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Implementation of Customer Relationship Management (CRM) in E-Commerce Systems to Improve Customer Satisfaction and Loyalty

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ABSTRACT
The rapid growth of e-commerce has intensified competition among online retailers, necessitating robust strategies to retain customers and foster long-term loyalty. This study investigates the implementation of Customer Relationship Management (CRM) systems within e-commerce platforms and their measurable impact on customer satisfaction and loyalty metrics. Employing a mixed-methods research design involving 320 respondents from various e-commerce platforms operating in Indonesia, the study evaluates six core CRM features personalized recommendations, loyalty programs, 24/7 chat support, automated order tracking, targeted email campaigns, and feedback systems before and after a six-month CRM intervention period. Quantitative data were analyzed using paired t-tests and Pearson correlation analysis, while qualitative data were obtained from structured focus group discussions. Results indicate a statistically significant mean satisfaction improvement of 40.8% (from 3.06 to 4.31 on a five-point Likert scale, $p < 0.001$), a 17.8 percentage point increase in annual retention rates, and a Net Promoter Score gain of 26 points. Customer Lifetime Value rose by 53.1%, and monthly churn rates declined from 8.9% to 4.2%. The findings demonstrate that integrated CRM implementation substantially strengthens customer engagement, satisfaction, and loyalty within e-commerce ecosystems. Practical implications for e-commerce operators and CRM platform developers are discussed.

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INTRODUCTION

The global e-commerce sector has experienced unprecedented expansion over the past decade, driven by widespread internet penetration, the proliferation of mobile devices, and evolving consumer preferences for digital shopping experiences. According to Statista (2024), global retail e-commerce sales surpassed USD 5.8 trillion in 2023, with projections estimating continued growth beyond USD 8 trillion by 2027. Within this dynamically competitive landscape, the ability to attract new customers is no longer the sole determinant of organizational success; rather, cultivating and sustaining enduring customer relationships has emerged as a critical strategic priority (Kotler & Keller, 2022).

Customer Relationship Management (CRM) refers to a comprehensive set of strategies, technologies, and processes that organizations deploy to manage, analyze, and enhance interactions with current and prospective customers throughout the entire customer lifecycle (Ledro et al., 2023). In the e-commerce context, CRM systems leverage data analytics, artificial intelligence, and automated communication tools to deliver personalized experiences that align with individual customer preferences, purchasing histories, and behavioral patterns (Harrigan et al., 2020).

Despite the recognized importance of CRM, many e-commerce enterprises particularly small and medium-sized operators in developing markets lack systematic frameworks for CRM implementation and struggle to measure its tangible effects on customer satisfaction and loyalty (Rababah et al., 2022). Prior research has predominantly examined CRM outcomes in traditional brick-and-mortar retail or large multinational e-commerce platforms, leaving a notable gap in studies addressing CRM effectiveness in emerging e-commerce markets characterized by diverse consumer demographics and infrastructure constraints (Ferrer-Estévez & Chalmeta, 2023).

Customer satisfaction, defined as the degree to which a product or service meets or exceeds customer expectations (Oliver, 2010), serves as a primary driver of repurchase intention and word-of-mouth referrals. Customer loyalty, in turn, reflects a customer's sustained commitment to repurchase or repatronize a preferred product or service despite situational influences and marketing efforts of competitors (Kumar & Reinartz, 2018; Khan et al., 2022). The interrelationship between CRM implementation, satisfaction, and loyalty has been theoretically established through frameworks such as the Service Quality Model (Parasuraman et al., 2018), the Technology Acceptance Model (Venkatesh & Davis, 2000; Venkatesh et al., 2003), and the Customer Engagement Framework (Brodie et al., 2011; Hollebeek et al., 2023).

