

Exploring digital leadership - TOE framework in CRM adoption by SMEs in developing countries

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Abstract

Purpose – This study aims to investigate how small and medium enterprises (SMEs) in developing countries can leverage customer relationship management (CRM) for business growth. It extends the Technology–Organization–Environment (TOE) framework by incorporating digital leadership and examining its role in moderating the effects of technological and organizational contexts on CRM adoption.

Design/methodology/approach – The research uses a quantitative, descriptive and cross-sectional approach, collecting data from 223 SMEs in Indonesia supported by Jajah Tempe Kaliurang Small and Medium Industries, which have already adopted CRM. Data analysis was conducted using SEM-PLS with SmartPLS.

Findings – The study finds that environmental factors and digital leadership are crucial for CRM adoption in SMEs, while technological and organizational factors have minimal impact. Notably, digital leadership negatively moderates the effect of organizational context on CRM adoption.

Research limitations/implications – The study emphasizes the need to integrate digital leadership into the TOE framework for a more comprehensive understanding of CRM adoption.

Practical implications – The results help SMEs identify key factors affecting CRM adoption and develop strategies for successful implementation, highlighting the importance of digital leadership.



Social implications – The study underscores that SME leaders in developing countries must enhance their digital skills to adopt CRM effectively.

Originality/value – This research contributes to the TOE framework by showing digital leadership's critical, albeit unexpectedly negative, role in CRM adoption among SMEs.

Keywords Technology, Organization, Environment, Digital leadership, CRM adoption, SMEs

Paper type Research paper

1. Introduction

The rise of the internet has prompted companies to adopt e-business practices to gain a competitive edge by maintaining customer relationships. Pratiwi and Arsyah (2021) noted that customer relationship management (CRM) platforms can enable businesses to engage with customers more efficiently and effectively through online channels. CRM offers an integrated approach to identifying, attracting, developing and retaining profitable customers (Al-Gasawneh, Anuar, Dacko-Pikiewicz, and Saputra, 2021). Moreover, AlQershi, Mokhtar, and Abas (2020) argue that small businesses should adopt CRM technology to prevent customer churn and ensure business continuity. The growth of small and medium enterprises (SMEs) has garnered significant attention because of their crucial role in boosting a country's economy. However, SMEs in developing countries encounter unique challenges when adopting information technology, with studies still viewing IT adoption as more of a challenge than an opportunity for these SMEs (Das, Gryseels, Sudhir, and Tan, 2016). According to Yasiukovich and Haddara (2021), CRM implementation is complex, requiring both technology use and strategic planning around change management. Thus, it is crucial to consider these specific challenges to enhance CRM adoption among SMEs in developing countries.

To address this issue, various models such as the Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, Diffusion of Innovation Theory (DoI) and the Technology–Organization–Environment (TOE) framework can explain technology adoption decisions. However, the TOE framework (Tornatzky and Fleischer, 1990) is deemed most appropriate for explaining CRM adoption decisions by SMEs within an organizational context. Ali, Shrestha, Osmanaj, and Muhammed (2020) suggest that the TOE framework is well-suited for explaining technology adoption in an organizational setting. Furthermore, in predicting decisions on the adoption of information technology innovations, several studies (such as Muafi, Religia, and Ramawati (2024) and Religia, Surachman, Rohman, and Indrawati (2021)) mention that the TOE framework can provide strong predictive results. Although the importance of CRM systems for the growth and sustainability of SMEs has been recognized, the factors influencing CRM adoption among SMEs in developing countries remain underexplored, particularly concerning the role of the TOE framework and the impact of digital leadership.

Previous studies have demonstrated that technology plays a crucial role in shaping the adoption of new technologies (Abdurrahman, Gustomo, and Prasetyo, 2024; Kumar and Shankar, 2024). Small and medium enterprises tend to implement information technology if they see it as beneficial and useful and its use aligns with their values (Religia et al., 2021). In terms of the organizational context, Bening, Dachyar, Pratama, Park, and Chang (2023) and Bhatiasevi and Naglis (2018) have found that the organizational context is frequently the most used determinant for predicting innovation adoption among SMEs. Organizational influence on technology adoption has been confirmed by previous research (Ninčević Pašalić and Čukušić, 2024; Qalati, Li, Ahmed, Mirani, and Khan, 2021). Filipe, Ruivo, and Oliveira (2023) and Religia (2022) argue that the environment also plays a significant role in IT

adoption. Rapid changes in the business environment make innovation more complex, so SMEs must continue to compete and support economic growth (Barkley and Jokonya, 2024).

