

BUILDING CUSTOMER LOYALTY THROUGH PRODUCT QUALITY AND DIGITAL TOUCHPOINTS : THE MEDIATING ROLE OF BRAND IMAGE

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Abstract

This study examines the effects of product quality and digital touchpoints on customer loyalty through brand image in the Water Quality Monitoring System (WQMS) market of PT Buana Biru Teknindo. A quantitative, causal-associative, and cross-sectional survey was conducted involving 65 institutional customer companies, with three respondents from each organization, resulting in 195 valid responses. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 and 5,000 bootstrap subsamples. The results show that product quality and digital touchpoints significantly strengthen brand image, while product quality and brand image significantly enhance customer loyalty. However, digital touchpoints do not directly affect customer loyalty. Brand image partially mediates the relationship between product quality and customer loyalty and provides indirect-only mediation between digital touchpoints and customer loyalty. The model explains 30.1% of the variance in brand image and 37.3% of customer loyalty. These findings indicate that technical product reliability can generate loyalty directly, whereas digital interactions create loyalty primarily when they strengthen a credible, consistent, and technically trustworthy brand image.

Keywords: brand image; customer loyalty; digital touchpoints; product quality; water quality monitoring system

1. INTRODUCTION

Environmental compliance increasingly requires organizations to generate accurate, continuous, and credible information regarding their environmental performance. In industries where wastewater discharge and environmental monitoring are operational and regulatory concerns, a Water Quality Monitoring System (WQMS) represents more than a stand-alone technological product. It constitutes an integrated monitoring solution whose effectiveness depends on equipment performance, sensor reliability, data continuity, calibration, maintenance, system integration, technical support, and the ability to provide information that customers can rely on for operational and compliance purposes. Consequently, customers purchasing WQMS solutions operate in a relatively high-

involvement business-to-business (B2B) environment where supplier selection carries technical, operational, financial, and reputational consequences.

In such a context, customer loyalty becomes strategically important because the value of a supplier relationship extends beyond an initial equipment transaction. Institutional customers may demonstrate loyalty through repeated purchases, contract renewals, supplier preference, recommendations, and continued commitment to a vendor for maintenance, calibration, system expansion, or technical support. Contemporary B2B loyalty research emphasizes that loyalty in organizational markets is multidimensional and develops through accumulated evaluations of supplier performance, relationship quality, and value creation rather than through isolated transactions (Kittur & Chatterjee, 2020). The broader B2B loyalty literature similarly indicates that understanding the mechanisms through which organizational buyers maintain supplier relationships remains an important research area because industrial loyalty is embedded in complex relational and risk considerations.

This issue is particularly relevant to PT Buana Biru Teknindo, the focal supplier examined in this study. Company-related data reported in the source study indicate that the repeat-purchase level was 42.3%, the Net Promoter Score (NPS) was 18, and the contract-renewal rate reached 54.9%. These figures indicate that customer adoption of WQMS solutions has not automatically translated into consistently strong long-term commitment. A customer may purchase and operate the system successfully while remaining open to alternative suppliers when future purchases, maintenance contracts, upgrades, or renewals occur. Thus, the managerial challenge is not simply how to secure an initial WQMS sale, but how technical performance and subsequent customer interactions can be converted into a credible brand perception that supports continuing loyalty.

One fundamental antecedent is product quality. In the present study, product quality reflects performance, reliability, conformance to specifications, durability, and serviceability. These attributes are particularly important for WQMS because failure or inconsistency can disrupt monitoring activities and undermine confidence in the information generated by the system. Customers are therefore likely to evaluate the product not only by whether the system functions at installation but also by whether it continues to operate reliably, produces stable measurements, meets required specifications, can be maintained effectively, and is supported when technical difficulties arise.

Contemporary branding research reinforces the role of perceived quality in developing long-term brand responses. Akoglu and Özbek (2022) demonstrate that perceived quality forms an important component of the process through which brand experiences translate into loyalty. More generally, perceived quality provides customers with evidence regarding a supplier's ability to consistently deliver expected value, thereby strengthening confidence in the brand and the likelihood of continued patronage. In a high-risk technical B2B market, this mechanism may be even more consequential because product performance reduces

uncertainty regarding the operational consequences of maintaining the relationship with the supplier.