This study addresses the identified gap by empirically investigating the effects of CRM system implementation on customer satisfaction and loyalty within Indonesian e-commerce platforms. Indonesia represents a compelling research context, as it is Southeast Asia's largest digital economy, with over 196 million e-commerce users projected by 2024 (We Are Social, 2024), yet CRM adoption among Indonesian e-commerce businesses remains inconsistent and under-researched. The study contributes to the existing literature by providing quantitative and qualitative evidence of CRM's effectiveness across six distinct functional dimensions and by offering actionable recommendations for practitioners operating in comparable emerging market environments.

The remainder of this article is structured as follows: Section 2 reviews the relevant theoretical and empirical literature. Section 3 describes the research methodology. Section 4 presents the findings. Section 5 discusses the implications of the results, and Section 6 concludes with recommendations for future research.

Customer Relationship Management has evolved significantly from its origins as a technology-centric database marketing tool to a holistic organizational philosophy encompassing culture, strategy, and technology (Ledro et al., 2023). Buttle and Maklan (2019) conceptualize CRM as a core business strategy that integrates internal processes and functions, and external networks, to create and deliver value to targeted customers at a profit. The theoretical underpinnings of CRM draw from relationship marketing theory (Berry, 1995), service-

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dominant logic (Vargo & Lusch, 2017), and stakeholder theory (Freeman et al., 2021; Dmytriyev et al., 2021), collectively emphasizing that sustainable business value is created through mutually beneficial long-term relationships.

In the digital domain, the extension of traditional CRM concepts into electronic CRM (eCRM) and social CRM has gained considerable scholarly attention. Harrigan et al. (2020) define social CRM as the integration of social media channels and community platforms into CRM processes to enhance customer engagement and co-creation. More recently, the proliferation of artificial intelligence and machine learning has catalyzed the development of intelligent CRM systems capable of real-time predictive analytics and hyper-personalization (Ngai et al., 2021).

E-commerce platforms present unique CRM challenges and opportunities relative to traditional retail environments. The absence of face-to-face interaction necessitates that CRM systems compensate through digital touchpoints including personalized product recommendations, proactive customer support, and seamless transactional interfaces (Laudon & Traver, 2021). Research by Akter and Wamba **(2020)** demonstrated that data-driven CRM capabilities significantly predict e-commerce performance, with personalization and customer analytics emerging as the most impactful dimensions.

Personalized recommendation systems, a cornerstone of modern e-commerce CRM, employ collaborative filtering and content-based algorithms to deliver contextually relevant product suggestions (Ricci et al., 2022). Studies have consistently demonstrated that personalized recommendations increase cross-selling rates, average order values, and customer dwell time on e-commerce platforms (Schafer et al., 2019). Similarly, loyalty reward programs have been shown to increase repeat purchase frequency and switching costs, thereby strengthening customer retention (Yi & Jeon, 2021).

The conceptualization and measurement of customer satisfaction in e-commerce contexts have been extensively examined through instruments such as the E-S-QUAL scale (Parasuraman et al., 2018), which evaluates efficiency, system availability, fulfillment, and privacy as core service quality dimensions. Satisfaction is widely acknowledged as an antecedent of loyalty (Bowen & Chen McCain, 2020), though the strength of this relationship is moderated by switching costs, involvement, and the quality of alternative options available to the consumer (Srinivasan et al., 2022).

Customer loyalty in e-commerce is commonly operationalized through behavioral measures (repeat purchase rates, share of wallet) and attitudinal measures (Net Promoter Score, brand commitment). Kumar and Reinartz (2018) argue that Customer Lifetime Value (CLV) provides the most comprehensive loyalty metric, integrating both the frequency and monetary value of future purchases. Recent meta-analytic evidence by Homburg et al. (2023) confirmed that CRM implementation produces significant positive effects on both satisfaction and behavioral loyalty, with effect sizes varying by industry and digital maturity.

Despite the extensive body of literature on Customer Relationship Management (CRM), several important research gaps remain. First, prior studies have predominantly focused on large-scale or developed-market e-commerce platforms, with limited empirical evidence from emerging digital economies such as Indonesia. Second, many studies treat CRM as a single construct without examining the relative impact of its specific functional features, making it difficult to identify which components most strongly influence customer satisfaction and loyalty. Third, there is still a lack of integrated mixed-methods research that combines quantitative performance metrics with qualitative insights into customer experiences following CRM implementation.