While many studies endorse the TOE framework, it is not without criticism. Kam and Tham (2022) argue that the technological context is not always the primary factor in technology adoption decisions. Similarly, Tiwari, Marak, Paul, and Deshpande (2023) have suggested that indicators in the organizational context are not necessarily effective in predicting technology adoption. Research by Himawan, Djuwaini, and Darmawan Putra (2024) has shown that technological and organizational readiness among SMEs does not significantly affect their innovation adoption decisions. This discrepancy necessitates further examination of the technological and organizational contexts, mainly to understand the factors leading to different impacts on technology adoption, especially CRM adoption.

According to the transformational leadership theory proposed by Bass and Avolio (1990), this type of leadership is suitable for enhancing followers' desires to achieve while also promoting organizational development. Transformational leadership is a figure who inspires their team to achieve extraordinary results through a clear vision and a positive work environment (Zhu and Huang, 2023). In the context of information technology, the combination of a transformational leadership style and digital technology utilization is commonly referred to as "digital leadership" (De Waal, Van Outvorst, and Ravesteyn, 2016; Mihardjo, Sasmoko, Alamsjah, and Elidjen, 2019). Several studies have identified a strong connection between digital leadership and a company's innovation capabilities (Borah, Iqbal, and Akhtar, 2022; Mo, Liu, Lu, and Yu, 2023). The leadership of SME owners has been proven to significantly influence the decision to adopt information technology, where they play a central role in evaluating and selecting the most appropriate technological options (Bening et al., 2023; Sugandini, Effendi, Istanto, and Arundati, 2022). This study investigates the role of digital leadership in CRM adoption among SMEs and examines how digital leadership moderates the impact of technological and organizational contexts on CRM adoption decisions by SMEs.

This study aims to explore how SMEs in developing countries can improve CRM adoption to support their growth, as current research on the technological, organizational, environmental factors and digital leadership affecting CRM adoption is limited. Practically, this research is justified because it offers valuable insights for stakeholders on the factors influencing CRM adoption decisions, particularly for SME owners and managers. The study can also provide recommendations to governments and relevant institutions for developing policies that support IT adoption among SMEs. Theoretically, the study contributes to a better understanding of the factors affecting CRM adoption by SMEs, particularly within the contexts of technology, organizations and the environment. The research also highlights the critical role of digital leadership in facilitating technology adoption among SMEs.

2. Conceptual model and hypotheses development

2.1 Small and medium enterprises and customer relationship management

CRM has gained popularity among SMEs as a strategy to improve business performance (Yasiukovich and Haddara, 2021). Many industries now rely on CRM to manage their business operations, making it an essential tool in marketing strategies. CRM adoption allows SMEs to better understand individual consumer preferences and behaviors, enabling more personalized interactions (Samal, 2021). Moreover, CRM automates processes such as lead management and digital marketing, helping SMEs save time and resources (Salah, Yusof, and Mohamed, 2021). CRM analytics also support data-driven decision-making by tracking key performance metrics (Naim and Alqahtani, 2021). Research shows that CRM can boost SME performance through increased sales, customer

satisfaction and competitive advantage (AlQershi et al., 2020; AlQershi, Mokhtar, and Abas, 2022). However, challenges such as limited organizational resources, resistance to change and difficulties in integrating CRM with existing business processes can hinder CRM implementation in SMEs (Salah et al., 2021). Therefore, further research is needed to ensure that CRM implementation is carefully planned to maximize benefits and improve SME performance.

