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DATA ANALYTICS OF E-CRM TECHNOLOGY: ITS IMPACT ON CUSTOMER EXPERIENCE, SATISFACTION, TRUST, AND LOYALTY IN E-COMMERCE

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This work is licensed under [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)**Abstract:**

This study investigates the role of Electronic Customer Relationship Management (E-CRM) technology in shaping customer loyalty within the Indonesian e-commerce context by examining customer experience, satisfaction, and trust as critical mediators, and exploring customer anxiety as a moderating psychological factor. Utilizing a quantitative approach, data were collected from 500 customers engaged with major Indonesian e-commerce platforms and analyzed via Partial Least Squares Structural Equation Modeling (PLS-SEM). The empirical findings indicate that E-CRM significantly enhances customer experience, satisfaction, trust, and loyalty. Importantly, customer experience, satisfaction, and trust effectively mediated the relationship between E-CRM and customer loyalty, with customer experience additionally mediating the E-CRM–satisfaction link. Furthermore, anxiety notably moderated the relationship between E-CRM and both customer experience and trust, highlighting anxiety's role in diminishing digital relationship management effectiveness; however, anxiety did not significantly moderate the relationship between E-CRM and customer satisfaction. The study substantially extends the Stimulus-Organism-Response (SOR) theoretical framework by integrating anxiety explicitly as a moderating factor. Practically, this research provides strategic insights for e-commerce practitioners, emphasizing the necessity of managing consumer anxiety to optimize E-CRM outcomes, enhance customer relationships, and foster sustainable customer loyalty.

Keywords:

Electronic Customer Relationship Management (E-CRM), Customer Anxiety, Customer Experience, Customer Satisfaction, Customer Trust, Customer Loyalty, E-commerce

Introduction

Electronic Customer Relationship Management (E-CRM) technologies have significantly enhanced customer engagement and loyalty in the rapidly growing global e-commerce sector (Farmania et al., 2021; Garg & Madan, 2024). Southeast Asia, and particularly Indonesia, represents one of the fastest-growing e-commerce markets globally, with sales projected to reach over USD 83 billion by 2025, driven by increased internet penetration, widespread smartphone adoption, and evolving consumer preferences towards online shopping (Alfanur & Kadono, 2021; Yang & Babapour, 2023; Younis et al., 2024). E-CRM encompasses technologies designed to manage customer relationships and enhance customer interactions in online environments, through personalized communication, targeted promotions, and efficient customer support. Previous studies have demonstrated that effective E-CRM strategies significantly enhance customer satisfaction, trust, and loyalty (Farmania et al., 2021; Yang & Babapour, 2023; Younis et al., 2024). However, while extensive literature has investigated the direct impacts of E-CRM on customer outcomes, fewer studies have explored psychological factors, particularly customer anxiety, as moderators of these relationships (Gunasinghe et al., 2021; Vijay et al., 2019).

Anxiety, characterized by unease or worry concerning online transactions, has become an increasingly relevant psychological consideration, especially in emerging digital markets where consumers frequently encounter uncertainties about transaction security, data privacy, and platform reliability (Khoa & Nguyen, 2022; Rupeika-Apoga et al., 2022). The heightened awareness of digital vulnerabilities and uncertainties, especially following the COVID-19 pandemic, has amplified the necessity to examine anxiety's role within digital commerce contexts (Price, 2023; Şahin & Güler, 2022). Addressing anxiety provides crucial insights into customer behavior, particularly in e-commerce settings where perceived risks significantly influence purchase decisions and loyalty.

Given this context, this study aims to explore how anxiety moderates the relationship between E-CRM technology and customer loyalty within Indonesian e-commerce platforms. The research specifically investigates anxiety's moderating impact on E-CRM's relationship with customer experience, satisfaction, trust, and loyalty. Leveraging data analytics techniques, specifically Partial Least Squares Structural Equation Modeling (PLS-SEM), this research contributes to theoretical developments by extending the Stimulus-Organism-Response (SOR) framework, incorporating anxiety as a critical psychological factor influencing consumer responses (Jacoby, 2002; Russell & Mehrabian, 1974).

From a practical perspective, findings from this study will offer actionable strategies for Indonesian e-commerce businesses to strategically manage customer anxiety, enhance customer experiences, and optimize E-CRM initiatives, ultimately strengthening customer loyalty in the highly competitive online marketplace (Farmania et al., 2021; Khoa & Nguyen, 2022).