Quality can also shape brand image. Unlike a purely promotional interpretation of branding, industrial buyers frequently construct brand perceptions from accumulated evidence regarding technical competence, reliability, service behavior, and organizational credibility. B2B research shows that goods-related and service-related brand images both contribute to customer responses and loyalty, demonstrating that organizational buyers incorporate tangible performance as well as service experiences when interpreting a supplier's brand (Kittur & Chatterjee, 2020). Balmer et al. (2020) similarly demonstrate that corporate brand image has strategic significance in B2B relationships and can influence brand retention and managerial evaluations of industrial suppliers.

For PT Buana Biru Teknindo, brand image is therefore particularly important because WQMS customers do not merely purchase equipment; they also rely on the supplier's perceived capability to sustain a technically and institutionally credible monitoring solution. Consistent with the original instrument, brand image in this study incorporates company image, product image, user image, regulatory credibility, and technical sustainability. This operationalization makes brand image an integrative evaluation through which customers interpret both tangible product performance and the supplier's broader credibility.

The relevance of sustainability-oriented brand meaning is also supported by contemporary B2B research. Vesal et al. (2021) demonstrate that environmental sustainability can strengthen B2B brand image and that customer relationship management reinforces the process through which sustainability-related signals are translated into market outcomes. Their findings are particularly relevant to environmental technology suppliers because they demonstrate that organizational buyers can treat environmental and sustainability characteristics as meaningful signals of supplier credibility rather than merely as peripheral corporate communication. Consequently, for a WQMS supplier, regulatory credibility and technical sustainability can form part of the brand's functional meaning in the customer's decision process.

Alongside product quality, the rapid digitalization of B2B relationships has increased the importance of digital touchpoints. Business customers increasingly interact with suppliers through websites, customer portals, messaging platforms, remote technical support, digital documentation, dashboards, e-mail, social media, and other technology-enabled interfaces. B2B customer journeys are therefore no longer confined to sales visits and physical service encounters. Rusthollikarhu et al. (2022) show that B2B customer journeys increasingly occur in digital environments and require firms to analyze, design, engage, and guide customers across increasingly complex interactions. Lundin and Kindström (2023) likewise demonstrate that digitalization changes B2B customer journeys

by adding or transforming touchpoints, altering customer and supplier roles, and extending digital support across the overall journey.

In this study, digital touchpoints encompass digital interactivity, responsiveness, cross-channel integration, digital after-sales support, and value co-creation. These characteristics are highly relevant after a WQMS has been installed. Customers may require calibration records, service tickets, troubleshooting assistance, system documentation, remote support, certificates, monitoring information, or communication regarding maintenance. The quality of these digital interactions can therefore become part of the customer's evaluation of the supplier.

However, the existence of more digital contact does not automatically imply stronger customer loyalty. Krings et al. (2021) show that although digital media have become increasingly important in B2B marketing and business development, the relationship between digital-media use and performance outcomes remains contingent on appropriate integration with marketing and sales processes. Similarly, Terho et al. (2022) emphasize that effective digital content marketing in business markets requires customer-centric activities that are aligned with different phases of the customer journey rather than indiscriminate increases in digital communication.

More recent evidence provides an even more specific explanation. Lundin and Kindström (2024) identify supplier capabilities required to manage digitalized B2B touchpoints and emphasize consistency, sequencing, resource integration, and seamless transitions between interactions. Thus, a website, customer portal, messaging service, remote assistance platform, or digital after-sales system has limited strategic value when these touchpoints produce fragmented information or inconsistent experiences. Their value emerges when they jointly support an attractive and coherent B2B customer journey.

Research on cross-channel integration also supports this mechanism. Chung et al. (2022) show that perceived channel integration affects customer experience, which subsequently influences behavioral responses. Although their empirical context differs from the present industrial setting, the underlying implication is relevant: integration between touchpoints can shape the customer's broader evaluation of the brand and service experience rather than operating merely as an isolated communication function. This suggests that digital touchpoints may influence WQMS customer loyalty not only directly, but also indirectly by strengthening perceptions of supplier competence, accessibility, integration, and credibility.

This reasoning places brand image as the central mediating mechanism in the proposed model. Contemporary customer-experience research conceptualizes customer experience as emerging across multiple interactions and touchpoints rather than from one isolated encounter (Becker & Jaakkola, 2020). Accumulated experiences can consequently become organized into broader judgments about the firm and its brand. In the WQMS context, product reliability may strengthen perceptions that the supplier is technically competent,

while responsive digital support may signal accessibility and commitment. Consistency between product performance and digital service can therefore produce a more credible brand image, which may ultimately determine whether customers renew contracts, recommend the supplier, or maintain their relationship.

