

DEVELOPING AN E-CRM MODEL TAILORED TO MSMES NEEDS FOR ENHANCING COMPETITIVENESS IN THE DIGITAL ERA

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy but often face barriers in adopting digital technologies, particularly in customer relationship management (CRM). This study aimed to develop and evaluate a contextually adaptive Electronic Customer Relationship Management (E-CRM) model tailored to MSMEs' operational realities. Using a mixed-methods approach, the research included needs analysis, model development, and pilot implementation involving five MSMEs in Surakarta. Key barriers identified were lack of human resources, high development costs, and low digital literacy. The proposed web-based E-CRM prototype included simplified interfaces, data analytics, and communication automation. Results showed improvements in customer retention (+23%), reduced marketing costs (-18%), and increased revenue (+12%). The findings highlight the model's potential to enhance MSME competitiveness through accessible, user-friendly digital innovation.

KEYWORDS

MSMEs, Digital Transformation, E-CRM Model, Customer Engagement, Technology Adoption



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INTRODUCTION

The rapid advancement of digital technologies has significantly transformed business landscapes, positioning customer relationship management (CRM) as a strategic imperative for sustaining competitiveness. In this context, Electronic Customer Relationship Management (E-CRM) offers considerable potential to enhance customer engagement, operational efficiency, and revenue performance through data-driven and automated interactions. Nevertheless, the adoption of E-CRM systems among Micro, Small, and Medium Enterprises (MSMEs) remains limited, particularly in developing countries such as Indonesia.

Despite accounting for over 60% of Indonesia's Gross Domestic Product (GDP) and employing more than 97% of the national workforce, MSMEs often struggle to integrate digital solutions due to constraints in digital literacy, financial resources, and human capital. Existing E-CRM platforms are frequently perceived as overly complex, cost-intensive, and misaligned with the operational characteristics of MSMEs, thereby impeding their effective utilization.

Addressing these challenges requires the development of contextually adaptive and accessible digital solutions tailored to the specific needs and capabilities of MSMEs. This study aims to design and evaluate a customized E-CRM model that accommodates the technological readiness and practical conditions of MSMEs in Surakarta, Central Java. Employing a mixed-methods approach—including needs assessment, system development, and pilot implementation—the research seeks to bridge the gap between digital innovation and inclusive enterprise development. In doing so, it contributes to the discourse on sustainable digital transformation and supports the objectives of Sustainable Development Goal 9 (SDG 9), which emphasizes innovation, infrastructure, and inclusive industrialization.

Micro, Small, and Medium Enterprises (MSMEs) represent a critical component of Indonesia's economic landscape, contributing over 60% to national Gross Domestic Product (GDP) and accounting for more than 97% of employment (Akhmad and Purnomo, 2021; Ministry of Cooperatives and SMEs, 2022). This trend is not unique to Indonesia; in many developing economies, MSMEs are widely recognized as engines of local economic growth and social development (Tambunan, 2019; OECD, 2020). However, despite their economic relevance, MSMEs continue to face persistent structural and strategic challenges—particularly regarding the adoption and integration of digital technologies in business operations, most notably in customer relationship management (Jatmiko, 2022; Nguyen and Waring, 2013).

Barriers such as low digital literacy, inadequate human resource capacity, and limited technological infrastructure have been frequently cited as major constraints hindering MSMEs' digital transformation (Alshawi et al., 2011; Fjermestad and Romano, 2003; Ratnasari et al., 2021). Addressing these challenges requires practical, accessible, and contextually grounded technological interventions.

Electronic Customer Relationship Management (E-CRM) offers a promising pathway for MSMEs to strengthen their customer engagement capabilities. Empirical studies have demonstrated that E-CRM can enhance operational efficiency, increase customer satisfaction, and foster long-term loyalty (Mozaheb et al., 2015; Solechan and Kusumo, 2022; Rosalina et al., 2019). Through the strategic use of integrated digital data, E-CRM enables firms to manage customer interactions more effectively and build sustained value relationships (Gefen and Straub, 2004; Payne and Frow, 2005). In the Indonesian context, William and Andah (2020) found that E-CRM adoption positively influences MSME revenue performance. Complementary findings by Zulfata et al. (2018) suggest that tailored CRM frameworks can significantly improve communication outcomes in small retail enterprises.

Nevertheless, the diffusion of E-CRM among MSMEs remains limited, largely due to a lack of models that align with the distinct operational constraints, user behaviors, and technological readiness levels characteristic of this sector (Akhmad et al., 2025; Astuti et al., 2023). This underscores the need for the development of adaptable, affordable, and trust-oriented E-CRM models that can be integrated into existing MSME systems and infrastructures (Romano and Fjermestad, 2003).