Literature Review And Hypotheses Development

Electronic Customer Relationship Management (E-CRM)

Electronic Customer Relationship Management (E-CRM) refers to the use of digital technologies, strategies, and practices to manage and enhance customer interactions and relationships in an online environment (Kumar & Mokha, 2022a; Masengu et al., 2021). E-CRM encompasses various tools and techniques, such as personalized communication, targeted promotions, customer data analysis, and responsive customer support, aimed at improving customer satisfaction, trust, and loyalty in e-commerce settings (Farmania et al., 2021; Kumar & Mokha, 2022a; Yang & Babapour, 2023). E-CRM leverages digital platforms and marketing technologies to streamline customer interactions, thereby cultivating stronger customer relationships (Eltahir et al., 2021; Khanh et al., 2022; Petru et al., 2020). Through the use of electronic channels such as web browsers, email, and call centers, E-CRM allows companies to tailor their marketing efforts to individual customers, thereby increasing customer satisfaction and loyalty (Dahal, 2022; Younis et al., 2024).

Furthermore, E-CRM enables companies to collect and analyze customer data, allowing for more targeted marketing campaigns and the ability to anticipate customer needs (Tariq et al., 2021). By implementing E-CRM, companies can effectively manage their customer relationships, providing personalized and seamless experiences across various touchpoints (Dahal, 2022; Eltahir et al., 2021; Khanh et al., 2022). Existing research consistently shows that E-CRM significantly improves customer experiences, satisfaction, trust, and loyalty in various digital contexts (Eltahir et al., 2021; Farmania et al., 2021; Khanh et al., 2022; Kumar & Mokha, 2022a; Yang & Babapour, 2023; Younis et al., 2024). Thus, we propose:

- **H1:** E-CRM has a positive effect on e-commerce Customer Experience.
- **H2:** E-CRM has a positive effect on e-commerce Customer Satisfaction.
- **H3:** E-CRM has a positive effect on e-commerce Customer Trust.
- **H4:** E-CRM has a positive effect on e-commerce Customer Loyalty

Customer Loyalty

Customer loyalty is a multidimensional construct that reflects a customer's deep commitment and strong preference for a brand, product, or service (Kaur et al., 2021). It encompasses both attitudinal and behavioral components (Nasir et al., 2021). Attitudinal loyalty refers to a customer's positive feelings, beliefs, and intentions towards a brand, characterized by a strong emotional connection, trust, and preference for the brand over competitors (Mulyono & Situmorang, 2018). Attitudinally loyal customers exhibit a high level of brand commitment, as they believe that the brand aligns with their values and meets their expectations (Mokha & Kumar, 2022).

On the other hand, behavioral loyalty focuses on the actual actions and purchase behaviors of customers. It is demonstrated through repeat purchases, increased spending, and a higher share of wallet allocated to the brand (Kaur et al., 2021). Behaviorally loyal customers consistently choose the brand over competitors and maintain their patronage even in the face of attractive alternatives or temporary dissatisfaction (Kumar et al., 2022).

In the e-commerce context, customer loyalty is particularly crucial, as online platforms strive to retain customers in a highly competitive digital marketplace (Mulyono & Situmorang, 2018). E-commerce customer loyalty can be manifested through behaviors such as repeat visits to the

website, frequent purchases, higher order values, and resistance to switching to other online platforms (Syapsan, 2019).

Prior research consistently demonstrates that E-CRM strategies effectively improve customer loyalty in digital settings (Farmania et al., 2021; Kumar & Mokha, 2022; Yang & Babapour, 2023). Customer loyalty, characterized by repeat purchasing, advocacy, and resistance to competing offers, remains a key indicator of e-commerce success (Kaur et al., 2021; Syapsan, 2019). Loyalty comprises attitudinal, behavioral, and cognitive dimensions, each influencing long-term profitability and sustainable competitive advantage (Farmania et al., 2021; Nasir et al., 2021). However, additional exploration of psychological moderators remains warranted (Mokha & Kumar, 2022).

