



The Role of CRM-Based Information Systems in Improving Customer Service Quality in Online Stores

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ABSTRACT

The rapid growth of e-commerce has increased customer expectations for fast, accurate, and personalized services, making Customer Relationship Management (CRM)-based information systems essential for online retailers. This study analyzes the role of CRM-based information systems in improving customer service quality in online stores by examining three technological dimensions: data management capability, service process automation, and personalization features. A quantitative research design was employed using a survey administered to 96 active customers of an online store that had implemented a web-based CRM system. Data were analyzed through validity and reliability tests, descriptive statistics, classical assumption tests, and multiple linear regression using SPSS version 26. The results show that all three CRM dimensions had positive and significant effects on customer service quality, both individually and simultaneously. The adjusted R² value of 0.742 indicates that 74.2% of the variance in customer service quality was explained by the CRM-based information system variables. Service process automation was the strongest predictor ($\beta = 0.412$; $p < 0.001$), followed by personalization features ($\beta = 0.318$; $p < 0.001$) and data management capability ($\beta = 0.221$; $p = 0.004$). These findings confirm that data management capability, service process automation, and personalization features contribute significantly to service reliability, responsiveness, assurance, empathy, and tangibility. An integrated CRM information system can therefore strengthen customer service quality and improve the online shopping experience. The study contributes to information systems literature and offers practical guidance for online store managers seeking to optimize CRM investments, enhance service performance, and build stronger, more sustainable customer relationships in increasingly competitive digital markets.

INTRODUCTION

The expansion of digital commerce in Indonesia and globally has fundamentally changed the way businesses interact with customers. Online stores no longer compete solely on price and product variety, but increasingly on the quality of service experienced by customers before, during, and after a transaction (Fernando et al., 2023). As customer expectations for fast response times, accurate information, and



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personalized treatment continue to rise, information systems that can manage large volumes of customer data while automating service processes have become a strategic necessity rather than an optional feature.

Customer Relationship Management (CRM) based information systems are designed to integrate customer data, communication channels, and service workflows into a single platform that enables businesses to understand, anticipate, and respond to customer needs more effectively. Buttle (2015), as cited in a systems-oriented case study, describes CRM as the core of business strategy that combines internal processes, technology, and external networks to create and deliver superior value to customers. In the context of online retail, CRM systems typically consist of modules such as ticketing, live-chat automation, order tracking, complaint handling, and customer data analytics, all of which directly influence the customer's perception of service quality.

Previous studies have examined various aspects of CRM adoption and its outcomes. A systematic literature review on CRM implementation in the digital economy found that changing consumer preferences and rising expectations for service quality, response speed, and product personalization require companies to continuously adapt their CRM strategies, yet many organizations still struggle with the cost and complexity of full implementation (Fernando et al., 2023), a difficulty echoed in banking-sector evidence showing that some private banks still favor direct personal interaction over CRM systems because of high implementation costs (Lokesh et al., 2023). Similarly, research on CRM tools in emerging markets found that ensuring customers receive timely and effective assistance through CRM tools enhances customer satisfaction and builds the trust that underlies long-term loyalty (Ijomah et al., 2024). A quantitative study on CRM systems for online retailing further reported that market knowledge, innovation management, and competitive intelligence each significantly and positively influence the efficiency of CRM systems used in online retail settings (Latifi et al., 2023).

Despite this growing body of literature, most existing studies emphasize CRM's contribution to customer loyalty, sales growth, or organizational strategy in general, while comparatively fewer studies specifically measure how the technical architecture of a CRM-based information system, namely its data management, automation, and personalization capabilities, translates into measurable dimensions of service quality (reliability, responsiveness, assurance, empathy, and tangibility) at the level of an individual online store. Recent bibliometric work on AI-driven CRM also indicates that research in this area remains fragmented, with a call for more empirical studies that connect specific CRM system features to concrete service-quality outcomes (Firdausi et al., 2025).

Based on this research gap, the present study aims to: (1) analyze the effect of data management capability, automation of service processes, and personalization features of a CRM-based information system on customer service quality in an online store, both partially and simultaneously; and (2) identify which CRM dimension contributes most dominantly to customer service quality improvement. The findings are expected to enrich the information systems literature on CRM-service quality relationships and to provide practical guidance for online store managers and system developers in prioritizing CRM feature development.