Accordingly, this study aims to address these gaps by empirically investigating the implementation of CRM across multiple functional dimensions within Indonesian e-commerce platforms and evaluating its impact on customer satisfaction and loyalty using a mixed-methods approach.

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METHODS

This study adopted a mixed-methods research design, integrating quantitative survey data with qualitative focus group discussions to provide a comprehensive assessment of CRM's impact on customer satisfaction and loyalty in e-commerce environments. The mixed-methods approach was selected because it enables triangulation of findings, ensuring that statistical patterns identified in the quantitative phase are contextualized and enriched by qualitative insights into customer perceptions and experiences (Creswell & Creswell, 2018).

The study population comprised registered customers of three mid-sized Indonesian e-commerce platforms that agreed to participate in a six-month CRM intervention program between July and December 2024. A stratified random sampling procedure was employed to recruit 320 participants, allocated equally across the three platforms (Platform A: n = 107; Platform B: n = 107; Platform C: n = 106). Within each platform, participants were stratified proportionally by gender, age group, and purchase frequency to ensure representativeness of each platform's broader customer base. The stratification quotas per platform were determined based on internal customer demographic records provided by each platform operator at the outset of the study, ensuring that the sub-sample drawn from each platform mirrored the actual demographic composition of that platform's active user population. All participants had a minimum of three months' prior purchasing history on their respective platforms and provided informed written consent prior to participation. Individuals under 18 years of age and those who had not made at least two purchases in the preceding three months were excluded.

The CRM intervention package, developed in collaboration with the platform operators' technical teams, comprised six functional modules: (1) an artificial intelligence-driven personalized product recommendation engine integrated into the homepage and product pages; (2) a tiered loyalty points reward program with redeemable vouchers; (3) a 24/7 live chat and automated chatbot customer support system; (4) real-time automated order tracking with push notifications; (5) behaviorally segmented email marketing campaigns; and (6) an interactive product review and feedback aggregation system. The intervention was implemented uniformly across all three platforms during the study period.

Data collection instruments included a structured questionnaire administered at two time points: immediately before CRM implementation (pre-test, T1) and six months after full implementation (post-test, T2). The questionnaire assessed customer satisfaction across six CRM-specific dimensions using a five-point Likert scale (1 = Very Dissatisfied, 5 = Very Satisfied). The adoption of a five-point Likert scale for measuring CRM-related customer satisfaction is well-grounded in prior empirical literature. Parasuraman et al. (2005) employed a multi-item five-point scale in developing the E-S-QUAL instrument, which has since become a benchmark measure for electronic service quality across e-commerce contexts. More recently, Almajali et al. (2022) applied a five-point Likert scale to assess e-CRM system success and customer satisfaction in an online shopping environment, confirming the scale's suitability for capturing nuanced satisfaction perceptions across digital service touchpoints. Similarly, Kumar et al. (2022) utilized a five-point Likert-based instrument to measure e-CRM effectiveness and customer experience in a digital banking context, reporting strong reliability coefficients consistent with those obtained in the present study. The five-point format was selected over wider scales on the grounds that it minimizes respondent fatigue while preserving sufficient discriminatory power for ordinal statistical analysis, as supported by Kusmaryono et al. (2022), whose systematic review of 60 Likert-scale studies confirmed that the five-point format is the most widely used and psychometrically appropriate scale for satisfaction research in social and business disciplines. Loyalty was measured using a composite index incorporating repeat purchase rate, Net Promoter Score (NPS), annual retention rate, average order value, Customer Lifetime Value, and monthly churn rate, all derived from platform transaction records and supplemented by self-reported survey items. Instrument validity was established through expert panel

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review (n = 7 information technology and marketing academics), and reliability was confirmed with Cronbach's alpha coefficients exceeding 0.85 for all subscales.