Recent B2B branding evidence provides direct support for the importance of such a mechanism. Balmer et al. (2020) demonstrate that industrial corporate brand image materially influences how managers evaluate and retain B2B brands, while Kittur and Chatterjee (2020) show that both goods- and service-related brand images are associated with B2B customer loyalty. Brand image therefore provides a conceptual bridge between objective or experiential evidence surrounding a supplier and the customer's subsequent relationship response.

The proposed relationships can additionally be interpreted through a contemporary application of the Stimulus-Organism-Response (S-O-R) perspective. In this logic, external or experiential stimuli affect an internal evaluative state, which subsequently shapes behavioral responses. Recent digital-marketing research continues to apply this framework to explain how digital stimuli generate internal perceptions and subsequent customer engagement or behavioral outcomes (Aslam & de Luna, 2021; Filipovic & Arslanagic-Kalajdzic, 2023). In the present model, product quality and digital touchpoints represent the stimuli, brand image represents the customer's organismic or evaluative state, and customer loyalty represents the relational response.

Despite these theoretical developments, several research gaps remain. First, much of the literature examining product quality, digital customer experience, brand image, and loyalty continues to focus on consumer markets, retailing, sports brands, telecommunications, and other relatively high-frequency consumption environments. Although research has established the strategic importance of brand image in B2B markets, the mechanisms linking tangible technical performance, digitally enabled supplier interactions, and loyalty remain less developed in specialized industrial compliance contexts. B2B customer-journey research itself remains comparatively underexplored, particularly regarding the capabilities required to manage digitalized touchpoints (Lundin & Kindström, 2024).

Second, product quality and digital interaction represent fundamentally different types of customer evidence. Product quality is predominantly grounded in the technical performance of the offering, whereas digital touchpoints represent the interactive and relational experience surrounding that offering. Treating both as simultaneous antecedents makes it possible to compare whether customer loyalty in a technical B2B environment is driven more strongly by reliable product performance or by technology-enabled customer interaction.

Third, prior research does not establish that digital interaction necessarily translates directly into loyalty. The digital B2B literature instead emphasizes integration, customer relevance, journey management, and the ability to transform digital contact into meaningful customer value (Krings et al., 2021; Rusthollikarhu et al., 2022; Terho et al., 2022). This creates a specific theoretical question: Do digital touchpoints independently generate loyalty, or do they primarily become valuable when they strengthen the customer's image of the supplier?

The present study addresses these gaps by examining customer loyalty among institutional users of PT Buana Biru Teknindo's WQMS solutions. The original study covers customer organizations from manufacturing, mining, government environmental agencies, water treatment or municipal water companies, and oil and gas, thereby situating the model within an explicitly organizational and technically intensive market. The study integrates product quality, digital touchpoints, brand image, and customer loyalty within one structural model and examines seven direct and mediated relationships. Its central contribution lies in comparing two potential routes to loyalty: a technical-quality route, in which reliable product performance can directly and indirectly strengthen loyalty, and a digital-image route, in which digitally enabled customer interactions may require favorable brand-image formation before they translate into long-term commitment.

From a managerial perspective, this distinction is consequential. If product quality creates loyalty directly, management must continue prioritizing system reliability, conformance, durability, and serviceability. If digital touchpoints operate primarily through brand image, simply increasing the number of digital platforms or customer contacts may be ineffective. Digital after-sales support, cross-channel integration, responsiveness, and value co-creation would instead need to communicate and reinforce a coherent image of technical competence, regulatory credibility, and long-term dependability. The study therefore seeks to explain not merely whether technical and digital investments matter, but how they are converted into customer loyalty.

2. RESEARCH METHOD

This study employed a quantitative, causal-associative, and cross-sectional survey design to examine the relationships among product quality, digital touchpoints, brand image, and customer loyalty. The organizational population consisted of 65 institutional customers of PT Buana Biru Teknindo that had actively used a Water Quality Monitoring System (WQMS) at least once during 2023–2025. All 65 customer companies were included through a census approach. Within each organization, respondents were purposively selected to represent three relevant roles: a company leader, an HSE manager, and a field user, resulting in 195 completed questionnaires.

The participating organizations represented several WQMS user sectors: manufacturing comprised 26 companies (40.0%), mining 19 companies (29.2%),

government environmental agencies 13 companies (20.0%), water treatment or municipal water companies four companies (6.2%), and oil and gas three companies (4.6%). The three respondent roles were selected because they provide complementary managerial, environmental-compliance, and operational perspectives regarding WQMS product performance, digital service interactions, supplier image, and customer loyalty.

