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Adoption Of E-Crm In Smes: Opportunities And Challenges In Emerging Markets

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ABSTRACT

This study examines the adoption of Electronic Customer Relationship Management (E-CRM) systems among Small and Medium-sized Enterprises (SMEs) in developing economies. It highlights the potential of E-CRM to improve customer relationships, streamline business operations, and support sustainable growth, while also identifying major challenges affecting successful implementation. Using a mixed-methods approach, quantitative data were collected from 500 SMEs across multiple sectors and analyzed using SPSS and R. The findings reveal that government support, affordable technology access, and customized training programs significantly influence E-CRM adoption. The study provides valuable insights and practical recommendations for policymakers, technology providers, and SME entrepreneurs to enhance effective E-CRM implementation in emerging markets...

Keywords:: Adoption of E-CRM, SMEs, Emerging Markets, Opportunities, Challenges, Customer Relationship Management, Digital Transformation, Technology Adoption..

INTRODUCTION:

Electronic Customer Relationship Management (E-CRM) has become an essential business strategy in the digital era, helping organizations improve customer satisfaction, loyalty, and profitability. While large multinational companies have widely adopted E-CRM systems, Small and Medium-sized Enterprises (SMEs) in developing economies face unique challenges due to limited financial resources, weak technological infrastructure, and varying levels of digital literacy. Since SMEs contribute significantly to employment, GDP, and innovation, their ability to adopt effective customer management technologies is crucial for business growth and competitiveness. This study explores the major drivers and barriers influencing E-CRM adoption among SMEs, including customer personalization, operational efficiency, cost constraints, lack of skilled workforce, and data security concerns. The research also emphasizes the importance of stakeholder collaboration, supportive government policies, vendor compatibility, and flexible digital strategies to ensure successful and sustainable E-CRM implementation in emerging economies..

1.1 SMEs in Emerging Markets: Opportunities of E-CRM

Some strategic benefits of E-CRM for emerging market SMEs are plentiful opportunities. Herman et al. (2021)

were among those groups that found one such potential of enhanced customer relationship quality. They devised that online interaction increases loyalty and retention. Nasir et al. (2022) described how real-time communication with the help of online CRM software enables the business to remain on course while maintaining pace with shifting customer needs. Centralizing customers' information, as Khdour et al. (2021) proposed, facilitates the predictive selling and marketing abilities of companies. Furthermore, Melo et al. (2023) utilized longitudinal performance indicators to explain in which manner E-CRM helps small and medium-sized firms' growth with little effort from inputs. In particular, Galvão et al. (2018) argued that centralizing information is easy to perform strategic planning by segmenting customers. Second, cross-functional processes were also highlighted by Al-Madadha et al. (2021) as being facilitated by automation capabilities in E-CRM. Internet channels were also testified to be a source of competitive advantage by Morgan et al. (2023), especially in online markets. Scalability, Guerola-Navarro et al. (2022) illustrated, enables SMEs to scale up without increasing staff proportionally. Femina and Elayidom (2015) proved this digital maturity with customer satisfaction and enhanced conversion rates.

1.2 SMEs' Implementation Barriers to E-CRM Implementation in Emerging Markets

Except for this, however, are SMEs' implementation barriers to the execution of E-CRM implementation. Resource-based implementation barriers were theorized by Omol (2024) and include unbudgeted licensing charges, customization, and maintenance costs. Training charges were theorized by Calik and Bardudeen (2016) to be an element of resource barriers. Lack of skills has also been an issue, observed Al-Madadha et al. (2021), where the technical skills are not available or beyond budget. Data protection issues have also occurred, cautioned Blanco- Gonzalez-Tejero et al. (2024), who cautioned that poor cybersecurity in SMEs leaves them vulnerable to a breach. The nuance of protection legislations for emerging markets data was contested by Zeb et al. (2021) in the case of small firms' compliance expenditures. Resistance in culture and organizational inertia's contribution to adoption success, particularly in heritage- focused SMEs, was highlighted by Salah et al. (2021). Inability to commit by employees and

fear of job loss are accountable for altering change processes. Choi and Kim (2022) reported the need for strategic change management so that internal resistance can be overcome. Inadequate digital infrastructure in rural or undeveloped regions was assessed by Fata et al. (2022) as an issue, and they presumed that cloud technologies of E-CRM can become obsolete when internet is slow. All these combined throws a shadow on failure in adoption, as also observed in the exploratory study of Lee-Kelley et al. (2003).

1.3 E-CRM's Emerging Markets Environment

Emerging markets environment for E-CRM is opportunity and complexity. Digitalization, writes Melo et al. (2023), is industry-biased and geography-biased and demands adoption models tailor-made. Miguel et al. (2022) correlated the embracement of technology with macroeconomic determinants such as inflation, finance accessibility, and exchange rate volatility. An informal business and community network was the focus of investigation by Al- Madadha et al. (2019), where the focus was on trust-based digital solutions being critical. Ineffective execution of government-subsidized digital transformation initiatives, as highlighted by Guerola-Navarro et al. (2022), impacts E-CRM maturity. However, all such efforts in SME digital awareness are increasing, observes Blanco-Gonzalez-Tejero et al. (2024). Multinationals' competition, as observed by Kraus et al. (2022), forces SMEs to adopt innovative routes such as E-CRM in the expectation of staying in the game. There is also a digitally native and younger generation of customers that is redefining the CRM agenda, an observation by Zeb et al. (2021). Mobile-first user experience and social-media integration strategies are an increasingly dominant top priority, a development Nambisan et al. (2017) passionately promoted. Salah et al. (2021) also stressed having to personalize the E-CRM system based on the local consumer's choice as well as cultural nuances of their language. The rich, complex facets of such drivers to context merely highlight the necessity for robust, resilient CRM systems, as Nasir et al. (2022) recommended.