2.2 Technological context

The technological context plays a crucial role in the adoption of CRM by SMEs (Abed, 2020). Technological characteristics refer to the relevant attributes of technology that align with the organization's needs. In general, the technological context in the TOE framework includes complexity or ease of use, relative advantages and compatibility (Religia et al., 2021; Wessels and Jokonya, 2022). Ease of use pertains to the simplicity with which the technology can be utilized (Davis, 1986). SMEs are more likely to adopt a platform if the technology is easy to use (Kumar and Shankar, 2024). Relative advantage refers to the perceived superiority of an innovation over the process it replaces (Abdurrahman et al., 2024), whereas compatibility reflects how well the technology aligns with the organization's values (Khawaji, Alsahafi, and Hussain, 2022). Previous studies have shown that the characteristics of technology significantly influence IT adoption by SMEs (Abdurrahman et al., 2024; Effendi, Sugandini, and Istanto, 2020; Kumar and Shankar, 2024). Previous research continues to highlight the importance of technological attributes in the successful adoption of CRM by SMEs. Recent studies show that integrating new technologies, such as CRM, can further enhance perceived benefits, relative advantages and compatibility, thereby driving higher adoption rates among SMEs. Thus, the following hypothesis is proposed:

- H1.* The technological context has a significant positive impact on CRM adoption among SMEs.

2.3 Organizational context

The organizational context has a significant impact on IT adoption among SMEs (Bening et al., 2023; Ninčević Pašalić and Čukušić, 2024). In this context, "organization" refers to the attributes and resources that facilitate CRM adoption. Top management support reflects how managers perceive and approach new technologies (Hassan, Ngah, and Tio, 2023). Organizational readiness is the extent to which an organization aligns and adapts its resources to effectively achieve the adoption of new technologies (Aligarh, Sutopo, and Widarjo, 2023). Several studies have found that organizational characteristics are the most significant factor in explaining innovation adoption among SMEs (Kajla, Sood, Gupta, Raj, and Singh, 2023). More clearly, Daood, Oppong, and Wang (2024) state that the organizational context is a crucial factor influencing IT adoption among SMEs. Recent research emphasizes that SMEs with top management support and organizational readiness are more likely to achieve successful CRM adoption. Additionally, studies have shown that a well-established organizational structure and adequate resource allocation are key drivers of effective technology implementation. Hence, the proposed hypothesis is as follows:

- H2.* The organizational context has a significant positive impact on CRM adoption among SMEs.

2.4 Environmental context

The environmental context significantly affects IT adoption among SMEs (Muafi et al., 2024). Several studies have demonstrated the environmental impact on IT adoption by SMEs (Barkley and Jokonya, 2024; Religia, 2022). The environment in this context refers to competitive pressure from rivals and consumer pressure to adopt specific technologies (Raj and Jeyaraj, 2023). Competitive pressure refers to the encouragement a company receives from industry rivals to adopt new technologies to gain a competitive advantage (Amini and Jahanbakhsh, 2023). Consumer pressure refers to customers' influence on firms to adopt IT to address changing market demands (Al-Hiyari, Kolsi, and Mas'ud, 2024).

Furthermore, government support can encourage SMEs to adopt IT to remain competitive in an increasingly digitalized market (Hussain, Shahzad, and Hassan, 2020). Previous research highlights the importance of environmental factors (such as competitive pressure, consumer pressure, and government support) in SMEs' decisions to adopt CRM. SMEs that respond to these external pressures tend to leverage CRM technology in their business operations more successfully. Thus, the hypothesis is as follows:

- H3.* The environmental context has a significant positive impact on CRM adoption among SMEs.

2.5 Digital leadership

Kam and Tham (2022) argue that technology itself is not the primary factor in adoption decisions. In terms of the organizational context, Sun, Hall, and Cegielski (2020) and Religia, Ekhsan, Huda, and Fitriyanto (2023) found that organizational context indicators are not always reliable predictors of technology adoption. These varying research findings underscore the need for additional perspectives to gain a more comprehensive understanding. Bass and Avolio (1990) proposed the transformational leadership theory, which is suitable for driving organizational development in innovation. Over time, transformational leadership in information technology adoption has become known as "digital leadership" (Jameson et al., 2022). Digital leadership can be defined as the ability of a leader to guide their members through a clear vision, a commitment to ICT usage and the ability to make strategic decisions to drive technology adoption. Digital leadership plays a positive moderating role in the relationship between organizational context and CRM adoption among SMEs (Yopan, Kasali, Balqiah, and Pasaribu, 2022). Brunner, Gonzalez-Castañé, and Ravesteijn (2021) emphasize that digital leadership substantially impacts a company's digital transformation. By leveraging technological innovation, digital leaders can drive business model innovation (Mihardjo et al., 2019). In fact, the digital competencies of SME leaders can be their most valuable asset when adopting IT (Zahra, Dhewanto, and Utama, 2021). Moreover, several studies have highlighted a strong link between digital leadership and organizational innovation capabilities (Borah et al., 2022; Mo et al., 2023). Therefore, we posit that:

- H4.* Digital leadership has a significant positive impact on CRM adoption among SMEs.
- H5.* Digital leadership positively moderates the influence of the technological context on CRM adoption among SMEs.
- H6.* Digital leadership positively moderates the influence of the organizational context on CRM adoption among SMEs.