Mediating Factors between E-CRM and Customer Loyalty

Customer Experience

Customer experience encompasses the entire emotional and cognitive customer journey with digital services, shaping satisfaction, trust, and loyalty (De Keyser et al., 2020; Dwivedi et al., 2021; Schmitt et al., 2015). It is defined as the sum of all interactions, perceptions, and emotions that a customer has with an e-commerce platform throughout their entire journey, from initial contact to post-purchase engagement (De Keyser et al., 2020; Kranzb et al., 2018). Customer experience encompasses various aspects, such as website navigation, product selection, checkout process, delivery, and customer support, which collectively shape the customer's overall impression and satisfaction with the e-commerce platform (Mokha & Kumar, 2022).

Previous studies highlight customer experience as an essential mediator through which digital interactions impact long-term customer relationships (Dwivedi et al., 2021; Kampani & Jhamb, 2020; Kumar et al., 2022). The mediating role of customer experience in the relationship between E-CRM and customer loyalty has gained significant attention in recent research (Kranzb et al., 2018; Mokha & Kumar, 2022). E-CRM initiatives, such as personalized recommendations, seamless omnichannel integration, and efficient customer support, serve as stimuli that shape customer perceptions and experiences (Kumar et al., 2022). These experiences, in turn, influence customer attitudes, behaviors, and ultimately, their loyalty towards the brand (De Keyser et al., 2020; Dwivedi et al., 2021).

Effective E-CRM enhances user experience by improving personalization, responsiveness, and service interactions, subsequently fostering loyalty (Kumar et al., 2022.; Mokha & Kumar, 2022). Mokha & Kumar, (2022) conceptualize customer experience as a crucial strategic requirement in the highly competitive environment. They identify four key dimensions of customer experience: peace of mind, moments of truth, outcome focus, and product experience. The authors highlight that e-CRM has a significant and positive impact on customer loyalty, with customer experience and satisfaction mediating this relationship (Kampani & Jhamb, 2020; Mokha & Kumar, 2022).

- **H5:** Customer Experience mediates the effect of E-CRM on Customer Loyalty.
- **H8:** Customer Experience mediates the effect of E-CRM on Customer Satisfaction.

Customer Satisfaction

Customer satisfaction, reflecting customers' overall evaluations of digital platforms based on their experiences and expectations (Martasari, 2023; Nasir et al., 2021; Oliver, 2014), strongly predicts loyalty and advocacy in e-commerce (Farmania et al., 2021; Mulyono & Situmorang, 2018). It is defined as the extent to which a customer's expectations are met or exceeded by their experience with an e-commerce platform (Kumar et al., 2022.; Martasari, 2023; Mokha & Kumar, 2022). Customer satisfaction is influenced by various factors, such as product quality, service reliability, ease of use, timely delivery, and process transparency (Kumar et al., 2022.; Nurjannah et al., 2022). Satisfied customers are more likely to continue patronizing the e-commerce platform, provide positive word-of-mouth, and demonstrate loyalty (Mokha & Kumar, 2022; Mulyono & Situmorang, 2018). Conversely, dissatisfied customers may switch to competitor platforms and damage the company's reputation (Kumar et al., 2022.; Mulyono & Situmorang, 2018).

Empirical evidence demonstrates that effective E-CRM strategies significantly improve customer satisfaction by providing seamless, personalized, and reliable interactions (Farmania et al., 2021; Khanh et al., 2022; Yang & Babapour, 2023). E-CRM initiatives can enhance satisfaction by personalizing interactions, facilitating purchases, resolving issues promptly, and managing expectations (Kumar et al., 2022; Nurjannah et al., 2022). By leveraging customer data and technology, e-commerce platforms can tailor their offerings and communications to individual preferences, leading to higher levels of satisfaction and long-term customer relationships (Kumar et al., 2022; Mokha & Kumar, 2022).

Hence, this research proposes:

- **H6:** Customer Satisfaction mediates the effect of E-CRM on Customer Loyalty.