REVIEW OF LITERATURE

Lee-Kelley et al. (2003): The researchers examined organizational learning and responsiveness through E-CRM adoption. They found that management support, employee training, and internal digital champions are essential for overcoming resistance to technology adoption in SMEs.

Femina & Elayidom (2015): The study focused on the use of data mining and predictive analytics in CRM systems to improve marketing accuracy. It highlighted that SMEs in developing economies face challenges due to poor data management and lack of analytical skills.

Santouridis & Tsachtani (2015): The study explained how E-CRM improves customer relationship management through digital transformation and personalized services. It highlighted that successful implementation requires strategies suited to local business and technological conditions, especially for SMEs in developing economies.

Calik & Bardudeen (2016): The study highlighted the importance of emotional connection and customer trust in E-CRM systems. It suggested that CRM platforms should support local languages and cultural preferences to improve customer loyalty in emerging economies.

Nambisan et al. (2017): This study presented E-CRM as part of a broader digital innovation ecosystem. It stressed the need for partnerships, CRM-as-a-service models, and resource-sharing platforms to support SME participation in digital transformation.

Galvão et al. (2018): The study focused on digital integration in SMEs and supply chains. It emphasized the importance of interoperability, stakeholder coordination, and scalable digital solutions for successful E-CRM implementation in developing economies.

Al-Madadha et al. (2021): The research highlighted innovation barriers affecting E-CRM adoption in SMEs. It suggested that integrated and modular digital systems are necessary to improve CRM performance and organizational coordination.

Herman et al. (2021): The researchers discussed the role of E-CRM in improving customer experience and business efficiency through automation. They found that SMEs in developing economies often lack proper IT infrastructure and training, making public-private support essential.

Fata et al. (2022): The authors explained that E-CRM tools improve customer loyalty through targeted communication and digital engagement. They emphasized the importance of low-cost, mobile-friendly, and localized CRM solutions for SMEs in emerging markets.

Morgan et al. (2023): This study analyzed digital transformation in SMEs and emphasized that E-CRM enhances competitiveness and business agility. It recommended affordable and customized CRM solutions for SMEs operating in low-technology environments.

Omol (2024): The research examined E-CRM adoption during the COVID-19 pandemic and found that businesses increasingly recognized the importance of digital customer engagement. Government support and training programs played a key role in increasing CRM awareness among SMEs.

2.1 E-CRM Drivers and Advantages

The literature highlights several benefits and key drivers supporting the adoption of E-CRM systems. E-CRM improves customer interaction through personalized communication and customized services, leading to higher customer satisfaction and loyalty. It also enhances operational efficiency by automating marketing, sales, and customer data management, reducing costs and manual work. Researchers have emphasized that E-CRM helps organizations gain a complete understanding of customer behavior, improving strategic decision-making and product development. Additionally, E-CRM provides competitive advantages by enabling better customer experiences, market expansion, and scalable business growth, especially for SMEs. Increasing digital literacy and the rapid growth of online transactions are further motivating businesses to adopt E-CRM systems to remain competitive in the digital economy.

Barriers and Challenges to E-CRM

The literature identifies several barriers affecting successful E-CRM implementation, particularly among SMEs. High costs related to software purchase, customization, maintenance, and technical support are major challenges. Lack of skilled employees and limited IT knowledge further reduce the effective use of E-CRM systems. Security and data privacy concerns also discourage adoption due to risks of data breaches and compliance issues. Additionally, resistance to organizational change, employee fear of automation, and dependence on traditional business methods slow down implementation. Technical difficulties in integrating E-CRM with existing systems create data management problems. In developing economies, poor infrastructure, limited internet connectivity, and unreliable power supply further complicate E-CRM adoption, making organizational, financial, and technological readiness essential for successful implementation.

SME Environment and Emerging Markets E-CRM

Research on E-CRM adoption among SMEs in emerging economies highlights several unique opportunities and challenges. SMEs often have close customer relationships and flexible business structures, which can support E-CRM implementation, but informal business practices and limited digital systems create difficulties in managing customer data effectively. Differences in digital infrastructure between urban and rural areas, cultural preference for personal communication, and lack of strong policy support further affect E-CRM adoption. Additionally, many CRM solutions are designed for large organizations and are often too costly or unsuitable for SMEs. Weak regulatory frameworks related to data protection and digital transactions also create uncertainty. These challenges indicate the need for affordable, customized, and locally adapted E-CRM frameworks to support SMEs in emerging markets.

Methodology

This research employed the quantitative approach in the examination of E-CRM adoption in emerging economy SMEs by challenge and opportunity. The application of a standard questionnaire as the primary instrument in the collection of data in the attempt to establish consistency and ease of statistical testing was utilized. The questionnaire was framed on the basis of systematic review of literature on E-CRM adoption, technology acceptance models, and the characteristics of SMEs in emerging economies. The questionnaire comprised a mix of close-ended questions with Likert scale, multiple choice, and demographics for obtaining different variables of E-CRM adoption,. The survey questionnaire was pilot-tested among a few owners and managers of SMEs and was seen to be understandable, valid, and inclusive and was revised as and when required on their suggestions. Owners, Managing Directors or Senior Managers of Small and Medium-sized Enterprises who conduct business within an emerging market, i.e., a wide variety of industries including manufacturing, retail, services, and technology constituted the study universe. A non-probability sampling technique, i.e., snowball sampling and convenience sampling, has been employed to sample the desired number of interviewees due to the existence of logistical constraints and inaccessibility of a full sampling frame of the selected emerging economy SMEs. Researchers utilized online questionnaire website tools for spreading the questionnaire, along with direct personal contact through use of business groups and local chamber of commerce in a bid to ensure maximum coverage as well as response rate. Data collection process was put in place to acquire responses of 500 data cases, i.e., adequate sample size for statistical analysis. A case is an SME as well as one person's perception of adopting E-CRM. Process of data collection was spread over a period of three months, giving adequate time to the respondents for completing the questionnaire according to their convenience. Ethical principles, such as informed

consent, anonymity, and data confidentiality, were adopted in the entire data collection process. That they might withdraw at any time, what the research is all about, and how their data will be stored and utilized was also thoroughly explained to them.