Quantitative data were analyzed using IBM SPSS Statistics version 29. Descriptive statistics characterized the sample demographics and satisfaction distributions. Paired-samples t-tests were used to compare pre- and post-intervention satisfaction scores for each CRM feature. Pearson correlation analysis examined the relationships between individual CRM feature satisfaction scores and overall loyalty metrics. Effect sizes were computed using Cohen's d to quantify practical significance. The significance threshold was set at $\alpha = 0.05$ for all inferential tests. Qualitative data from two focus group discussions (n = 12 participants each) were transcribed verbatim and subjected to thematic analysis using NVivo 14, guided by an inductively developed coding framework that captured emergent themes related to CRM experience and loyalty motivation.

RESULTS

1. Respondent Demographics

Table 1 presents the demographic profile of the 320 study participants. The sample was broadly representative of Indonesian e-commerce users, with a near-equal gender split (52.3% male, 47.7% female) and a predominance of individuals in the 26–35 age bracket (38.6%), consistent with nationally reported e-commerce user demographics. The majority of respondents reported making purchases on a monthly basis (40.2%), followed by weekly purchasers (34.5%).

Table 1. Demographic Characteristics of Study Participants (N = 320)

Characteristic	Category	Frequency (%)
Gender	Male	52.30%
Gender	Female	47.70%
Age	18–25 years	28.40%
Age	26–35 years	38.60%
Age	36–45 years	21.20%
Age	46+ years	11.80%
Purchase Frequency	Daily	12.10%
Purchase Frequency	Weekly	34.50%
Purchase Frequency	Monthly	40.20%
Purchase Frequency	Rarely	13.20%

Source: Primary data, 2024

2. Impact of CRM Features on Customer Satisfaction

Table 2 presents the pre- and post-intervention mean satisfaction scores for each of the six CRM features, along with the percentage improvement and statistical significance values from the paired t-tests. All six CRM features demonstrated statistically significant improvements in satisfaction scores following the six-month intervention period ($p < 0.05$). The loyalty points program and personalized recommendation engine produced the largest relative improvements (43.6% and 43.3%, respectively), while targeted email campaigns, though statistically significant, yielded the smallest improvement (37.6%). The overall mean satisfaction score

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across all six features increased from 3.06 to 4.31, representing a mean improvement of 40.8% ($p < 0.001$, Cohen's $d = 1.42$, indicating a large effect size).

Formula Improvement (%):

$$\text{Improvement} = \frac{\text{Post} - \text{Pre}}{\text{Pre}} \times 100$$

Table 2. Pre- and Post-Intervention Customer Satisfaction Scores by CRM Feature

CRM Feature	Satisfaction (Pre)	Satisfaction (Post)	Improvement (%)	p-value
Personalized Recommendations	3.12	4.47	43.3%	< 0.001
Loyalty Points Program	3.05	4.38	43.6%	< 0.001
24/7 Customer Support Chat	2.98	4.21	41.3%	< 0.001
Automated Order Tracking	3.24	4.52	39.5%	< 0.001
Targeted Email Campaigns	2.87	3.95	37.6%	0.002
Feedback & Review System	3.1	4.3	38.7%	< 0.001
Overall Mean Score	3.06	4.31	40.8%	< 0.001

Source: Primary data, 2024. Scores based on 5-point Likert scale (1=Very Dissatisfied, 5=Very Satisfied).

3. Impact of CRM Implementation on Customer Loyalty Metrics

Table 3 summarizes the changes in six loyalty metrics before and after the CRM intervention. The most pronounced change was observed in Customer Lifetime Value, which increased by 53.1% (from USD 318 to USD 487), and repeat purchase rate, which rose by 24.5 percentage points (from 34.2% to 58.7%). The annual customer retention rate improved from 61.5% to 79.3%, and the Net Promoter Score increased from 28 to 54 moving the platforms from the 'Passive' to the 'Promoter' category on the NPS scale. Monthly churn rates declined substantially, falling from 8.9% to 4.2%.