The overall results of the hypothesis development are summarized and illustrated in [Figure 1](#). [Figure 1](#) provides a comprehensive overview of the research model framework proposed in this study.

3. Methodology

This study used a quantitative, descriptive and cross-sectional research design using primary data. The study focused on SMEs mentored by Jاده Tempe Kaliurang Small and Medium Industries in Yogyakarta. These SMEs were selected for their similar business operations and familiarity with the CRM system developed by Jاده Tempe Kaliurang Small and Medium Industries, which ensured relevant and focused findings. The entire population of 248 SMEs was included in the study using a census sampling method. The questionnaire was crafted based on an extensive literature review and adapted from previous studies on the TOE framework, digital leadership and CRM adoption. A preliminary test with 40 SME owners and experts was conducted to evaluate the clarity and relevance of the questions. Feedback led to revising or removing some items to improve validity and reliability. The final questionnaire comprised 25 statements categorized under technology (6 items), organization (5 items), environment (5 items), digital leadership (5 items) and CRM adoption (4 items), with a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Demographic details such as gender, age, education and business duration were also gathered.

The questionnaires were distributed to all 248 SME owners, and after a three-month period, 223 completed questionnaires were collected. This sample size was considered sufficient, following [Stevens's \(1996\)](#) recommendation of a minimum sample size of 15 times the research construct to ensure accurate sample size estimation with maximum likelihood. The SEM-PLS approach was used for data analysis with CFA (confirmatory factor analysis) for the external model and bootstrapping for the internal model ([Kaufmann](#)

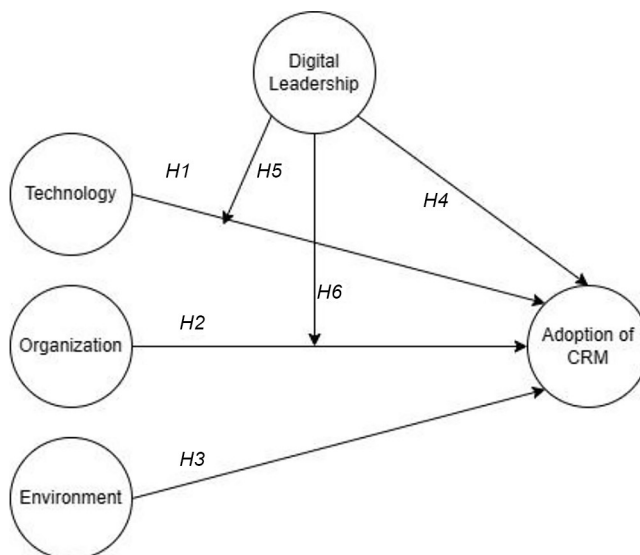


Figure 1. Research model framework

Source: Figure adapted from [Tornatzky and Fleischer \(1990\)](#)

and Gaeckler, 2015). The CFA was assessed using outer loading values, average variance extracted (AVE), Cronbach’s alpha (CA), composite reliability (CR) and discriminant validity through the Fornell–Larcker Criterion. Bootstrapping was applied to evaluate the significance of path coefficients between variables in the structural model (Hair, Hult, Ringle, and Sarstedt, 2014). Additionally, demographic characteristics were used as control variables to ensure consistent and stable estimates of the assumed effects, aiding in eliminating alternative explanations and strengthening causal inferences (Hair, Hult, Ringle, Sarstedt, Danks, and Ray, 2021).