Accordingly, this study seeks to design and validate a need-based E-CRM optimization model tailored to the real-world conditions of MSMEs. The research further

explores the key success factors influencing E-CRM implementation, offering both theoretical and practical insights. In doing so, it contributes to ongoing discourse on inclusive digital innovation and supports global development agendas, particularly Sustainable Development Goal 9 (SDG 9), which emphasizes the importance of fostering industry, innovation, and infrastructure (UNDP, 2021)..

RESEARCH METHOD

This study adopted a mixed-methods approach, structured into three main phases: needs analysis, model development, and implementation-evaluation. The research design followed an exploratory sequential mixed-methods strategy, where qualitative insights informed the subsequent development and testing of a technology-based solution.

The population in this study consisted of MSME actors operating in Surakarta, Central Java, Indonesia. A purposive sampling technique was employed to ensure relevance and depth of data. In the first phase, a structured survey was distributed to 50 MSME owners to identify the key challenges in adopting digital technologies. In parallel, in-depth interviews were conducted with 10 selected MSMEs to obtain more nuanced perspectives on customer relationship management practices and digital readiness. Based on the findings from the needs analysis, a web-based prototype of an Electronic Customer Relationship Management (E-CRM) model was developed. The prototype featured key modules, including customer data management, interaction tracking, and consumer behavior analytics—tailored to the operational characteristics of MSMEs.

The final phase involved implementing the prototype in five MSMEs from the food and fashion sectors over a period of three months. A combination of quantitative and qualitative methods was used to evaluate the effectiveness of the model. Quantitative evaluation was carried out using a pre-post design with paired-sample t-tests to measure changes in key metrics such as customer engagement and business performance. Qualitative evaluation was conducted through participant observations and follow-up interviews, with data analyzed using thematic coding to provide contextual depth and triangulate quantitative results.

RESULT AND DISCUSSION

The needs assessment phase provided valuable insights into the current state of digital capability and customer management practices among micro, small, and medium enterprises (MSMEs) in Surakarta, Indonesia. A survey involving 50 MSMEs and in-depth interviews with 10 MSME owners revealed that as many as 82% had not implemented any form of customer relationship management (CRM) system. This absence of CRM adoption reflects a substantial digital divide in managing customer data, interactions, and loyalty programs, which can limit competitiveness in the digital economy. Respondents identified several primary barriers. The most frequently mentioned challenge was **the** lack of human resources (74%), indicating a shortage of staff with adequate knowledge or training in digital tools. This was followed by high system development costs (65%), which suggests that financial constraints prevent small enterprises from investing in CRM platforms. Additionally, low levels of technological literacy (53%) also hindered adoption, showing that even if systems were available, users might lack the skills to use them effectively. These findings underscore the necessity of a CRM model tailored to the operational realities of MSMEs—simple, affordable, and compatible with the limited digital infrastructure often available in small businesses.

Table 1. Key Barriers to CRM Adoption Among MSMEs

Barrier Type	Percentage of Respondents (%)
Lack of human resources	74%
High system development cost	65%
Low technological literacy	53%
No CRM system in place	82%

To address the aforementioned barriers, a web-based Electronic Customer Relationship Management (E-CRM) prototype was designed specifically for MSMEs. The system design was rooted in the analysis of user needs and emphasized simplicity, functionality, and affordability. The model comprises three integrated modules designed to enhance customer relationship management within resource-constrained environments. The first module is a Simplified Interface, featuring a user-friendly dashboard with intuitive navigation and mobile responsiveness. This allows MSMEs with limited digital experience to access the platform easily, including those who primarily operate through smartphones. The second is a Data Analytics Module, which enables segmentation of customer groups, generation of customized reports, and monitoring of behavior and purchasing patterns. These functions are essential for strategic decision-making and allow MSMEs to tailor services and promotions based on customer insights. The third component is a Communication Module, which integrates email and WhatsApp APIs to automate customer notifications and marketing messages. This feature significantly reduces the time and cost required to manage interactions and follow-ups. The architecture of the model was developed to ensure scalability, allowing it to grow in functionality as MSMEs increase their capacity over time. The system is visualized in Figure 1.