A) Relative Change untuk metrik yang meningkat:

$$\text{Relative Change} = \frac{\text{After} - \text{Before}}{\text{Before}} \times 100$$

B) Relative Change untuk metrik yang menurun (Churn Rate):

$$\text{Relative Change} = \frac{\text{Before} - \text{After}}{\text{Before}} \times 100$$

C) Absolute Change (pp = percentage points):

$$\text{Absolute Change} = \text{After} - \text{Before}$$

Table 3. Customer Loyalty Metrics Before and After CRM Implementation

No.	Loyalty Metric	Before CRM	After CRM	Absolute Change	Relative Change
1	Repeat Purchase Rate (%)	34.2	58.7	+24.5 pp	+71.6%
2	Customer Retention Rate (Annual, %)	61.5	79.3	+17.8 pp	+28.9%
3	Net Promoter Score (NPS)	28	54	+26 pts	+92.9%
4	Average Order Value (USD)	42.30	61.80	+19.50	+46.1%

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No.	Loyalty Metric	Before CRM	After CRM	Absolute Change	Relative Change
5	Customer Lifetime Value (USD)	318	487	+169	+53.1%
6	Churn Rate (Monthly, %)	8.9	4.2	−4.7 pp	−52.8%

Source: Platform transaction records and survey data, 2024. pp = percentage points; pts = points.

4. Correlation Between CRM Feature Satisfaction

Pearson correlation analysis revealed significant positive correlations between post-intervention satisfaction scores for all six CRM features and the overall composite loyalty index (r ranging from 0.61 to 0.79, $p < 0.001$). The strongest correlation was observed between loyalty program satisfaction and the overall loyalty index ($r = 0.79$), followed by personalized recommendation satisfaction ($r = 0.76$). Targeted email campaign satisfaction demonstrated the weakest, though still significant, correlation with overall loyalty ($r = 0.61$). These results suggest that all CRM features contribute meaningfully to loyalty outcomes, with loyalty programs and personalization functioning as the primary loyalty drivers.

Focus group analysis yielded three primary thematic clusters: (1) 'Perceived Value Enhancement,' encompassing participant narratives about how loyalty rewards and personalized discounts increased their perceived value from the platform; (2) 'Trust and Reliability,' reflecting themes related to the role of transparent order tracking and responsive customer support in building platform trust; and (3) 'Emotional Connection,' capturing expressions of attachment and brand affinity that emerged from consistent, personalized communication experiences.

DISCUSSION

The findings of this study provide robust empirical evidence that systematic CRM implementation within e-commerce platforms produces substantial, statistically significant improvements in customer satisfaction and loyalty across multiple dimensions. The overall satisfaction improvement of 40.8% and the large effect size (Cohen's $d = 1.42$) indicate that CRM is not merely a marginal enhancement but a transformative operational investment for e-commerce operators. These results are broadly consistent with prior meta-analytic findings reported by Homburg et al. (2023), who documented average CRM-related satisfaction improvements of 25–45% across diverse service industries, lending external validity to the current study's findings.

The superior performance of the loyalty points program and personalized recommendation engine in driving satisfaction improvements aligns with theoretical predictions derived from relationship marketing and social exchange theory. Loyalty programs create tangible reciprocity mechanisms that signal organizational commitment to the customer relationship, increasing affective attachment and reducing the perceived attractiveness of competing platforms (Yi & Jeon, 2018; Kumar & Reinartz, 2018). Personalized recommendations reduce cognitive load in product search and discovery, enhancing perceived service quality and reinforcing the customer's sense of being individually understood and valued by the platform (Ricci et al., 2022).

The 53.1% increase in Customer Lifetime Value and the 24.5 percentage point rise in repeat purchase rates underscore the economic significance of CRM investment for e-commerce operators. These findings suggest that CRM should be positioned not as a cost center but as a revenue-generating capability, a reframing consistent with the strategic CRM perspective advanced by Buttle and Maklan (2019). The reduction in monthly churn from 8.9% to 4.2% is particularly notable from a financial modeling perspective, as even modest churn reductions yield disproportionate CLV gains given the compounding nature of customer relationship value over time (Gupta et al., 2016).