Primary data were collected using a structured questionnaire measured on a five-point Likert scale. Product quality was operationalized through performance, reliability, conformance to specifications, durability, and serviceability. Digital touchpoints comprised digital interactivity, responsiveness, cross-channel integration, digital after-sales support, and value co-creation. Brand image included company image, product image, user image, regulatory credibility, and technical sustainability, while customer loyalty was represented by repeat purchase, recommendation, preference, and commitment. The construct operationalization is summarized in Table 1.

Table 1. Construct Operationalization

Construct	Dimensions
Product quality	Performance; reliability; conformance; durability; serviceability
Digital touchpoints	Interactivity; responsiveness; cross-channel integration; digital after-sales support; value co-creation
Brand image	Company image; product image; user image; regulatory credibility; technical sustainability
Customer loyalty	Repeat purchase; recommendation; preference; commitment

Source: Proceed Data, 2026

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. PLS-SEM enables the simultaneous assessment of relationships among latent constructs, including direct and mediating effects, and contemporary methodological literature recommends evaluating measurement and structural models systematically rather than relying on individual fit or reliability statistics (Hair et al., 2019; Sarstedt et al., 2022).

The analysis consisted of two stages. First, the reflective measurement model was evaluated using indicator loadings, Cronbach's alpha, rho_A, composite reliability (CR), average variance extracted (AVE), and the heterotrait-monotrait ratio (HTMT). Indicator loadings and reliability coefficients were used to assess indicator reliability and internal consistency, AVE was used to evaluate convergent validity, and HTMT was used to determine discriminant validity. Current PLS-SEM guidance emphasizes the joint evaluation of these criteria to establish adequate construct measurement before interpreting structural relationships (Hair et al., 2019; Sarstedt et al., 2022).

Second, the structural model was evaluated using variance inflation factors (VIF), coefficients of determination (R^2), effect sizes (f^2), structural-model fit indicators, path coefficients, and specific indirect effects. The seven hypotheses comprised five direct relationships and two mediation relationships. Statistical significance was evaluated through two-tailed bootstrapping with 5,000 subsamples at $\alpha = .05$, as specified in the original analysis. Bootstrapping provides resampling-based inference for structural coefficients and indirect effects and is consistent with current PLS-SEM reporting practice (Sarstedt et al., 2022).

The mediating role of brand image was assessed through the specific indirect effects of product quality and digital touchpoints on customer loyalty. The significance of the indirect effect was considered together with the corresponding direct effect to determine whether the mediation pattern represented partial or indirect-only mediation. This approach avoids interpreting mediation solely from a sequence of individual direct-path significance tests.

Because all principal constructs were collected through the same questionnaire, common method variance remains a methodological consideration. Contemporary research cautions that common-source data can affect estimated associations and that conventional post hoc tests alone cannot conclusively eliminate this concern (Baumgartner & Weijters, 2021).

A further limitation arises from the nested respondent structure. Although the dataset contained 195 observations, these responses originated from 65 organizations with three respondents within each company. The source study did not report within-company agreement testing, data aggregation, cluster-robust inference, or multilevel modeling. Clustered observations may violate the conventional assumption of complete independence because respondents belonging to the same organization can share common organizational conditions; multilevel approaches are designed to address such dependence explicitly (Rappaport et al., 2020). Therefore, the respondent-level PLS-SEM estimates are retained as reported in the original study, but their statistical precision and organizational-level generalizability should be interpreted cautiously.

No mathematical equations were required because the hypothesized direct and indirect relationships were estimated directly through SmartPLS 4. Accordingly, the template requirement concerning equation numbering is not applicable to this study.

3. RESULTS AND DISCUSSION

Results

a. Measurement Model

The measurement-model assessment demonstrated satisfactory psychometric properties for the four constructs: product quality, digital touchpoints, brand image, and customer loyalty. All indicator loadings were statistically significant at $p < .001$. Most

indicator loadings exceeded .70, with the exception of DTP5 (.696). This indicator was retained because its loading was very close to the recommended benchmark and its removal did not materially improve either reliability or average variance extracted (AVE). Retaining the indicator also preserved the conceptual coverage of digital value co-creation within the digital-touchpoint construct.