METHODS

1. Research Design

This study uses a quantitative approach with an explanatory (associative) survey design to examine the relationship between CRM-based information system dimensions and customer service quality. A quantitative approach was selected because it allows objective measurement of variables and statistical hypothesis testing (Choi Sang Long et al., 2023). Because the survey was cross-sectional and the sample was obtained through purposive sampling from a single online store, the findings are intended to describe statistical

associations within this study context rather than to be generalized to the broader population of online store customers.

2. Population and Sample

The population of this study consists of active customers of an online store operating in Indonesia that has implemented a web-based CRM information system for at least twelve months. Using the Slovin formula with a margin of error of 10% applied to an estimated active customer base of 1,200 individuals, a minimum sample size of 92 respondents was required. A 10% margin of error was adopted, rather than a stricter 5%, because it kept the required sample size feasible within the available population of active customers of a single online store while still providing an acceptable level of precision for exploratory survey research of this kind. The study collected 96 valid responses through purposive sampling, with the criterion that respondents must have interacted with the store's customer service feature (live chat, ticketing, or order-tracking module) at least once within the last three months; this criterion was applied to ensure that respondents had direct, first-hand experience with the CRM-based service features under study. Because sampling was purposive rather than random and drawn from a single online store, the results primarily represent the perceptions of active CRM users within this specific online store context rather than online store customers or e-commerce customers in general.

3. Research Variables and Instrument

The independent variables consist of three dimensions of the CRM-based information system: Data Management Capability (X1), Automation of Service Process (X2), and Personalization Features (X3). The dependent variable is Customer Service Quality (Y), measured using five SERVQUAL dimensions: reliability, responsiveness, assurance, empathy, and tangibility. Indicators for the three CRM dimensions (X1, X2, X3) were adapted from the CRM framework of Buttle (2015), while indicators for customer service quality (Y) were adapted from the SERVQUAL model of Parasuraman et al. (1988). All variables were measured using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) with a structured questionnaire consisting of 28 items, distributed evenly across the four variables (seven items each) and distributed online via Google Forms. Because the CRM system evaluated in this study is a purely digital, web-based service with no physical branch, the tangibility dimension of SERVQUAL was operationalized in terms of the online service environment, namely the visual design, clarity, and ease of use of the website or application interface, rather than physical facilities or equipment.

Figure 1 presents the conceptual framework linking the three CRM dimensions directly to customer service quality, consistent with the multiple linear regression model tested in the Results section, while Figure 2 illustrates the layered system architecture of the CRM-based information system evaluated in this study, consisting of a presentation layer, application layer, integration layer, and data layer.

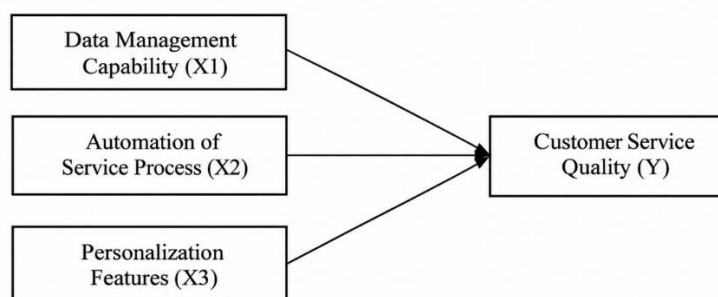


Figure 1. Research Conceptual Framework

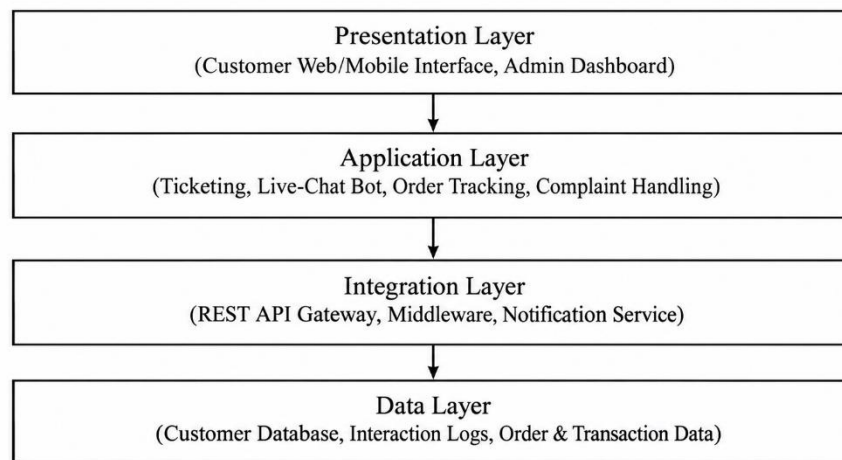


Figure 2. System Architecture of the CRM-Based Information System

4. Data Collection and Analysis Technique

Data were collected through an online questionnaire distributed over a four-week period. Prior to the main analysis, instrument validity was tested using Pearson product-moment correlation, and reliability was assessed using Cronbach's Alpha. Classical assumption tests (normality, multicollinearity, and heteroscedasticity) were performed before conducting multiple linear regression analysis to examine the partial and simultaneous effects of X1, X2, and X3 on Y. All statistical procedures were carried out using SPSS version 26 at a 5% significance level ($\alpha = 0.05$).