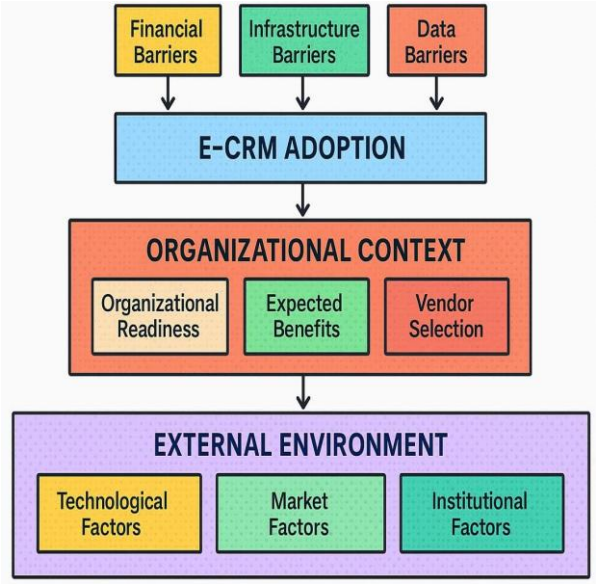

Figure 1. E-CRM Adoption Framework in Emerging Markets

Figure 1 gives the conceptual model of describing E-CRM system adoption in emerging economies. The model has three different super layers: E-CRM Adoption, Organizational Context, and External Environment. The E-CRM Adoption layer divides the primary barriers organizations encounter while they consider different E-CRM solutions: Financial Barriers, Infrastructure Barriers, and Data Barriers. Financial barriers are the high initial cost involved in E-CRM systems, infrastructure barriers are the availability of the infrastructures for technology to host such systems, and data barriers are the availability or quality of information. They are immediate barriers because they immediately cause developing country organizations not to be able to employ E-CRM solutions. Organizational Context layer assigns organizational drivers to the internal organization to the deployment of E-CRM, i.e., Organizational Readiness, Expected Benefits, and Vendor Selection. Organizational readiness is a situation in which an organization is ready in capabilities, resources, and culture. Expected Benefits are value perceived to an organization when it can expect to gain something after having implemented an E-CRM system. Vendor Selection is a very vital activity for organizations in

choosing the most appropriate vendor for the system. External Environment layer takes into consideration those elements outside the organization and which influence the adoption such as Technological Factors, Market Factors, and Institutional Factors. Technology is reflected in technology availability and preparedness, markets by customer needs and competition, and institutions by standards and regulations that influence the adoption process. This is a multi- dimensional model to implement E-CRM, and both internal as well as external dimensions need to be accomplished so that it can be implemented effectively. Raw data was neatly cleaned and standardized after the data collection was completed.

It included a check for outliers, inconsistency, and missing values and performing the required data transformation so that it becomes correct and ready to use in statistical analysis. Clean data were subsequently exported to statistical packages to be analyzed. The core computer programme used for data analysis was SPSS (Statistical Package for the Social Sciences) and

R. SPSS was used for descriptive statistics, frequency table, cross-tabulation, and initial inferential analysis such as t-tests and ANOVA. R was utilized for carrying out sophisticated statistical modeling, i.e., factor analysis and regression analysis, in order to identify drivers and barriers to adoption of E-CRM and test relationships across various constructs.

2.2 Data Collection and Sampling

The study used a structured online questionnaire to collect data on E-CRM adoption among SMEs in a developing economy. The questionnaire included Likert scale questions to measure perceptions and attitudes, multiple-choice questions for demographic details, and open-ended questions for additional insights. SMEs were selected based on locally accepted business criteria such as annual turnover and number of employees. Convenience and snowball sampling methods were used due to the absence of a clear SME database. A total of 500 SME responses were collected to ensure reliable statistical analysis. Ethical considerations, including informed consent and data confidentiality, were maintained throughout the research process.

2.3 Data Analysis Software

The collected data were analyzed using SPSS and R statistical software. SPSS was mainly used for descriptive statistics such as frequency distributions, mean, standard deviation, cross-tabulation, t-tests, and ANOVA to examine relationships and differences among variables. It also supported basic data visualization through charts and graphs. R was used for advanced statistical analysis, including multiple linear regression, logistic regression, and exploratory factor analysis to identify key factors influencing E-CRM adoption. The combined use of SPSS and R provided comprehensive and reliable statistical analysis, improving the accuracy and depth of the research findings.

Research Variables and Measures

Research variables under study in this research were well-conceptualized and whose measures were collected in efforts to capture the multi-dimensionality of the adoption of E-CRM for SMEs in emerging economies. Dependent variable, "E-CRM Adoption," was measured as a dichotomous variable (Adopted/Not Adopted) as well as on the Likert scale reflecting the level of maturity of adoption (e.g., experimentation for the first time, partial implementation, full integration). This facilitated discrete and continuous adoption analysis. Independent key variables were "Perceived Usefulness," defined as measured by a series of items that inquired

to what degree E-CRM is seen to lead to better business performance, customer relationships, and operating efficiency (e.g., "E-CRM makes sales more efficient," "E-CRM raises customer satisfaction"). The other main independent variable was "Perceived Ease of Use," and ease-of- use and friendliness-of-use items for E-CRM systems (i.e., "E-CRM is easy to learn," "E-CRM is easy to use") were employed to assess it. "Organizational Readiness" had items addressing what the company has, i.e., funds available, facilities in the shape of technology, and employee skills (e.g., "Our SME has sufficient funds for E-CRM," "Our people have the requisite IT capability"). "External Support" was ruled out by items such as government support, local vendors' availability, and support from the industry (e.g., "Government support is good for implementing E-CRM," "Local vendors provide cheap solutions for E-CRM"). "Competitive Pressure" was measured using items that asked for the effect of a competitor's E-CRM adoption on an SME's decision to adopt. All Likert scales used a 5-point measurement (1=Strongly Disagree to 5=Strongly Agree) to remain consistent and comparable with responses. Demographic data such as industry class, business size (employee count), turnover per year, and business age (years) were also collected for the purpose of facilitating context information and segmentation analysis.