Convergent validity was supported because AVE values ranged from .578 to .664, indicating that the constructs explained an adequate proportion of the variance in their respective indicators. Internal consistency was also satisfactory. Cronbach's alpha ranged from .818 to .867, rho_A from .828 to .875, and composite reliability from .872 to .904. Unlike excessively high reliability coefficients that may indicate redundant measurement items, these values indicate strong internal consistency while retaining sufficient variation among indicators.

Discriminant validity was supported by the heterotrait-monotrait ratio (HTMT), which ranged from .270 to .668 and remained substantially below .90. Therefore, product quality, digital touchpoints, brand image, and customer loyalty were empirically distinguishable constructs. The results provide an adequate basis for evaluating the structural relationships among the variables.

Table 2. Measurement Model Summary

Construct	Loading Range	Cronbach's Alpha	rho_A	CR	AVE
Product quality	.771-.841	.867	.875	.904	.653
Digital touchpoints	.696-.796	.818	.828	.872	.578
Brand image	.784-.816	.861	.864	.900	.643
Customer loyalty	.781-.837	.832	.839	.888	.664

Note. CR = composite reliability; AVE = average variance extracted. All loadings were significant at $p < .001$.

Source: Proceed Data, 2026

The measurement results are particularly useful because the study combines tangible technical evaluations with relational and digital evaluations. Contemporary customer-experience research emphasizes that customer responses develop across different touchpoints, contexts, and experiential qualities rather than being reducible to a single interaction (De Keyser et al., 2020). In B2B markets, this distinction becomes especially important because customer journeys involve multiple buying and usage-center members whose evaluations may develop over extended periods (Purmonen et al., 2023).

b. Structural Model

Structural VIF values ranged from 1.059 to 1.431, indicating that predictor collinearity did not present a material problem. Product quality and digital touchpoints jointly explained 30.1% of the variance in brand image ($R^2 = .301$; adjusted $R^2 = .294$). Product quality, digital

touchpoints, and brand image jointly explained 37.3% of customer loyalty ($R^2 = .373$; adjusted $R^2 = .363$)

Table 3. Structural Model Summary

Endogenous Construct	R^2	Adjusted R^2	Interpretation
Brand image	.301	.294	Moderate
Customer loyalty	.373	.363	Moderate

Note. SRMR = .065; NFI = .831; structural VIF range = 1.059-1.431.

Source: Proceed Data, 2026

The SRMR value of .065 provided supplementary evidence that the estimated model was reasonably consistent with the observed data. NFI was .831. These global indices were treated as supporting information rather than substitutes for the interpretation of measurement quality, explanatory power, effect sizes, and structural coefficients.

The effect-size analysis provides further insight into the relative importance of each relationship. Brand image $\rightarrow$ customer loyalty produced the largest effect size ($f^2 = .213$), followed by digital touchpoints $\rightarrow$ brand image (.193), product quality $\rightarrow$ brand image (.137), product quality $\rightarrow$ customer loyalty (.056), and digital touchpoints $\rightarrow$ customer loyalty (.015). Thus, digital interaction contributed meaningfully to customers' perceptions of the supplier but contributed little additional explanatory power to loyalty once brand image and product quality were included.

This distinction is consistent with emerging digital-servitization research. Digital technologies and services generate value when customers recognize improvements in information access, transparency, support, or broader value delivery; digital capability by itself is not equivalent to customer value (Simonsson & Agarwal, 2021; Raddats et al., 2022).

c. Hypothesis Testing

Table 4. Direct and Indirect Effects

Hypothesis and Path	β	t	p	Decision
H1: Product quality $\rightarrow$ Brand image	.319	5.517	< .001	Supported
H2: Digital touchpoints $\rightarrow$ Brand image	.378	6.800	< .001	Supported
H3: Product quality $\rightarrow$ Customer loyalty	.206	3.275	.001	Supported
H4: Digital touchpoints $\rightarrow$ Customer loyalty	.109	1.593	.111	Not supported
H5: Brand image $\rightarrow$ Customer loyalty	.437	6.614	< .001	Supported
H6: Product quality $\rightarrow$ Brand image $\rightarrow$ Customer loyalty	.139	4.258	< .001	Supported
H7: Digital touchpoints $\rightarrow$ Brand image $\rightarrow$ Customer loyalty	.165	4.369	< .001	Supported

Note. Two-tailed bootstrapping with 5,000 subsamples.

Source: Proceed Data, 2026

Six of the seven hypotheses were supported. Importantly, digital touchpoints significantly improved brand image but did not directly improve customer loyalty. Conversely, product quality produced significant direct effects on both brand image and customer loyalty. Brand image emerged as the strongest direct predictor of loyalty.