Customer Trust

Trust plays a critical role in online environments, reflecting customers' beliefs regarding the integrity, reliability, and security offered by e-commerce platforms (Faqih, 2022; Jaradat et al., 2020; Taheri et al., 2024; Yusuf et al., 2023). It is a fundamental aspect of online relationships and a catalyst for the rapid adoption of online services (Faqih, 2022; Mellisa et al., 2020). The absence of trust is a serious obstacle to the adoption of online-based technologies, as the online domain is radically different from the traditional domain, and the relationships developed in this environment do not follow the same patterns and rules (Faqih, 2022; Jaradat et al., 2020). Trust is particularly significant in digital contexts due to inherent uncertainties about privacy, security, and vendor reliability (Rasty et al., 2021; Soleimani, 2022). Lack of trust increases ambiguity among potential customers, raises their sense of insecurity, and evokes negative risk perceptions that inherently lead to unfavorable feelings towards performing internet shopping behavior (Faqih, 2022; Mellisa et al., 2020). These negative aspects that evolve due to the lack of trust have considerably reinforced the significance of trust in online domains (Faqih, 2022; Mellisa et al., 2020).

Previous studies consistently indicate trust as a significant mediator connecting E-CRM practices and customer loyalty (Taheri et al., 2024; Yusuf et al., 2023). Customer trust in this study is conceptualized as a multidimensional construct, encompassing four key dimensions: trust, reliability, integrity, and assurance. These dimensions collectively contribute to the overall trust that customers have in the e-commerce platform and its ability to meet their expectations and protect their interests.

Therefore, this study hypothesizes:

- **H7:** Customer Trust mediates the effect of E-CRM on Customer Loyalty

Direct Relationship Between E-CRM And Customer Loyalty

Beyond mediation, prior literature suggests a direct impact of E-CRM on customer loyalty, emphasizing strategic customer relationship management, including personalization, interactivity, and problem-solving mechanisms (Khan & Khawaja, 2013; Lee-Kelley et al., 2003). E-CRM encompasses various strategies and tools used by businesses to manage customer relationships electronically, such as personalized communication, secure transactions, responsive customer service, and data-driven insights (Faqih, 2022; Kumar & Mokha, 2022).

Effective implementation of E-CRM has been shown to positively influence customer loyalty by demonstrating reliability, competence, and benevolence in online interactions (Faqih, 2022; Kurniati et al., 2019). E-CRM strategies that focus on fostering trust, transparency, and reliability can create a strong foundation for long-term customer relationships and loyalty (Faqih, 2022; Kumar & Mokha, 2022). Previous studies have established the direct link between E-CRM and customer loyalty. Satisfied customers are more likely to engage in repeat purchases, share personal information for personalized services, and pay premium prices, as they perceive lower risks and uncertainties in their interactions with the company (Pratiwi et al., 2022). Customer loyalty built through effective E-CRM implementation leads to positive word-of-mouth, as satisfied and trusting customers are more likely to recommend the company to others, thereby enhancing loyalty (Mokha & Kumar, 2022).

Considering the strong alignment between effective E-CRM initiatives and customer retention strategies, the current study posits:

- **H4:** E-CRM technology positively affects customer loyalty in e-commerce.

This hypothesis suggests that E-CRM strategies positively influence customer loyalty, highlighting the importance of building and maintaining customer confidence through reliable, secure, and personalized electronic interactions. By investing in E-CRM initiatives that foster loyalty, businesses can cultivate long-term relationships and gain a competitive advantage in the digital marketplace (Khan & Khawaja, 2013; Lee-Kelley et al., 2003).

Moderating Role of Customer Anxiety in Digital Interaction

Anxiety plays a significant role in e-commerce consumer behavior, influencing trust, personal information disclosure, and purchasing decisions (Faqih, 2022; Gunasinghe & Nanayakkara, 2021; Khoa & Huynh, 2022). Research indicates that anxiety moderates the relationship between perceived benefits, online trust, and information disclosure in online shopping (Khoa & Huynh, 2022). Negative affective states, including anxiety, contribute to transaction abandonment, highlighting the need for systems that boost motivation and mitigate negative emotions (Bell et al., 2020). Anxiety involves psychological discomfort, apprehension, and uncertainty, especially regarding the safety of transactions, product quality, and privacy (Faqih, 2022; Rupeika-Apoga et al., 2022). The role of anxiety in e-commerce has become increasingly important, particularly in light of the COVID-19 pandemic (Şahin & Güler, 2022). The pandemic has accelerated the shift towards online shopping, but it has also heightened consumer anxiety due to the uncertainty and risks associated with the virus (Bell et al., 2020; Rupeika-Apoga et al., 2022). Customers may experience anxiety related to the safety of package deliveries, the reliability of supply chains, and the overall health risks associated with in-person shopping (Faqih, 2022).