RESULTS

1. Respondent Characteristics

A total of 96 valid responses were obtained. Table 1 summarizes the demographic and usage characteristics of the respondents.

Table 1. Respondent Characteristics (n = 96)

Characteristic	Category	n (%)
Gender	Male	41 (42.7%)
	Female	55 (57.3%)
Age	18-24 years	38 (39.6%)
	25-34 years	42 (43.8%)
	35-44 years	12 (12.5%)
	> 44 years	4 (4.1%)
Frequency of CRM feature use / month	1-3 times	29 (30.2%)
	4-6 times	40 (41.7%)
	> 6 times	27 (28.1%)

2. Validity and Reliability Test

Instrument testing shows that all item-total correlation coefficients (r-count) exceed the r-table value of 0.201 (df = 94, $\alpha = 0.05$), indicating that all 28 questionnaire items are valid. Reliability testing using

Cronbach's Alpha shows that all variables exceed the minimum threshold of 0.70, indicating that the instrument is reliable, as presented in Table 2.

Table 2. Validity and Reliability Test Results

Variable	r-count range	r-table	Cronbach's Alpha
Data Management Capability (X1)	0.512 - 0.771	0.201	0.834
Automation of Service Process (X2)	0.548 - 0.802	0.201	0.861
Personalization Features (X3)	0.499 - 0.756	0.201	0.812
Customer Service Quality (Y)	0.533 - 0.789	0.201	0.877

3. Descriptive Statistics

Descriptive analysis shows that respondents generally rated customer service quality the highest (mean = 4.05), followed by automation of service process (mean = 4.02), personalization features (mean = 3.91), and data management capability (mean = 3.86), as shown in Table 3.

Table 3. Descriptive Statistics

Variable	Min	Max	Mean	Std. Dev.
Data Management Capability (X1)	2.20	5.00	3.86	0.612
Automation of Service Process (X2)	2.00	5.00	4.02	0.588
Personalization Features (X3)	2.40	5.00	3.91	0.647
Customer Service Quality (Y)	2.60	5.00	4.05	0.559

4. Classical Assumption Test

Before regression testing, classical assumption tests were performed. The Kolmogorov-Smirnov test indicates that the residuals are normally distributed (Asymp. Sig. = 0.184 > 0.05). The Variance Inflation Factor (VIF) values for all independent variables are below 10, indicating no multicollinearity problem. The Glejser test results show significance values above 0.05 for all variables, indicating homoscedasticity. A summary is provided in Table 4.

Table 4. Classical Assumption Test Summary

Test	Result	Conclusion
Normality (Kolmogorov-Smirnov)	Asymp. Sig. = 0.184	Normal
Multicollinearity (VIF)	VIF X1=1.42; X2=1.55; X3=1.38	No multicollinearity
Heteroscedasticity (Glejser)	Sig. X1=0.311; X2=0.276; X3=0.402	Homoscedastic



5. Multiple Linear Regression Analysis

Multiple linear regression analysis was conducted to examine the effect of the three CRM dimensions on customer service quality. The results in Table 5 show that all three independent variables have a positive and statistically significant partial effect on customer service quality ($p < 0.05$).

Table 5. Multiple Linear Regression Coefficients

Variable	B	Std. Beta	t	Sig.
(Constant)	0.482	-	2.114	0.037
Data Management Capability (X1)	0.213	0.221	2.968	0.004
Automation of Service Process (X2)	0.398	0.412	5.204	< .001
Personalization Features (X3)	0.302	0.318	4.187	< .001

The resulting regression equation is: $Y = 0.482 + 0.213X1 + 0.398X2 + 0.302X3 + e$. This indicates that automation of service process (X2) has the strongest partial effect on customer service quality ($\beta = 0.412$), followed by personalization features (X3; $\beta = 0.318$) and data management capability (X1; $\beta = 0.221$). The model summary in Table 6 shows an R value of 0.865 and an adjusted R² of 0.742, meaning that the three independent variables jointly explain 74.2% of the variance in customer service quality, while the remaining 25.8% is explained by other factors outside the model.