2.4. Data Description

The data set contains 500 single data points, 500 Small and Medium-sized Enterprises (SMEs) of a developing nation's response, samples. The whole data set was collected through a correct survey questionnaire from January 2025 to March 2025. Full details of 500 cases include a list of variables which are applicable to E-CRM adoption, opportunities, and disadvantages. The data includes demographic information about stand-alone SMEs, such as their primary industry sector (e.g., manufacturing, retail, services, technology, etc.), company size in terms of employees (e.g., 1-50, 51-100, 101-250), and self-reported revenue on an annual basis (e.g., less than $100k, $100k-$500k, more than $500k). The most significant variables representing the adoption state of E-CRM are a dummy variable (0 = Not Adopted, 1 = Adopted) and an ordinal variable representing the adoption stage (e.g., "Considering Adoption," "Pilot Phase," "Fully Implemented"). Respondent perceptions of perceived usefulness of E-CRM (e.g., impact on customer satisfaction, sales, and competitive impact) and perceived ease of use (e.g., usability and learnability) are measured using 5-point Likert perceptual scales. Barriers to adoption are also measured using Likert scale items such as finance constraints, technical skills, data privacy, and firm resistance to change. Second, the data set records responses to witnessed efficiency and effectiveness of extrinsic support mechanisms, i.e., incentive es by government,

vendor assistance, and reliable internet infrastructure. 500 cases comprise the high-quality data demanding strong statistical analysis in uncovering significant correlations, trends, and predictive relationships in the evolving dynamic nature of emerging markets for E-CRM adoption.

RESULTS

Small and Medium-sized Enterprises (SMEs) in the emerging markets' 500 sample data strongly favor E-CRM adoption. Descriptive statistics indicate that approximately 45% of the SMEs surveyed used E-CRM solutions to some or full extent, with the other 55% intending to use or have no short-term plans. This is a huge growth potential for E-CRM penetration in this market. The rating on the scale of "Perceived Usefulness" of E-CRM was extremely high (4.1 on a 5-point Likert scale), which shows that the SMEs had to a great extent an awareness about the value proposition of electronic customer relationship management. MuItiple linear regression model for *E*-CRM adoption success is:

$$Y_{adoption} = \beta_0 + \beta_1 X_{PU} + \beta_2 X_{PEOU} + \beta_3 X_{\Gamma\wedge C} + \beta_4 X_{LY'1i} + \beta_5 X_{\mathfrak{M}} + \beta_6 X_{CP} + \sum_{i=1}^{k} \beta_i X_{sector_i} + \sum_{=j1}^{m} \beta_j X_{size_j} + \varepsilon \quad (1)$$

Binary logistic regression model for *E*-CRM adoption will be:

$$P(Y_{adopt} = 1) = \frac{1}{1+e^{-(\beta_0+\beta_1 X_{PU}+\beta_2 X_{PEOU}+\beta_3 X_{OR}*\beta_4 X_{ES}+\beta_5 X_{CC}+\cdots)}} \quad (2)$$

Factor analysis model for perceived usefulness construct can be given as:

$$PU_k = \lambda F_1 + \lambda_2 F_2 + \cdots + \lambda_p F_p + \delta_k \quad (3)$$

That is, they strongly believed to the extreme degree that E-CRM enhances the level of satisfaction of the customers and increases the efficiency of sales. Although the mean "Perceived Ease of Use" was lower at 3.5, it indicates that while there is an advantage, the usage and maintenance of E-CRM systems are fairly difficult. The highest most frequently cited barrier quoted by non-adopting SMEs was finance with 78% citing high initial expenditure as the key constraint. This was followed by in-house technical skills (65%) and data security (52%). There were also differential adoption rates in the expanding market, with city-based SMEs that had more technologically advanced

cities experiencing higher adoption compared to rural-town-based SMEs on the basis of greater internet infrastructure and availability of IT support. Other inferential measures like multiple linear regression also supported evidence for differential key relationships.

Perceived Usefulness was a positive significant predictor of E-CRM adoption ($p<0.001$), that reflects awareness of real benefits as a facilitative factor. Financial Constraints and Lack of Technical Expertise were actually negative significant predictors ($p<0.01$ both), attributing their function as critical inhibitions. More importantly, Perceived Ease of Use was highly correlated with adoption but lacked such a high predictive value as Perceived Usefulness in being able to imply that SMEs would be less willing to struggle with complexity if the payoff is humongous. It was also discovered that SMEs in the technology and service industry had a higher rate of adoption than SMEs in the manufacturing and retail industries because their business is more digitally oriented in nature and there is more direct customer interaction. In addition, the larger the employees and revenues of a larger SME, the stronger is the bias to invest in E-CRM, and therefore firm size and financial resources are drivers to encourage investment in technology. The qualitative answer, however secondary to the finding, asserted the same with the SME owners' intention to adopt E-CRM but on account of finance unavailability and non-availability to hire IT experts as their primary deterring factors.