COVID-19 pandemic-induced anxieties have further magnified these psychological concerns in digital interactions, making anxiety a critical but underexplored moderating factor in consumer technology adoption studies (Gunasinghe & Nanayakkara, 2021; Şahin & Güler, 2022). Consequently, incorporating anxiety into the understanding of E-CRM technology's effectiveness offers significant theoretical insights (Khoa & Huynh, 2022). E-CRM can play a crucial role in mitigating customer anxiety and fostering a sense of trust and confidence in e-commerce (Bell et al., 2020; Faqih, 2022). By providing clear and transparent information about payment security measures, privacy policies, and product quality assurance, businesses can alleviate customer concerns and build trust (Khoa & Huynh, 2022; Rupeika-Apoga et al., 2022). E-CRM technologies, such as live chat and customer support, can provide prompt assistance and reassurance to anxious customers, helping to reduce their apprehensions (Bell et al., 2020; Faqih, 2022).

The present research explicitly investigates anxiety as a moderator, proposing:

- **H9:** Customer anxiety significantly moderates the relationship between E-CRM technology and customer experience.
- **H10:** Customer anxiety significantly moderates the relationship between E-CRM technology and customer satisfaction.
- **H11:** Customer anxiety significantly moderates the relationship between E-CRM technology and customer trust.

These hypotheses suggest that the impact of E-CRM on customer experience, satisfaction, and trust is contingent upon customers' anxiety levels. E-commerce businesses should consider customers' emotional states, particularly anxiety, when designing and implementing E-CRM strategies to enhance the effectiveness of these initiatives in shaping customer perceptions and driving positive outcomes (Faqih, 2022; Khoa & Huynh, 2022).

Theoretical Foundation: Stimulus-Organism-Response (SOR) Framework

The Stimulus-Organism-Response (SOR) framework, initially developed by Russell & Mehrabian, (1974), serves as a robust theoretical foundation to understand consumer behavioral processes, especially within technology-mediated environments. According to the SOR framework, environmental stimuli (S) influence individuals' internal states or organisms (O), subsequently eliciting specific behavioral responses (R) (Jacoby, 2002; Russell & Mehrabian, 1974). The framework provides a comprehensive theoretical lens for exploring psychological and behavioral responses arising from interactions with digital technologies, making it particularly suitable for e-commerce contexts. In this study, E-CRM technology represents the primary external stimulus (S). E-CRM initiatives, such as personalized communication, security measures, interactivity, and responsive customer support, serve as influential stimuli capable of significantly shaping consumers' internal psychological states—specifically, customer experience, satisfaction, and trust—classified as the organism (O). Prior research strongly supports the influence of technology-driven stimuli in altering consumer attitudes, emotions, and cognitive evaluations (Dwivedi et al., 2021; Farmania et al., 2021; Yang & Babapour, 2023).

The organismic states in this study customer experience, customer satisfaction, and customer trust function as critical psychological and cognitive mediators, translating the effects of external E-CRM stimuli into observable behavioral responses. These organismic variables are central to the SOR framework, as they bridge external technological interactions and ultimate customer behavior outcomes (Kampani & Jhamb, 2020; Taheri et al., 2024; Yusuf et al., 2023). Specifically, enhanced experiences, greater satisfaction, and increased trust are theorized to

promote favorable consumer behaviors, including increased customer loyalty, repeat purchase intentions, and brand advocacy. Crucially, this research extends the classical SOR framework by explicitly incorporating customer anxiety as a novel moderating psychological factor. Anxiety, reflecting emotional states of worry and apprehension during online interactions, serves as a boundary condition influencing the relationship between external technological stimuli (E-CRM) and organismic states (customer experience, satisfaction, and trust). By introducing anxiety as a moderator, this study provides significant theoretical enrichment to the traditional SOR framework, capturing more nuanced consumer psychological dynamics and clarifying conditions under which digital technology interactions might be less effective due to psychological barriers (Faqih, 2022; Gunasinghe & Nanayakkara, 2021).

Thus, applying the SOR framework within this research not only facilitates a deeper theoretical understanding of consumer responses to digital relationship management strategies but also offers novel theoretical insights into the psychological processes underlying technology-mediated consumer interactions. This extended SOR model provides both theoretical clarity and practical insights, aiding managers and researchers in effectively navigating psychological complexities in digital consumer environments.

