exogenous latent variables on endogenous latent variables.

Tabel 7. Effect Size

Jalur	f^2	Kategori
SQ → CC	0,159	Sedang
CI → CC	0,004	Sangat kecil
SI → CC	0,001	Sangat kecil

Table 8 reports a positive predictive relevance (Q^2) value of 0.135. This result indicates that the model possesses predictive relevance, as Q^2 values greater than zero suggest predictive capability (Hair et al., 2022); however, its predictive power remains weak. In other words, the model's limited ability to predict customer compliance highlights the need for further model development through the inclusion of additional explanatory variables to enhance its predictive performance.

Tabel 8. Predictive Relevance (Q^2)

Konstruk	Q^2	RMSE	MAE
Customer Compliance	0,135	0,957	0,647

The dominant influence of Service Quality indicates that customer compliance is largely practical in nature and driven by direct service experiences. Customers tend to demonstrate higher compliance when the services they receive are perceived as easy, comfortable, and supportive. This finding is reinforced by several Service Quality indicators with high outer loading values, namely SQ15 (friendly and polite staff in serving customers) with an outer loading of 0.797, SQ19 (easy-to-reach or strategically located service offices) with an outer loading of 0.803, and SQ20 (ease of contacting staff) with an outer loading of 0.826. These indicators are closely associated with everyday service interactions and customer convenience.

Friendly, polite, and professional staff at Perumdam Tirta Darma Ayu make customers feel valued and comfortable. Such experiences tend to foster customer cooperation, including timely bill payment. From a managerial perspective, strengthening staff communication skills and service ethics through continuous training remains a priority. Service accessibility also plays a decisive role in shaping compliance. Customers require not only the willingness to comply but also the practical means to do so. When service locations are difficult to access, additional time and financial costs may arise, increasing the likelihood of payment delays. Expanding service points or introducing mobile service units therefore offers a practical approach to improving compliance.Responsiveness further shapes customer perceptions. Staff who are easy to contact and able to respond promptly can help prevent dissatisfaction from accumulating and translating into non-compliance. In this regard, the adoption of a Customer Relationship Management (CRM) system can support more structured handling of customer communications and complaints. Overall, these findings indicate that customer compliance is closely linked to perceived ease of access, convenience, and the quality of service interactions.

The absence of a significant effect of corporate image suggests that reputation alone is insufficient to drive customer compliance. In public service settings such as regional water utilities, which operate under monopolistic or semi-monopolistic

conditions, customers have limited alternatives. As a result, compliance behavior is less responsive to variations in corporate image, whether positive or negative.

The insignificant role of social influence indicates that decisions related to water bill payment are largely individual rather than socially driven. Customers tend to perceive bill payment as a personal responsibility, which reduces the effectiveness of strategies relying solely on social pressure or normative messaging. Without parallel improvements in service quality, such approaches are unlikely to produce substantial changes in compliance behavior.

Based on the research findings, strategies to enhance customer compliance should prioritize improvements in service quality at Perumdam Tirta Darma Ayu, particularly in the following areas:

1. Enhancing staff attitudes and competencies (SQ15) through training in communication skills and service ethics.
2. Expanding service accessibility (SQ19) by establishing additional service points or providing mobile service units.
3. Improving responsiveness and ease of communication (SQ20) through the optimization of digital service channels and the implementation of a Customer Relationship Management (CRM) system.

Conversely, initiatives aimed at improving corporate image and leveraging social influence should be positioned as supporting measures rather than primary strategies for increasing customer compliance.

IV. CONCLUSIONS

The findings demonstrate that customer compliance at Perumdam Tirta Darma Ayu is primarily shaped by direct service experiences, particularly those related to accessibility, staff behavior, and responsiveness. In contrast, corporate image and social influence play only a secondary role in this context. Although the model exhibits limited explanatory and predictive power, the results highlight the practical importance of service-oriented strategies in strengthening compliance within public water utilities.

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