4. Results and discussion

4.1 Responder characteristics

The survey results reveal that most SME owners are women, although gender distribution is fairly balanced. Dea (2019) suggests that more women in Indonesia manage SMEs than men due to cultural expectations, economic necessities and a supportive environment for women in this sector. The largest age group among SME owners is between 27 and 46 years, indicating they are in their most productive years. Most owners have completed senior high school, aligning with a report from Table 1, which notes that senior and junior high school graduates represent Indonesia’s most extensive education levels (Muhamad, 2023). Additionally, most SMEs have been in operation for under five years, although the number of businesses operating for over five or even ten years is not significantly different. For detailed information, refer to Table 1.

4.2 Measurement model evaluation

A confirmatory factor analysis (CFA) was conducted to validate the study’s constructs to ensure the data’s validity and reliability. The results showed that each statement item had an outer loading value greater than 0.7, indicating strong relevance (Hair et al., 2021). The AVE

Table 1. Characteristics of respondent (223 n)

Characteristics	n	%
<i>Gender</i>		
Female	117	52.47
Male	106	47.53
<i>Age (years old)</i>		
17 ~ 26	32	14.35
27 ~ 36	57	25.56
36 ~ 46	56	25.11
47 ~ 56	42	18.83
> 56	36	16.14
<i>Level of education</i>		
Junior high school (JHS)	78	34.98
Senior high school (SHS)	104	46.64
Undergraduate (bachelor)	38	17.04
Postgraduate	3	1.35
<i>Operational duration (years)</i>		
< 5	87	39.01
5 ~ 10	72	32.29
> 10	64	28.70

Source(s): Table prepared by the authors

Table 2. Reflective measurement model analysis

Constructs	Items	Loadings (>0.7)	AVE (>0.5)	CA (>0.7)	CR (>0.7)
Technological context (TEC) (Religia et al., 2021; Wessels and Jokonya, 2022)	TEC1: CRM is easy to implement	0.767	0.684	0.909	0.928
	TEC2: CRM is simple to operate	0.831			
	TEC3: CRM offers marketing convenience	0.819			
	TEC4: CRM boosts product sales	0.863			
	TEC5: CRM meets business needs	0.863			
	TEC6: CRM aligns with business processes	0.815			
Organizational Context (ORG) (Aligarh et al., 2023; Hassan et al., 2023)	ORG1: Owner allocates resources for CRM	0.804	0.578	0.818	0.872
	ORG2: Owner supports CRM use	0.752			
	ORG3: Sufficient infrastructure for CRM	0.784			
	ORG4: Adequate facilities for CRM	0.801			
	ORG5: Competent staff for CRM	0.701			
	ENV1: Competitors use CRM	0.791			
Environmental Context (ENV) (Al-Hiyari et al., 2024; Amini and Jahanbakhsh, 2023)	ENV2: CRM provides a competitive edge	0.710	0.578	0.818	0.872
	ENV3: CRM helps manage customer loyalty	0.785			
	ENV4: Customers request promo updates	0.733			
	ENV5: Customers need product info	0.799			
	DLE1: Clear ITC vision	0.727			
	DLE2: Committed to ITC integration	0.860			
Digital leadership (DLE) (Borah et al., 2022; Mihardjo et al., 2019; Mo et al., 2023)	DLE3: Encourages ITC innovation	0.780	0.615	0.846	0.888
	DLE4: Clear ITC strategy	0.750			
	DLE5: Introduces CRM for customer data	0.798			
	AOC1: CRM changes customer interaction	0.968			
	AOC2: Actively uses CRM for data	0.973			
	AOC3: Actively uses CRM in service	0.954			
Adoption of CRM (AOC) (Religia et al., 2023; Salah et al., 2021)	AOC4: Actively uses CRM for loyalty	0.983	0.940	0.979	0.984
Note(s): Loading = outer loading; AVE = average variance extracted; CA = Cronbach's alpha; CR = composite reliability Source(s): Software SmartPLS 3.0; table prepared by the authors					

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Source(s): Software SmartPLS 3.0; table prepared by the authors

for each construct exceeded 0.5, demonstrating good convergent validity, meaning the constructs largely account for item variance with minimal error or external influence. Each construct's AVE surpassing 0.5 confirms that the research instruments are valid. Additionally, CA values for all constructs were above 0.7, demonstrating good internal consistency, while CR values were also above 0.7, indicating high construct accuracy and quality. [Hair et al. \(2021\)](#) note that a high CR typically results in a high AVE. Details are shown in [Table 2](#).