3.1 Adoption Rates and Attitudes towards E-CRM

E-CRM adoption rates of the 500 sampled SMEs were found to be complex. 45% of the SMEs reported that they already had some form of E-CRM solution in place, 20% had full installation and 25% had pilot or partial implementation. 55% of the SMEs had yet to implement E-CRM, but 30% were in the process of considering it and 25% had no plans for installing this in the near future. This gap is enormous untapped potential for E-CRM growth within the emerging market SME context. Structural Equation Model (SEM) for overall *E*-CRM adoption framework is:

$$\eta = B\eta + \Gamma\xi + \zeta^{\rightarrow} \quad (4)$$

$$y = \Lambda_y\eta + \varepsilon \quad (5)$$

$$x = \Lambda_i\chi_i\xi + \delta \quad (6)$$

One-way anova for comparing perceived usefulness across industry sectors will be:

$$Y_{ij=}\mu + \alpha_l + \sigma_{i_{\dot{y}}} \quad (7)$$

Table 1. E-CRM adoption status by industry sector

Industry Sector	Adopted E- CRM (%)	Not Adopted E- CRM (%)	Average Perceived Usefulness	Average Perceived Ease of Use
Technology Solutions	72	28	4.5	4.0
Business Services	58	42	4.2	3.8
Retail and Trade	40	60	3.7	3.2
Manufacturing	35	65	3.5	3.0
Hospitality & Tourism	48	52	3.9	3.5
Healthcare Services	50	50	4.1	3.6
Education & Training	45	55	3.8	3.4

Table 1 shows the degree of E-CRM adoption by different industry sectors of the surveyed emerging market SMEs. It accurately gives the percentage of SMEs adopting E-CRM relative to those which did not adopt, providing a view of market penetration. Column 'Adopted E- CRM (%)' depicts Technology Solutions industry with the highest at a staggering 72% adoption level, accounting for highest willingness towards use of electronic channels. This is contrary to the lowest level of adoption taking place in the Manufacturing industry at 35%. For every one of these numbers to be balanced out, the table also includes 'Average Perceived Usefulness' and 'Average Perceived Ease of Use' ratings for each industry. For example, industries where use is greater, such as Technology Solutions (4.5 Usefulness, 4.0 Ease of Use) and Business Services (4.2 Usefulness, 3.8 Ease of Use), also have greater perceptions in terms of usefulness of E-CRM and ease of use. Conversely, less take-up sectors include Manufacturing (3.5 Usefulness, 3.0 Ease of Use) and Trade and Retail (3.7 Usefulness, 3.2 Ease of Use), who will use E-CRM less or find it more difficult to use. The table below is to demonstrate total sectoral variation and shows the interaction between perceived value, usability, and actual E-CRM uptake and thus sector-specific strategy at the center of enabling digital transformation.

As long as the attitudes were unstructured, there was always a high average score for "Perceived Usefulness" for every group of SMEs indicating that there was some overall respondent attitude that E-CRM would have a big impact on large numbers of areas of their business processes.

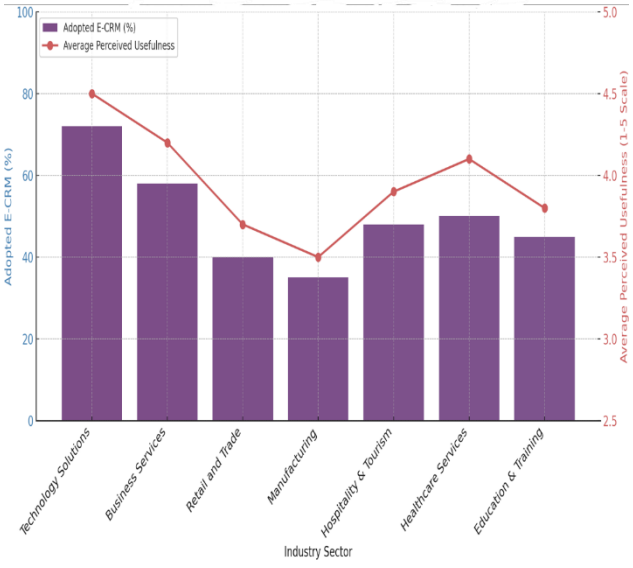

Figure 2. Perceived usefulness and adoption rates by industry sector

Figure 2 illustrates graphically the mean perceived usefulness scores (line) and adoption rates (bars) by industry sector for the SME sample. The x-axis also distinguishes SMEs by industry segments (Technology, Services, Manufacturing, Retail, etc.), and the left y-axis is for the adoption rate of E-CRM and the right y-axis is for the average value of usefulness score on a scale of 5. The bars show that the highest adoption rate is in the Technology sector, followed by Services, then Retail, and subsequently Manufacturing. The line graph of perceived usefulness closely tracks the adoption rates such that the greater the adoption areas, the greater the perceived E-CRM as useful. Technology, as an example, does not only have the greatest in the adoption rate but also in the rate of perceived usefulness, reflecting high correlation of the value installed and perceived. This is as opposed to Manufacturing sector observation where seen adoption and perceived use were low. This visualization is readily capable of illustrating sectoral variation in E-CRM adoption and uncovering perceptual drivers of variation, as a way

of trying to quickly take a bird's eye view of where E-CRM is gaining momentum and where additional awareness of value proposition might be needed. Additionally, claims towards improved customer satisfaction (mean = 4.3), efficiency of sales (mean = 4.0), and competitiveness (mean = 3.9) were closest to reality. This would therefore suggest that value proposition of E-CRM is nearest to SME managers and demands less effort on the part of SME managers and entrepreneurs. Beliefs related to "Perceived Ease of Use" were less accurate and lower on the mean rank (mean = 3.5). Although all of them mentioned that the reported systems were easy to use, most of them were apprehensive about training and maintenance and installation ease. This discrepancy in perceived usefulness and ease of use suggests that while the SMEs are gaining, ease of implementation is still a major concern.