Research Methods

This research utilized a rigorous quantitative methodology with a cross-sectional survey design to empirically investigate the relationships among E-CRM, customer experience, satisfaction, trust, and loyalty, incorporating anxiety as a psychological moderator within the context of Indonesian e-commerce. Specifically, data were collected from 500 respondents selected via a purposive sampling technique, ensuring recent transactional engagement (within the past six months) with major Indonesian online marketplaces, including Tokopedia, Shopee, Lazada, Bukalapak, and Blibli. Measurement items were meticulously adapted from previously validated scales to ensure construct reliability and validity, employing a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM), executed with SmartPLS 4.0 software, chosen for its capability to handle complex mediation and moderation models, accommodate non-normal data, and effectively predict structural relationships. Furthermore, the study rigorously adhered to ethical research standards by clearly ensuring informed consent, anonymity, and data confidentiality throughout the data collection and analytical procedures, thus upholding methodological integrity and enhancing the credibility of the findings.

Results and Discussions

Measurement Model Evaluation

Prior to hypothesis testing, a rigorous evaluation of the measurement model was performed. Internal consistency reliability was confirmed by Cronbach's Alpha and Composite Reliability values (all > 0.70). Convergent validity was established with Average Variance Extracted (AVE) values exceeding the recommended 0.50 threshold, and discriminant validity was affirmed through the Fornell–Larcker and HTMT criteria (all values < 0.90), thereby ensuring construct validity and reliability (Hair et al., 2019).

Structural Model Evaluation (SEM Results)

The structural model analysis was executed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results of the hypothesis testing are summarized clearly in Table 1 and depicted visually in Figure 1.

Table 1. Hypothesis Testing Results

Hypothesis	Hypothesized Relationship	Path Coefficient (β)	t-value	p-value	Decision
H1	E-CRM \rightarrow Customer Experience	0.651	18.913	0.000	Accepted
H2	E-CRM \rightarrow Customer Satisfaction	0.468	11.405	0.000	Accepted
H3	E-CRM \rightarrow Customer Trust	0.718	25.682	0.000	Accepted
H4	E-CRM \rightarrow Customer Loyalty	0.155	5.727	0.000	Accepted
H5	Customer Experience mediates E-CRM \rightarrow Customer Loyalty	0.102	3.002	0.003	Accepted
H6	Customer Satisfaction mediates E-CRM \rightarrow Customer Loyalty	0.146	5.236	0.000	Accepted
H7	Customer Trust mediates E-CRM \rightarrow Customer Loyalty	0.185	4.507	0.000	Accepted
H8	Customer Experience mediates E-CRM \rightarrow Customer Satisfaction	0.279	8.972	0.000	Accepted
H9	Anxiety moderates E-CRM \rightarrow Customer Experience	0.385	5.581	0.000	Accepted
H10	Anxiety moderates E-CRM \rightarrow Customer Satisfaction	-0.099	1.500	0.134	Not Accepted
H11	Anxiety moderates E-CRM \rightarrow Customer Trust	0.197	3.176	0.002	Accepted



Figure 1. Structural Equation Model Results (PLS-SEM)

The SEM results illustrate strong explanatory power (R^2): Customer Experience (0.618), Customer Satisfaction (0.640), Customer Trust (0.666), and Customer Loyalty (0.559).

Discussion of Findings

Direct Effects of E-CRM (H1–H4)

The findings significantly confirm that E-CRM positively influences customer experience (H1), satisfaction (H2), trust (H3), and loyalty (H4). This supports existing literature highlighting digital CRM technologies as critical determinants of customer relationship outcomes (Farmania et al., 2021; Yang & Babapour, 2023). Practically, these findings underline the importance for e-commerce platforms to strategically implement personalized, responsive, and secure digital engagement practices to enhance overall customer perceptions and loyalty.

Mediating Roles of Customer Experience, Satisfaction, and Trust (H5–H8)

This study strongly validates customer experience (H5), satisfaction (H6), and trust (H7) as mediators linking E-CRM technology with customer loyalty. Additionally, customer experience significantly mediated the relationship between E-CRM and customer satisfaction (H8). These mediation outcomes align closely with previous empirical studies underscoring psychological and cognitive states as critical pathways translating technology-enabled interactions into sustained loyalty and satisfaction (Dwivedi et al., 2021; Kampani & Jhamb, 2020). Businesses should thus prioritize optimizing customer experience, satisfaction, and trust through advanced E-CRM strategies to foster sustained customer loyalty.