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The relatively weaker performance of targeted email campaigns compared to other CRM features warrants consideration. While statistically significant, the 37.6% satisfaction improvement for email campaigns was the lowest among the six features studied. This may reflect increasing consumer fatigue with email-based marketing communications in an era of information overload, as documented by Marinova et al. (2022), who found that email frequency beyond a platform-specific threshold negatively moderated satisfaction with digital marketing communications. Future CRM implementations may benefit from integrating push notification and in-app messaging channels, which research suggests yield higher open and engagement rates among younger e-commerce consumers (Shankar et al., 2021).

The qualitative thematic analysis enriches the quantitative findings by illuminating the psychological mechanisms through which CRM features generate loyalty. The emergence of 'Emotional Connection' as a distinct thematic cluster encompassing expressions of brand affinity and attachment arising from consistent personalized communication resonates with the customer engagement theory advanced by Brodie et al. (2019), which posits that engagement, operationalized through cognitive, emotional, and behavioral dimensions, mediates the relationship between CRM activities and loyalty outcomes. This finding suggests that e-commerce CRM strategies should deliberately design for emotional resonance, not merely functional utility.

The 'Trust and Reliability' theme, strongly associated with automated order tracking and 24/7 customer support, corroborates the foundational role of perceived reliability and responsiveness in service quality models (Parasuraman et al., 2018). In the context of e-commerce, where customers cannot physically inspect goods prior to purchase and are dependent on logistical processes beyond their direct control, real-time tracking and accessible support channels fulfill a crucial anxiety-reduction function that appears central to satisfaction and loyalty formation. E-commerce operators should therefore prioritize the reliability and responsiveness of these CRM features, even if their relative satisfaction scores are somewhat lower than those of personalization features.

This study is not without limitations. The sample, while representative of the participating platforms' user bases, was confined to three Indonesian e-commerce platforms, limiting generalizability to other cultural and market contexts. The six-month intervention period, though sufficient to capture meaningful behavioral changes, may not reflect the long-term stabilization of CRM effects; longitudinal follow-up studies extending to 18–24 months are recommended. Furthermore, the absence of a control group means that extraneous variables including concurrent marketing campaigns and broader macroeconomic trends cannot be entirely excluded as confounding influences. Future research employing randomized controlled designs and cross-national samples would significantly advance causal inference in this domain.

CONCLUSIONS

This study investigated the implementation of Customer Relationship Management systems in e-commerce platforms and their effects on customer satisfaction and loyalty. Through a mixed-methods design involving 320 participants across three Indonesian e-commerce platforms over a six-month period, the research demonstrated that integrated CRM implementation encompassing personalized recommendations, loyalty programs, live customer support, order tracking, targeted email campaigns, and feedback systems produces significant improvements across all measured dimensions of satisfaction and loyalty.

The mean customer satisfaction score improved by 40.8%, the annual retention rate increased by 17.8 percentage points, the Net Promoter Score rose by 26 points, and Customer Lifetime Value grew by 53.1%. Loyalty programs and personalization features were identified as the most impactful CRM dimensions, while qualitative analysis revealed that CRM implementation fosters emotional connection and trust psychological mechanisms that underlie sustained behavioral loyalty. These findings affirm that CRM represents a

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strategically valuable investment for e-commerce operators seeking competitive differentiation in high-growth digital markets.

For practitioners, the study recommends prioritizing the integration of AI-driven personalization engines and tiered loyalty reward systems as foundational CRM capabilities, complemented by reliable, accessible customer support and transparent order tracking. Organizations should invest in data analytics infrastructure to continuously monitor CRM feature effectiveness and adapt strategies based on evolving consumer preferences. For researchers, the study highlights the need for longitudinal, cross-cultural, and experimentally controlled investigations to deepen understanding of CRM's long-term effects on loyalty and its interaction with platform trust, cultural values, and competitive market dynamics.

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