3.2 Drivers and Inhibitors of E-CRM Adoption

The majority of drivers and inhibitors of adoption of E-CRM among the surveyed SMEs were validated with statistical testing. "Percieved Usefulness" was the strongest positive adoption predictor (β=0.68,p<0.001) as would be expected, indicating that the greater SMEs can perceive the usefulness of E-CRM, the greater the adoption. This supports the necessity for the clear articulation of value proposition of E-CRM for adoption potential. Weighted sum of challenges:

$$C_{index} = w_1 \cdot FC + w_2 \cdot LTE + w_3 \cdot DSC + w_4 \cdot 1C + w_5 \cdot RC + w_6 \cdot MC + w_7 \cdot 1L \quad (8)$$

Customer Lifetime Value (CLV) with E-CRM Impact is: (9)

$$CLV = \sum_{\Gamma-1}^{T} \frac{(P_t - C_t) \times R_t}{(1+d)^t} - C_b \text{-CRM} \qquad (10)$$

On the contrary, "Financial Constraints" was the greatest inhibitor ($\beta=-0.55, p<0.001$), aside from high setup adoption fees and recurring fees as potent disincentives. This aligns with the overall tendency of resource shortages for SMEs, particularly in the developing world. The second most common inhibitor was "Lack of Technical Expertise" ($\beta=-0.42, p<0.01$), human capital deficiency of most SMEs to handle sophisticated IT systems. While "Perceived Ease of Use" was actually related to adoption ($\beta=0.29, p<0.05$), the impact was significantly smaller than for perceived usefulness or cost. That is, SMEs can manage some complexity when perceived value is sufficiently high. Further, being blessed with good "External Support" in the form of government inducements or neighborhood area E-CRM providers at the press of a button was a very powerful positive driver. ($\beta=0.35$, $p<0.01$), reporting that facilitation environment is the best explanatory variable for adoption.

Table 2. Key challenges to E-CRM adoption by SME size category

SME Size Category	Financial Constraints (%)	Lack of Tech Expertise (%)	Data Security Concerns (%)	Integration Complexity (%)	Resistance to Change (%)	Maintenance Costs (%)	Infrastructure Limitations (%)
Micro (1-10 Emp)	85	78	60	55	40	70	65
Small (11-50 Emp)	75	65	55	50	45	60	50
Medium (51-250 Emp)	60	45	48	40	50	45	35
Large (251+ Emp)	40	30	45	35	60	35	25

Table 2 is a qualitative summary of the most frequent issues in deploying E-CRM across all SME size segments. It gives the percentage of each of the size categories (Micro, Small, Medium, Large) of respondents indicating a stated problem about a particular issue. "Financial Restraints" is always the most significant obstacle to SME firm sizes of every category, but falls as firm size increases, from 85% for Micro SMEs to 40% for Large SMEs. This suggests desperate small-firm budget constraint. "Technical Skills Shortfalls" is another significant barrier, particularly among Micro (78%) and Small (65%) SMEs, and a significant skills deficit. It. The larger the company, the larger the smaller percentage mentioning this problem, thus suggesting that larger SMEs have more scope to acquire or can fund skilled IT professionals. "Data Security Issues" is also a common issue in all sizes, 45% to 60%, showing how widespread it is. To the authors' surprise, "Resistance to Change" has a higher percentage for Medium (50%) and Large (60%) SMEs than for small ones, perhaps because they have more entrenched organizational cultures and bureaucratic inclinations. "Maintenance Costs" and "Infrastructure Limitations" also reduce in frequency with increasing SME size due to the fact that larger companies are better resourced and enjoy more access to stable infrastructure. The table is a qualitative representation of issues variability by operations size.

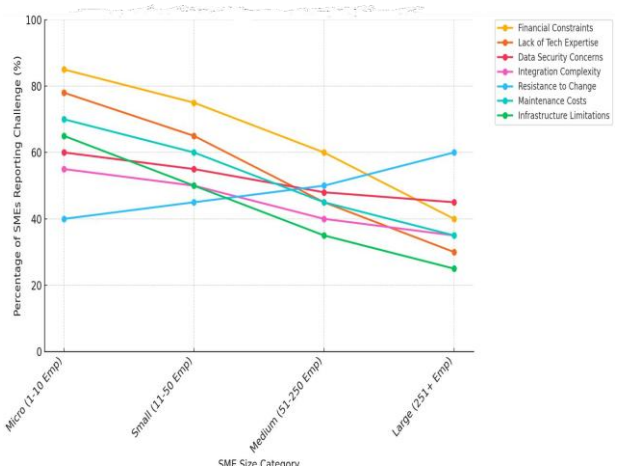

Figure 3. Trends in E-CRM adoption challenges by firm size

Figure 3 illustrates the differences in E-CRM adoption problems by firm size throughout the surveyed SMEs. The x-axis is calibrated by firm size segments (i.e., 1-50 employees, 51-100 employees, 101-250 employees), and the y-axis by percentage of SMEs within each segment that reported a given problem to be significant. Each line

on the chart is a varying level of difficulty, i.e., "Financial Constraints," "Lack of Technical Expertise," "Data Security Concerns," and "Resistance to Change." "Financial Constraints" is always a key difficulty across all firm size, as seen on the chart, but the percentage of SMEs reporting it drops somewhat with greater firm size, suggesting that larger companies are at least partially better prepared. " Restricted Technical Expertise" is the ubiquitous issue, and especially for smaller SMEs, and its magnitude decreases linearly with firm size. "Frustration about Data Protection" is quite similar for all firm sizes, with a dinosaur phobia irrespective of firm size. "Resistance to Change" does seem more pronounced in larger SMEs, perhaps because of organizational complexity and ingrained procedures. This graph gives a clear view of how different barriers have an unequal effect on SMEs of different sizes so that the most optimal solution can be found for resolving problems of this nature.