Moderating Role of Anxiety (H9–H11)

An important contribution is the moderation effect of anxiety, significantly moderating the relationships between E-CRM and customer experience (H9) and trust (H11). Anxiety diminished the effectiveness of E-CRM on these psychological responses, highlighting the crucial role of anxiety management in digital environments (Faqih, 2022; Gunasinghe &

Nanayakkara, 2021). E-commerce practitioners should explicitly integrate strategies to alleviate customer anxiety, such as transparent communication, enhanced privacy measures, and trust-building initiatives.

Interestingly, anxiety did not moderate the relationship between E-CRM and customer satisfaction (H10), suggesting customer satisfaction evaluations might be more influenced by transaction outcomes rather than anxiety-induced emotional states. This nuanced finding provides critical direction for future research, indicating that certain consumer perceptions (experience and trust) may be more sensitive to anxiety compared to others (satisfaction).

Theoretical Contributions

This research significantly enriches the Stimulus-Organism-Response (SOR) theory (Jacoby, 2002; Russell & Mehrabian, 1974), clearly integrating customer anxiety as a moderating factor. The results provide nuanced insights, clarifying boundary conditions under which technology-driven consumer relationships are effective or constrained by psychological states, thereby offering valuable theoretical advancement.

Practical Implications

From a practical perspective, the findings provide actionable recommendations for e-commerce managers. Specifically, managers must strategically focus on optimizing E-CRM practices to enhance customer experience, satisfaction, and trust. Concurrently, explicit anxiety management initiatives, such as ensuring transaction security, transparent privacy policies, and personalized interactions, are critical in maximizing the effectiveness of digital CRM strategies.

Limitations And Directions For Future Research

Despite methodological robustness, limitations remain, including the cross-sectional nature of this study limiting causal inference. Longitudinal studies are recommended to further establish causality. The generalizability of findings outside the Indonesian context warrants future exploration. Additional research could also explore other potential psychological moderators and diverse customer segments to further enrich theoretical understanding and managerial insights.

Conclusion

This research provides empirical evidence regarding the significant role of E-CRM in influencing customer loyalty within e-commerce. The results clearly demonstrate that effective E-CRM positively impacts customer experience, satisfaction, trust, and customer loyalty. Importantly, customer experience, satisfaction, and trust significantly mediated the relationship between E-CRM and customer loyalty, highlighting these psychological states as essential pathways through which E-CRM strategies enhance sustained customer engagement. Furthermore, customer experience was identified as a critical mediator influencing customer satisfaction, reinforcing the importance of delivering meaningful online experiences to achieve sustained customer satisfaction and loyalty. A major theoretical contribution of this study lies in its explicit integration of customer anxiety as a psychological moderator within the SOR framework. Anxiety significantly moderated the relationships between E-CRM and both customer experience and trust, indicating that anxiety can diminish the effectiveness of digital interactions. Interestingly, anxiety did not moderate the E-CRM–customer satisfaction relationship, suggesting a nuanced boundary condition regarding anxiety's influence on different customer psychological states. This finding adds depth to our theoretical

understanding of how emotional and cognitive processes function differently within digital consumer interactions.

From a practical perspective, these findings offer clear guidance for e-commerce practitioners, emphasizing the necessity of developing robust, anxiety-reducing digital strategies. E-commerce platforms should prioritize personalized and secure interactions, transparent communication, and robust trust-building mechanisms to mitigate anxiety, enhance customer experience, and build sustained trust. Furthermore, understanding that anxiety may not significantly impact satisfaction highlights the need for practitioners to differentiate their strategic approaches when addressing specific psychological outcomes. Despite the methodological rigor, this research acknowledges limitations inherent to its cross-sectional survey design, restricting causal inference. Future research should thus adopt longitudinal designs or experimental methodologies to strengthen causal interpretations. Additionally, extending this study to diverse cultural or sectoral contexts, exploring other potential psychological moderators, and examining varied consumer segments could further enrich theoretical insights and practical applicability. Ultimately, this study contributes substantial theoretical and practical advancements, offering nuanced insights into managing psychological aspects of customer relationship management in digital environments and providing a robust foundation for future research into digital consumer behaviors.

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