Discussion

Product Quality and Brand Image

Product quality had a positive and significant effect on brand image ($\beta = .319$; $p < .001$), supporting H1. The result indicates that customers' assessments of technical product performance contribute to their broader perception of PT Buana Biru Teknindo as a supplier. Reliability was the strongest product-quality indicator, with a loading of .841.

This finding is particularly important in the WQMS context. Product quality is not limited to cosmetic characteristics or general satisfaction with a physical product. Performance, sensor reliability, specification conformance, durability, calibration consistency, and serviceability can affect whether customers perceive the monitoring system as dependable for operational and environmental-compliance purposes. Repeated evidence of technical reliability can therefore become accumulated evidence about the credibility of the supplier itself.

This interpretation is consistent with B2B branding research showing that brands can reduce uncertainty by providing credible signals in technically complex exchanges. Yuan et al. (2020), for example, demonstrate that credible external quality signals can create perceived value and ultimately strengthen B2B loyalty, while Gustafson and Pomirleanu (2021) emphasize credibility and reputation as important outcomes of B2B brand legitimacy.

The finding suggests that PT Buana Biru Teknindo's brand promises should be anchored in verifiable technical evidence. Claims concerning reliability, environmental suitability, system stability, or long-term support should be substantiated through calibration histories, performance records, response times, certification documents, maintenance histories, and relevant technical case evidence. In an industrial compliance environment, brand image is strengthened when customers repeatedly observe that the product performs as promised.

Digital Touchpoints and Brand Image

Digital touchpoints had a significant positive effect on brand image ($\beta = .378$; $p < .001$), supporting H2. Notably, this coefficient was higher than the product quality $\rightarrow$ brand image coefficient (.319), indicating that digital interactions were an especially important mechanism in shaping how institutional customers evaluated the supplier.

Within the construct, cross-channel integration (.796) was the strongest digital-touchpoint indicator. Digital value co-creation was the weakest loading (.696), while the

original study also reports that digital after-sales support had the lowest item-level mean of 3.80. The pattern indicates that customers value coherent interactions across digital and conventional channels, but opportunities remain to deepen collaborative and after-sales aspects of the digital relationship.

The result corresponds with contemporary customer-journey research. De Keyser et al. (2020) argue that touchpoints acquire meaning through the broader experience in which they occur, while Herhausen et al. (2019) show that different combinations of touchpoints produce different loyalty-formation mechanisms. Grewal and Roggeveen (2020) similarly emphasize that technology-enabled journeys involve interrelated cognitive, emotional, and behavioral responses rather than isolated channel effects.

In B2B contexts, the issue becomes more complex because journeys involve multiple actors and stages. Purmonen et al. (2023) conceptualize B2B customer journeys as extending across both buying and usage centers, while Terpoorten et al. (2024) show that complex digital services require customer-journey management that accounts for differences in customer capability and support needs.

For WQMS customers, therefore, digital touchpoints should not operate as disconnected interfaces. A website, WhatsApp contact, service portal, remote-support system, calibration database, e-mail communication, and field service team should provide consistent information. When these interfaces collectively signal responsiveness and technical competence, they strengthen brand image.

Product Quality and Customer Loyalty

Product quality significantly affected customer loyalty ($\beta = .206$; $p = .001$), supporting H3. This direct effect indicates that dependable product performance gives institutional customers a substantive reason to continue purchasing from, recommending, or maintaining commitment to the supplier.

The finding is consistent with B2B research showing that functional and experiential value remain central to relationship continuation. Roy et al. (2019) found that both service quality and service experience influence downstream outcomes such as loyalty and word of mouth in B2B settings. Similarly, Woo et al. (2021), in a safety-related industrial service context, showed that supplier activities that improve business-customer performance ultimately contribute to recommendations and re-contracting intentions.

The parallel with WQMS is especially relevant. When failure carries operational or compliance consequences, customers may remain loyal because switching suppliers creates uncertainty about system compatibility, sensor stability, technical support, calibration processes, and regulatory documentation. Therefore, technical performance can create loyalty independently of promotional or digital interaction.

However, the direct coefficient of product quality (.206) was considerably smaller than the brand image coefficient (.437). This indicates that product performance is important but does not represent the whole loyalty mechanism. Customers also interpret individual

technical experiences as evidence about the supplier's broader identity and future dependability.