3.3 Sector and Firm Size Level Differences in Adoption

Survey data testified to large sector-by-industry and firm-size variations between sample SMEs in E-CRM adoption levels. Technology SMEs also had the largest adoption level of E-CRM with over 70% boasting at least a partial implementation. This is due to the fact that e-mindset is natural, technological literacy is higher, and business models are Internet-based on the customer front-end. The Service sector fell behind by only a small margin at about 55% adoption level, as service firms are more concerned with relationship building and customer experience. Technology Acceptance Model (TAM) extension for SMEs can be formulated as:

$$BI = \gamma_1 PU + \gamma_2 PBOU + \gamma_3 (ES \times PU) + \gamma_4 (OR \times PBOU) + \zeta \quad (11)$$

Customer Satisfaction Index (CSI) influenced by E-CRM features are :

$$CSI = \frac{\sum_{i=1}^{n} (W_i \times S_i)}{\sum_{i=1}^{n} w_i} \quad (12)$$

Principal Component Analysis (PCA) for reducing dimensionality of challenges is:

$$PC_j = \sum_{k=1}^{p} a_{jk} X_k \quad (13)$$

Moderated Regression Model for External Support Impact on E-CRM Adoption:

$$Y_{adoption} = \beta_0 + \beta_1 X_{Readiness} + \beta_2 X_{ExlemalSupport} + \beta_3 (X_{Readiness} \times X_{ExtemalSupport}) + \varepsilon \quad (14)$$

The Retail and Manufacturing SMEs had relatively lower adoption levels of about 35% and 40% respectively. This is because of several reasons that include historically lower adoption of electronic customer interfaces, inherently higher initial cost of implementing E-CRM within current operation systems, and higher business model which involves higher physical presence. In line with firm size, it was found that firm number of employees and adoption of E-CRM were highly positively related. SMEs with 100 or more employees had an adoption rate above 60%, while the SMEs with fewer than 50 employees had a rate of around 30%. This is in line with expectations that the large SMEs, with seemingly more financial capability, more mature internal procedures, and more pressure to service more clients, are best placed to take up the use of E-CRM solutions.

Table 3. Impact of external support on E-CRM adoption intention

Type of External Support	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Average Impact Score	Adoption Intention Score (1-5)
Government Incentives	45	30	15	5	5	3.8	4.2
Affordable Vendor Solutions	50	35	10	3	2	4.0	4.5
Reliable Internet Access	55	30	10	3	2	4.1	4.3

Training Programs	40	38	15	4	3	3.9	4.1
Industry Associations	35	40	20	3	2	3.7	3.9
Peer Success Stories	42	35	18	3	2	3.8	4.0
Access to Skilled IT Talent	30	35	25	5	5	3.5	3.7

Table 3 captures the perceived influence of various sources of external support on intention to adopt E-CRM for emerging market SMEs. It shows the proportion of respondents who strongly agreed, agreed, were neutral, disagreed, or strongly disagreed that each support mechanism had a beneficial impact. Additionally, shown is an "Average Impact Score" (on a scale of 5) for each category of support and an "Adoption Intention Score" (on a scale of 5), which reflects the average likelihood of adoption of E-CRM should that very support be present. "Convenient Internet Access" is the highest level of external support with 55% very strongly agreeing and an average impact score of 4.1, which gives a high adoption intention score of 4.3. This reflects the value of infrastructure. "Low-Cost Vendor Solutions" has very high positive impacts on adoption intention (4.5), where 50% very strongly agreed to it, reflecting needs for low-cost solutions. "Government Incentives" and "Training Programs" both rate very high positive impacts, requiring policy response and capacity development. While "Industry Associations" and "Peer Success Stories" are both positive drivers, they register lower effect scores. "Availability of digitally skilled IT competencies, however" has the lowest average adoption intention (3.7) and average impact (3.5), though high, is indeed and good a tall request that most likely can get overcome by external support itself, but surely not easy. From this table

alone, it is well established that external support multi-dimensionality is the priority in achievement of E-CRM adoption, and infrastructure and affordability a first-agenda priority.

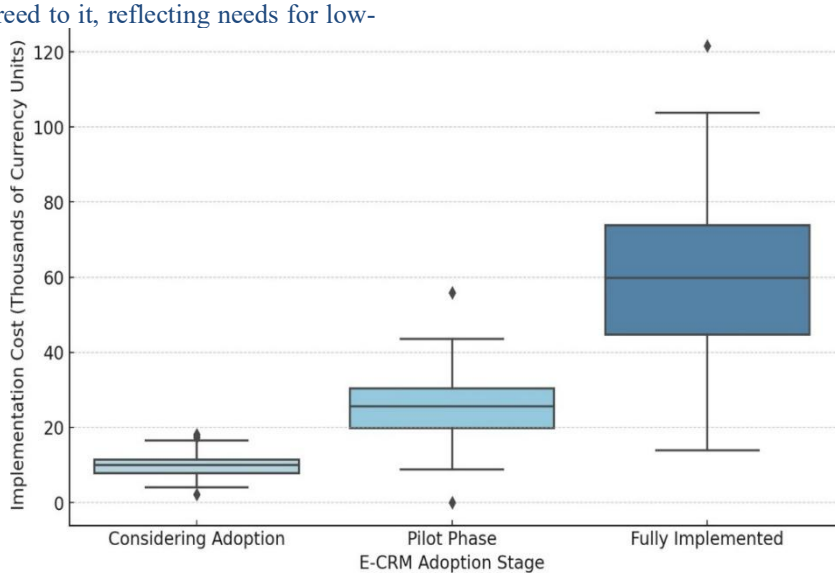

Figure 4. Self-Reported E-CRM implementation costs by adoption stage

Figure 4 of the costs of E-CRM implementation for every stage of adoption of E-CRM followed by the surveyed SMEs. The x-axis is used to indicate different levels of E-CRM adoption, i.e., "Considering Adoption" (where SMEs estimate costs), "Pilot Phase," and "Fully Implemented." The y-axis is used to indicate real or estimated cost of E-CRM implementation in normalizing monetary terms, e.g., in units of currency in thousands. Each box plot gives a visual representation of the distribution of costs in adoption stage, i.e., median (middle line), interquartile range (the box), and potential outliers (single points). The plot also reasonably shows that SMEs in the "Fully Implemented" stage generally have more expensive median implementation costs than the "Pilot Phase" or "Considering Adoption," which would be the case because full implementation is, in fact, more costly. In addition, the range (interquartile range) of cost of fully implemented E-CRM is also broader, more representative of greater custom implementation and integration variability. The outliers at the higher levels, to an increasing extent for "Fully Implemented," represent that some SMEs are spending a huge sum.