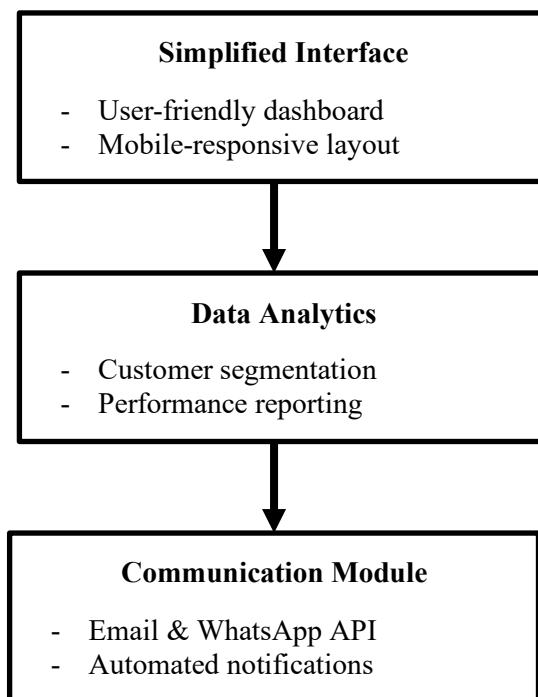


Figure 1. Core Components of the Developed E-CRM Model

To assess the real-world effectiveness of the proposed E-CRM model, a pilot implementation was carried out with five MSMEs from the food and fashion sectors. These enterprises were selected based on their existing customer bases and their expressed willingness to adopt new technology. Over a three-month period, the E-CRM prototype

was integrated into their daily operations. Quantitative evaluations—comparing pre- and post-implementation metrics—alongside qualitative feedback from users, were used to assess outcomes. The results demonstrated substantial improvements in three key performance indicators. First, customer retention increased by 23%, indicating a significant enhancement in client loyalty due to regular and targeted communication. Second, marketing expenditures decreased by 18%, attributed to the automation of customer engagement through WhatsApp and email notifications, which reduced the need for costly, manual marketing strategies. Finally, average monthly revenue increased by 12%, suggesting that better customer management and engagement translated into greater financial returns. These improvements collectively support the model's viability as a low-cost, high-impact digital innovation for MSMEs. Detailed results are presented in Table 2.

Table 2. Business Performance Indicators Before and After E-CRM Implementation

Indicator	Before Implementation	After Implementation	% Change
Customer Retention Rate	42%	65%	+23%
Marketing Expenditure	IDR 2.5 million/month	IDR 2.05 million/month	-18%
Average Monthly Revenue	IDR 12.5 million	IDR 14.0 million	+12%

The pilot results strongly indicate that the adoption of a context-specific E-CRM model can significantly contribute to improving MSME competitiveness through enhanced customer engagement, reduced operational costs, and increased sales performance.

The purpose of this study was to develop and evaluate an Electronic Customer Relationship Management (E-CRM) model tailored to the specific needs of micro, small, and medium enterprises (MSMEs) in the digital era. The findings reinforce the growing consensus in both academic literature and policy discussions that MSMEs remain a critical component of national economies, especially in developing countries like Indonesia. As supported by data from the Indonesian Ministry of Cooperatives and SMEs (2022), MSMEs contribute more than 60% to the national Gross Domestic Product (GDP) and account for over 97% of employment. Despite their economic importance, these enterprises continue to struggle with the adoption of digital technologies, particularly in customer management systems that are crucial for long-term sustainability and competitiveness.

The initial phase of this study identified a series of interrelated barriers preventing MSMEs from adopting digital CRM solutions. More than 80% of respondents lacked any form of CRM infrastructure, and the leading causes were insufficient human resources (74%), high system development costs (65%), and low technological literacy (53%). These results are consistent with the findings of Nguyen and Waring (2013), who argue that digital readiness among MSMEs in developing economies is typically hampered by both internal and external limitations. Alshawi et al. (2011) further emphasized that a lack of IT capability within small businesses often leads to the underutilization of technologies even when external support is available.

In response to these challenges, this study introduced a web-based E-CRM model that integrates essential customer relationship management features into a simplified and low-cost system. The model includes three primary components: a user-friendly interface, a data analytics module for customer segmentation and reporting, and an automated communication module integrated with WhatsApp and email. These design choices reflect the importance of usability and accessibility, as suggested by Gefen and Straub (2004), who found that trust and ease of use significantly influence technology acceptance, particularly in SMEs.

The implementation phase involving five MSMEs from the food and fashion sectors demonstrated that even limited digital interventions can lead to substantial business improvements. Over a three-month pilot period, enterprises reported an average increase

of 23% in customer retention, an 18% reduction in marketing costs, and a 12% rise in average monthly revenue. These results validate the theoretical expectations set forth by Payne and Frow (2005), who argue that CRM systems, when properly aligned with business strategy and customer data, can foster stronger customer relationships and enhance financial performance. Moreover, similar studies by Mozaheb et al. (2015) and Rosalina et al. (2019) have shown that E-CRM adoption improves organizational efficiency and customer satisfaction, both of which are crucial for MSME competitiveness.