Digital Touchpoints and Customer Loyalty

Digital touchpoints did not have a statistically significant direct effect on customer loyalty ($\beta = .109$; $p = .111$), resulting in the rejection of H4. Its effect size of .015 was also the smallest in the structural model.

This finding is one of the most meaningful results of the study. It demonstrates that more digital interaction is not equivalent to more customer loyalty. Institutional customers may value responsive messaging, integrated digital channels, portals, and online after-sales access without automatically translating these experiences into repeat purchases, recommendations, or contractual commitment.

Digital-service literature helps explain this distinction. Raddats et al. (2022) show that digital service innovations vary substantially in whether they create value for manufacturers, customers, or both. Favoretto et al. (2022) similarly demonstrate that digital servitization involves changes to service offerings, capabilities, processes, ecosystems, and value creation rather than simply adding technologies. Marcon et al. (2022) further emphasize that successful digital servitization requires complementary capabilities across manufacturers, intermediaries, and customers.

The WQMS result therefore distinguishes digital availability from relationship value. A customer portal has little loyalty value if service records are incomplete. Fast messaging does not create commitment if technical problems remain unresolved. Multiple digital channels do not improve the relationship if customers receive inconsistent answers.

Rose et al. (2021) provide a closely related B2B finding: social-media communication practices increased customer trust, with trust subsequently mediating effects on loyalty. Thus, digital communication can require an intervening relationship evaluation before it influences loyalty. The present study extends this logic by identifying brand image as the conversion mechanism.

Brand Image and Customer Loyalty

Brand image had the strongest direct effect on customer loyalty ($\beta = .437$; $p < .001$), supporting H5. This finding positions brand image as the central relationship mechanism in the model.

For WQMS buyers, brand image encompasses company image, product image, user image, regulatory credibility, and technical sustainability. Thus, brand image should not be interpreted as a superficial communications construct. It represents the customer's accumulated judgment regarding whether the supplier is technically competent, credible, dependable, and likely to support the system over time.

This interpretation is supported by contemporary B2B relationship research. Gansser et al. (2021) show that reputation and service quality contribute to organizational trust, which subsequently supports commitment. Mohan et al. (2021) similarly demonstrate that relationship quality can translate into supplier-favorable outcomes through customer identification. Gustafson and Pomirleanu (2021) highlight reputation, awareness, and credibility as key outcomes of B2B brand legitimacy.

Regulatory credibility is especially important in the present study. Yuan et al. (2020) show that trusted third-party signals can communicate otherwise difficult-to-observe quality in B2B settings. For environmental monitoring suppliers, regulatory documents, transparent certification, calibration evidence, traceable maintenance records, and technically credible client cases can serve a similar signaling function.

Therefore, brand image is best understood as the integrated interpretation of technical and relationship evidence. Customers may remember individual service encounters imperfectly, but these experiences accumulate into a broader judgment: whether PT Buana Biru Teknindo is a supplier that can be relied upon.

Brand Image as a Mediator of Product Quality and Customer Loyalty

The indirect effect of product quality on customer loyalty through brand image was statistically significant ($\beta = .139$; $p < .001$), supporting H6. The direct effect of product quality remained significant and positive ($\beta = .206$), producing a total effect of approximately .345. Approximately 40.3% of the total effect was therefore transmitted through brand image.

The pattern represents complementary partial mediation. Product quality builds loyalty through two mechanisms. First, reliable equipment provides direct functional value and reduces operational uncertainty. Second, experienced quality strengthens the customer's perception that the brand is technically credible, which further increases loyalty.

This distinction is managerially important. A reliable WQMS can generate repeat purchasing because it performs well. However, the same reliability creates additional value when the customer interprets it as evidence of a consistently dependable supplier. Brand building should therefore not be separated from engineering and service performance.

Research on digital and industrial service transformation increasingly emphasizes this integration of product and service value. Soellner et al. (2024) show that industrial firms increasingly build digital and service offerings upon existing product-based competitive advantages, while Iriarte et al. (2023) demonstrate that advanced digital service value propositions require coordinated service-design capabilities.

This means PT Buana Biru Teknindo should convert technical achievements into credible customer-facing brand evidence. System uptime, reduced failures, calibration accuracy, successful regulatory monitoring, technical problem resolution, and documented customer outcomes can all reinforce the brand image generated by product performance.

Brand Image as a Mediator of Digital Touchpoints and Customer Loyalty

The indirect digital touchpoint → brand image → customer loyalty effect was significant ($\beta = .165$; $p < .001$), supporting H7. At the same time, the corresponding direct relationship remained nonsignificant. The total digital-touchpoint effect was approximately .274, with approximately 60.2% transmitted through brand image.