Table 6. Model Summary

R	R Square	Adjusted R Square
0.865	0.749	0.742

The simultaneous test (F-test) presented in Table 7 shows an F-value of 91.238 with a significance level of $p < 0.001$, confirming that data management capability, automation of service process, and personalization features simultaneously and significantly affect customer service quality.

Table 7. ANOVA (F-Test) Results

Model	Sum of Squares	df	F	Sig.
Regression	18.442	3	91.238	< .001
Residual	6.191	92	-	-
Total	24.633	95	-	-

6. Comparative and Correlational Visualization

To further illustrate the practical impact of CRM adoption, Figure 3 compares the mean scores of the five SERVQUAL dimensions before and after the implementation of the CRM-based information system, based on respondents' retrospective self-assessment. Figure 4 presents the relationship between overall CRM system usage intensity and the customer service quality index across respondents.

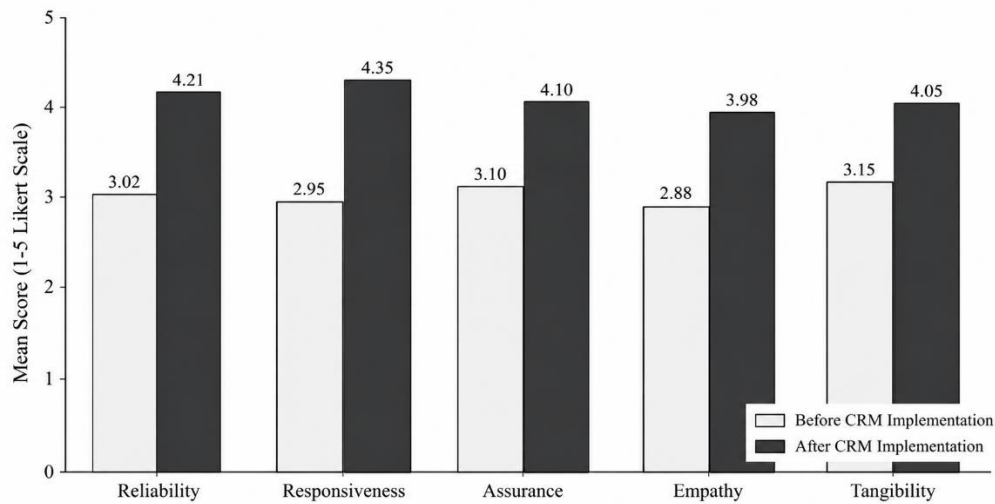


Figure 3. Mean Comparison of Service Quality Dimensions Before and After CRM Implementation

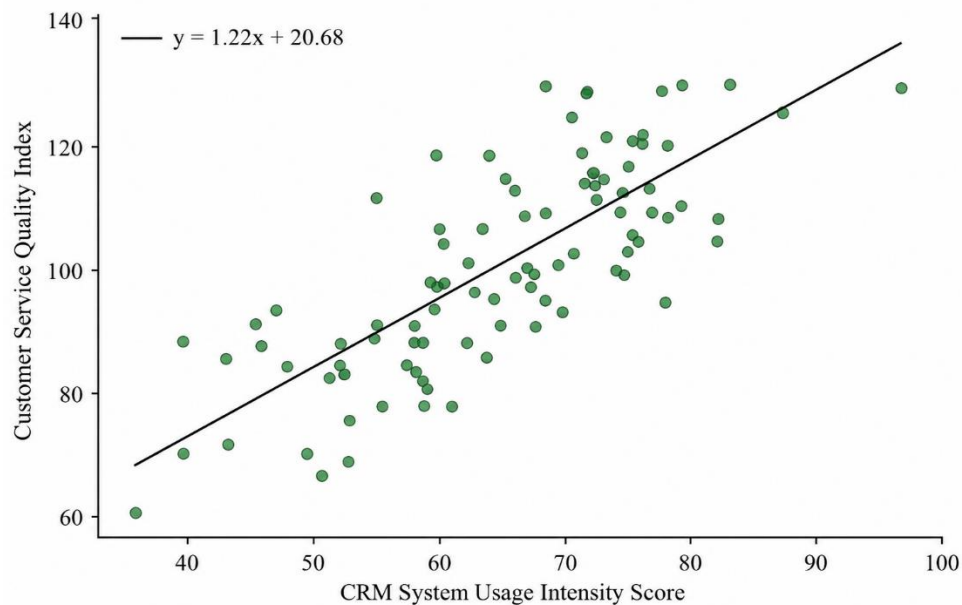


Figure 4. Relationship between CRM Usage Intensity and Customer Service Quality Index