From a practical standpoint, the success of the model demonstrates that small-scale, customized digital solutions can be effectively deployed even in resource-constrained environments. The use of popular and widely accessible communication platforms such as WhatsApp reflects the importance of integrating local technological habits into system design. This finding aligns with the conclusions of the OECD (2020), which suggests that the scalability and relevance of digital tools for MSMEs are heavily dependent on their compatibility with existing communication channels and user behaviors.

The implications of these findings are particularly important in the post-pandemic recovery era. As countries strive to rebuild their economies, MSMEs are positioned as drivers of inclusive growth. However, without access to affordable and contextually appropriate digital solutions, these enterprises may be left behind in the digital transformation agenda. The E-CRM model developed in this study directly addresses this gap by offering a pragmatic solution that aligns with the real conditions faced by MSMEs. Furthermore, the research contributes to broader development goals, particularly Sustainable Development Goal (SDG) 9, which emphasizes the role of innovation, industry, and infrastructure in promoting sustainable economic growth (UNDP, 2021).

In terms of academic contribution, this study extends the current body of knowledge on CRM implementation in MSMEs by offering an empirically tested model specifically designed for low-literacy and low-capacity environments. While previous research has often focused on large-scale enterprises or on high-tech solutions (Romano & Fjermestad, 2003), this study demonstrates that CRM technologies can be successfully downscaled and adapted for smaller businesses without compromising impact. It also highlights the importance of combining both qualitative and quantitative approaches in technology adoption research, enabling a more holistic understanding of user needs and implementation outcomes.

Nonetheless, the study is not without limitations. The sample size, while sufficient for exploratory research, remains limited to a single geographic area and a narrow range of business sectors. Future research could expand the model testing to a larger and more diverse group of MSMEs, including those in rural areas or in industries with more complex customer management needs. Additionally, longitudinal studies would be useful to assess the sustainability and long-term impact of E-CRM implementation.

In conclusion, this research provides compelling evidence that digital transformation among MSMEs can be accelerated through the development of targeted, user-centric solutions. The E-CRM model introduced in this study demonstrates measurable benefits in customer retention, marketing efficiency, and revenue growth. More importantly, it presents a replicable model for other regions facing similar challenges, contributing not only to academic discourse but also to the practical advancement of digital inclusion and MSME development.

CONCLUSION

This study set out to explore and address the fundamental challenges faced by micro, small, and medium enterprises (MSMEs) in adopting digital customer management

technologies, with the overarching objective of developing a practical and contextually relevant Electronic Customer Relationship Management (E-CRM) model. Grounded in the realities of Indonesian MSMEs, the research has successfully revealed that despite their central role in national economic development, most MSMEs remain constrained by limited digital literacy, financial resources, and human capital in implementing CRM systems.

By integrating mixed-methods research and real-world implementation, the study not only identified the key obstacles to E-CRM adoption but also offered an empirically tested model that aligns with the unique operational characteristics of MSMEs in emerging economies. The developed E-CRM model—featuring a simple interface, integrated customer analytics, and automated communication tools—has demonstrated measurable improvements in customer retention, marketing efficiency, and revenue generation. These outcomes support the initial hypothesis that a user-friendly, affordable, and accessible CRM system can significantly enhance the competitiveness of MSMEs in the digital economy.

Beyond practical applications, the findings also trigger a conceptual shift in how E-CRM systems are understood and applied in low-resource business environments. The study contributes to the theoretical discourse by introducing a model of "situationally adaptive E-CRM", which emphasizes the importance of customizing digital solutions based on the operational readiness and behavioral habits of MSME actors. This nuanced understanding goes beyond traditional CRM frameworks that are often derived from large enterprise contexts, and proposes a new direction in technology design—one that prioritizes technological minimalism, functional relevance, and behavioral integration.

Ultimately, the research reinforces the argument that digital transformation among MSMEs cannot be driven by technology alone. It requires a combination of adaptive system design, capacity building, and trust-building mechanisms that reflect the lived realities of MSME actors. The findings are particularly timely and relevant in the context of post-pandemic economic recovery and the global push toward achieving Sustainable Development Goals (SDG 9), particularly in fostering innovation and inclusive industrialization.

Future studies should further validate the "situationally adaptive" E-CRM approach across diverse industries and geographic regions. Moreover, longitudinal research would be valuable in understanding the sustainability and long-term behavioral changes triggered by such digital interventions. Nevertheless, the current research offers both a practical roadmap for MSME digitalization and a theoretical lens through which CRM implementation in developing economies can be more effectively understood and addressed.

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