This pattern constitutes indirect-only mediation, commonly described as full mediation. It represents the principal theoretical finding of this research:

Digital touchpoints do not independently create loyalty; they create loyalty when they strengthen brand image.

This explains why H2 was significant while H4 was not. Customers can appreciate responsive digital interaction, but loyalty depends on what those interactions mean. If a portal, digital service interaction, or remote-support activity signals technical competence, regulatory credibility, and long-term commitment, it strengthens brand image and subsequently loyalty. If it functions merely as another communication channel, its relationship effect may remain limited.

Digital-servitization literature supports precisely this value-conversion logic. Simonsson and Agarwal (2021) show that digital capabilities can enhance perceived value through faster access to information and transparency. Chirumalla et al. (2023) argue that moving toward digital servitization requires organizational and capability reconfiguration rather than simple technology adoption. Ruffoni and Reichert (2024) further demonstrate that combinations of digital-servitization capabilities, rather than isolated digital resources, enable customer value creation.

The result is also consistent with customer-journey logic. Salonen et al. (2024) demonstrate that the timing and relevance of digital B2B content determine engagement and subsequent sales-related outcomes, while Herhausen et al. (2019) show that loyalty mechanisms vary according to the configuration of touchpoints within the journey. Digital interaction must therefore be meaningful, coherent, and appropriately embedded in the customer journey.

4. CONCLUSION

This study examined how product quality and digital touchpoints influence customer loyalty through brand image in the Water Quality Monitoring System (WQMS) market of PT Buana Biru Teknindo. The findings show that product quality significantly strengthens both brand image and customer loyalty, while digital touchpoints significantly strengthen brand image but do not directly affect customer loyalty. Brand image emerged as the strongest direct predictor of customer loyalty, confirming that customers' perceptions of company credibility, product reputation, regulatory credibility, and technical sustainability play a central role in sustaining long-term relationships.

The mediation results further clarify these relationships. Brand image partially mediates the effect of product quality on customer loyalty, indicating that product quality creates loyalty through both direct functional value and the favorable brand perceptions generated by reliable technical performance. In contrast, brand image provides indirect-only mediation in the relationship between digital touchpoints and customer loyalty. This means that digital interactivity, responsiveness, cross-channel integration, digital after-sales support, and value co-creation do not automatically produce customer loyalty. Their strategic value emerges when they reinforce a credible and dependable brand image. The model explained 30.1% of the variance in brand image and 37.3% of the variance in customer loyalty, while six of the seven proposed hypotheses were supported.

These findings suggest that WQMS suppliers should integrate technical reliability and digital service experience rather than manage them separately. Product-quality improvement should prioritize system performance, reliability, conformance, durability, calibration consistency, and serviceability. At the same time, digital touchpoints should be designed to make this technical competence visible and credible through integrated customer portals, responsive after-sales support, consistent cross-channel information, service histories, calibration records, and transparent regulatory documentation. In this context, digitalization should be treated as a mechanism for strengthening customer confidence in the brand rather than merely as an expansion of communication channels.

From a managerial perspective, PT Buana Biru Teknindo should evaluate customer loyalty through both technical and relational indicators. Metrics such as system uptime, incident frequency, response and resolution time, calibration compliance, repeat purchase, contract renewal, recommendation, Net Promoter Score, and brand-image perceptions should be integrated into a customer-loyalty dashboard. This approach would allow management to determine whether improvements in product quality and digital services are effectively translated into stronger brand perceptions and subsequent customer commitment.

The study has several limitations. The research used a cross-sectional and self-reported design and focused on customers of a single WQMS supplier. Although 195 questionnaires were analyzed, they represented three respondents from each of only 65 customer organizations, creating a nested data structure that was not adjusted through within-company agreement tests, aggregation, cluster-robust inference, or multilevel modeling. Consequently, the independence and precision of respondent-level estimates should be interpreted cautiously.

Future research should therefore employ longitudinal, multilevel, or company-level designs, combine perceptual measures with objective indicators such as contract renewal, repeat orders, service incidents, and system-performance records, and replicate the model across different suppliers and environmental-technology markets. Further studies may also extend the model by incorporating customer trust, satisfaction, switching costs, perceived value, relationship quality, and regulatory risk. Such extensions would provide a more comprehensive explanation of how technical performance, digital interaction, and brand-related evaluations jointly shape loyalty in high-involvement B2B markets.

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