As shown in Figure 3, the largest improvement occurred in the responsiveness dimension (from 2.95 to 4.35), followed by reliability (3.02 to 4.21) and assurance (3.10 to 4.10), suggesting that automation features have the most visible effect on how quickly and consistently customer inquiries are handled. Figure 4 shows a clear positive linear relationship between CRM usage intensity and the service quality index, consistent with the regression results reported above.

DISCUSSION

The findings of this study confirm that CRM-based information systems play a significant role in improving customer service quality in online stores, consistent with earlier findings that CRM tools enhance customer satisfaction by ensuring customers receive timely and effective assistance (Ijomah et al., 2024). The



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dominant effect of automation of service process ($\beta = 0.412$) aligns with the systematic review finding that rising customer expectations for response speed require companies to continuously strengthen their automated service capabilities (Fernando et al., 2023). In practical terms, features such as automated ticket routing, chatbot-assisted first response, and real-time order-tracking notifications appear to improve customers' perceived responsiveness and reliability, the two SERVQUAL dimensions that improved the most in this study, although actual waiting time was not directly measured and this interpretation is based on respondents' perceptions rather than objective service-time data.

The significant contribution of personalization features ($\beta = 0.318$) supports the view that CRM systems enable businesses to gather and analyze detailed customer data to tailor interactions and build stronger relationships (Ijomah et al., 2024). Respondents in this study appeared to value personalized recommendations, tailored promotional communication, and the ability of customer service agents to access their previous interaction history, all of which strengthen the empathy and assurance dimensions of service quality.

Data management capability, although the smallest of the three coefficients, remains a statistically significant predictor ($\beta = 0.221$), reflecting its role as the foundational layer that supports both automation and personalization. This is consistent with the layered system architecture illustrated in Figure 2, where the data layer underpins the integration and application layers; without accurate and well-structured customer data, automation and personalization features cannot function effectively. This observation is in line with prior research noting that many organizations struggle with data integration challenges when implementing CRM systems (Choi Sang Long et al., 2023).

The adjusted R^2 of 0.742 indicates a strong explanatory power of the proposed model, which is comparable to prior structural studies on CRM systems in online retailing that also reported strong standardized path coefficients for key CRM-related constructs (Latifi et al., 2023). Nevertheless, the remaining 25.8% of unexplained variance suggests that other factors, such as employee competence, organizational culture, delivery logistics performance, and payment system reliability, may also influence customer service quality perceptions in the online store context and warrant further investigation.

From a managerial perspective, these findings suggest that online store managers seeking to improve service quality with limited resources should prioritize investment in automation features first, given their dominant effect, followed by personalization capabilities, while continuing to maintain robust data management practices as the technical foundation of the overall CRM information system.

CONCLUSIONS

This study concludes that CRM-based information systems, represented by data management capability, automation of service process, and personalization features, are positively and significantly associated with customer service quality in online stores, both partially and simultaneously, with the model explaining 74.2% of the variance in customer service quality. Given the cross-sectional survey design, these results are best interpreted as showing a significant statistical contribution to customer service quality rather than a confirmed causal effect. Automation of service process was found to be the most dominant contributor, followed by personalization features and data management capability. These findings reinforce the strategic importance of investing in well-integrated CRM system architecture, spanning presentation, application, integration, and data layers, to enhance the reliability, responsiveness, assurance, empathy, and tangibility dimensions of service quality.

Theoretically, this study contributes to the information systems literature by empirically linking specific technical dimensions of CRM systems to measurable service-quality outcomes at the level of an individual online store, addressing a gap identified in recent CRM literature reviews. Practically, the results



provide guidance for online store managers and system developers on which CRM features to prioritize when resources are limited.

This study has several limitations. First, the sample was drawn from customers of a single online store, which may limit the generalizability of the findings to other e-commerce contexts. Second, the cross-sectional survey design captures customer perceptions at a single point in time and cannot fully establish causal, longitudinal relationships. Future research is recommended to replicate this model across multiple online stores or industry sectors, to incorporate qualitative methods such as customer interviews for deeper contextual insight, and to examine the moderating role of factors such as employee digital competence or AI-based CRM features on the CRM-service quality relationship.

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