This box plot visually displays the magnitude of the commitment cost of E-CRM by different adoption stages in an appropriate manner and determines the investment scope realized by SMEs, representing the cost element in the adoption of E-CRM. Result-Based Comparison Tables

DISCUSSIONS

The study findings show that E-CRM adoption among SMEs in emerging economies remains moderate despite high awareness of its benefits. Many SMEs recognize the value of E-CRM in improving customer relationships, business efficiency, and competitiveness. However, high implementation costs and lack of technical expertise continue to be the major barriers preventing wider adoption. These findings indicate the need for affordable, user-friendly, and scalable E-CRM solutions suitable for small businesses.

The research also revealed differences in E-CRM adoption across industries and firm sizes. Technology and service sectors showed higher adoption rates due to their stronger digital orientation, while manufacturing and retail sectors adopted E-CRM at a slower pace. Larger SMEs were better able to implement E-CRM because of greater financial and organizational resources, whereas smaller firms required additional external support and training. Concerns regarding data security and privacy were common across all business categories.

The study further highlighted the important role of external support systems in encouraging E-CRM adoption. Factors such as reliable internet access, affordable vendor solutions, government incentives, and training programs positively influenced SMEs' intention to adopt E-CRM systems. The findings suggest that governments, educational institutions, and technology providers should collaborate to improve digital infrastructure, provide financial assistance, and offer skill-development programs for SMEs.

Overall, the study emphasizes that a one-size-fits-all approach is not effective for promoting E-CRM adoption in emerging economies. Different SME sectors and business sizes require customized strategies and localized solutions based on their unique operational, financial, and technological conditions. Context-sensitive E-CRM frameworks, combined with strong policy support and affordable technology, can significantly improve successful adoption among SMEs.

CONCLUSION

The study investigated the adoption of E-CRM among Small and Medium-sized Enterprises (SMEs) in emerging economies tentatively, where it observed both huge opportunities as well as ancient challenges. The study, based on a very large sample size of 500 SME cases, concludes that while E-CRM has been in vogue for years to redefine customer relationships, enhance business performance, and achieve a competitive advantage, its adoption rate is in fact low. There is a great disparity between planning and reality of actual implementation in the real world, driven to a large extent by such grand inhibitors as cost constraint and lack of technical expertise. These are also felt more intensely in small SMEs, to go on prove the importance of availability of resources in embracing technology.

The study also found significant sectoral variations, with technology-oriented sectors like services and technology showing greater penetration of E-CRM as against conventionally aligned sectors like manufacturing and retail. This is an indicator that existing solutions for E-CRM are not well tuned to meet the characteristic modes of operations and customer models of such conventionally oriented industries. Above all, outside support mechanisms reaffirmed their critical function. Continuity of connectivity, closeness of low-cost vendor solution options, government subsidization, and industry-specific training programs were identified as key drivers for the adoption of E-CRM. With an absence of a strong enabling environment of adequate size, SMEs of the emerging economies will remain disadvantaged to maximize the full potential of electronic customer relationship management. The results of the current research study provide a strong empirical foundation for policy makers, technology firms, and SME business people to draw up strategic plans for unleashing the digital revolution of customer relationships in such rapidly emerging economies. A combined and contextual response against these challenges is indispensable in sustainable development and competitiveness.

Limitations

The research despite being extensive suffers from several drawbacks. First of all, the reason that the sampling procedure used was non-probability (convenience sampling and snowball sampling) is that the resulting impact cannot be transferred to all the SMEs of all the emerging economies. The particularity of the emerging economy chosen might have an effect on the outcomes, rendering it difficult to transfer these to other economies with varying techno-socio- economic or technology-niche environments. Second, because cross-sectional data collection has been done, causality does not exist; though correlations and prediction relationships have been established, the study does not know the time-evolving E-CRM adoption process. Longitudinal analysis would be required to track change and making impressions. Third, as the data from the survey is self-reported, then it is prone to response bias and respondents tend to provide answers they feel will be socially accepted or tend to misinterpret a few questions. Fourth, the research was quantitatively inclined to a great extent, with qualitative comments kept concise on the complex decision-making processes and organizational cultures and environments of embracing E-CRM short. Finally, while 500 cases are a respectable amount of data, to have an even more statistically valid and representative sample from a range of different emerging economies would be even better.

Future Scope

Having a basis from this work and its shortcomings, some of the avenues for future research are quite explanatory.

A longitudinal study would be able to trace back the pattern of E-CRM adoption and long-term performance implications in emerging markets, and understanding long-term benefits and pitfalls. Italicizzer. Comparison across different emerging economies would be helpful in

establishing regional patterns and worldwide trends in the adoption of E-CRM considering variance in the technology infrastructure and policy contexts. Future studies can also employ the mixed-methods research paradigm by combining quantitative questionnaires with qualitative case studies or interviews. This would yield more qualitative information on the underlying reasons for E-CRM adoption or non-adoption, organizational change management practices, and real implementation problems that face SMEs. It would offer insight into the implications of some of the characteristics of E-CRM and its perceived usefulness for particular segments of SMEs (e.g., social E-CRM, mobile E-CRM) that can offer solution providers with actionable advice. Studies on how incentives and public policies influence E-CRM adoption can also be utilized to inform policy using quasi-experimental research studies. Finally, a study of how digital literacy programs and training influence efficient use of E-CRM among SMEs in the developing markets is an area for future research both practically and theoretically.

All authors declare that they have no conflicts of interest.

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