Discriminant validity analysis was used to confirm the distinctiveness of the constructs, employing the Fornell–Larcker criterion. According to this criterion, a construct's AVE should exceed its shared variance with other constructs, ensuring the constructs are distinct and not simply measuring the same underlying factors ([Hair et al., 2021](#)). The results showed that the square root of each construct's AVE was higher than its correlations with other constructs, indicating strong discriminant validity (see [Table 3](#)). Consequently, the overall analysis confirms that the proposed model is successfully verified.

4.3 Structural model analysis

The structural model was analyzed using SEM-PLS. The initial analysis involved linking all exogenous constructs to the endogenous construct, including the moderating effect of digital leadership. This was followed by a comparison with a second structural model that incorporated all control variables, such as demographic factors, alongside the endogenous construct (CRM adoption).

The comparison showed that demographic factors such as gender, age, education level and SME operational duration did not significantly impact CRM adoption decisions among SMEs. This suggests that the endogenous variable is not significantly affected by the inclusion or exclusion of these control variables, providing consistent and more generalizable results. This finding aligns with [Hair et al. \(2014\)](#) and [Hair et al. \(2021\)](#), who emphasize that control variables are crucial for isolating the effects of independent variables, improving accuracy, distinguishing sample groups, analyzing interactions and enhancing the generalizability of research findings. Proper use of control variables leads to more valid and reliable results. [Figure 2](#) illustrates the analysis outcomes, highlighting the significance of the tested relationships and the impact of each.

Model fit was assessed using the coefficient of determination (R^2) and predictive relevance (Q^2). R^2 reflects the model's ability to explain variation in observed values, expressed as a percentage ([Hair et al., 2014](#)). Meanwhile, Q^2 evaluates the model's prediction accuracy. In behavioral research, an R^2 above 0.35 is considered satisfactory and Q^2 values should be significantly greater than 0 ([Hair et al., 2021](#)). This study's results show a good fit for CRM adoption, with R^2 values of 0.396 and 0.294 for tests without control variables and R^2 values of 0.357 and 0.302 when control variables were included.

Table 3. Discriminant validity according to Fornell and Larcker

	1. TEC	2. ORG	3. ENV	4. DLE	5. AOC
1. TEC	0.827				
2. ORG	0.621	0.761			
3. ENV	0.673	0.601	0.760		
4. DLE	0.698	0.478	0.489	0.784	
5. AOC	0.389	0.352	0.509	0.431	0.970

Source(s): Software SmartPLS 3.0; table prepared by the authors

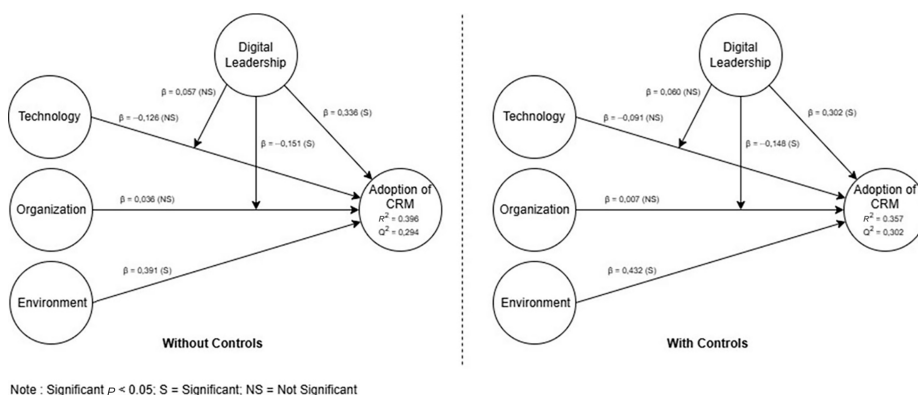


Figure 2. Comparison of test results with and without control
Source: SmartPLS 3.0 Software; figure prepared by the author

4.4 Hypothesis testing result

4.4.1 Direct effect results. As shown in Table 4, the findings remain consistent whether control variables are applied or not. Therefore, the hypothesis testing in this study is based on the structural model without control variables. Technology does not significantly impact CRM adoption decisions, with a p -value of 0.085, leading to the rejection of $H1$. Similarly, the organization does not significantly influence CRM adoption among SMEs, as indicated by a p -value of 0.334, resulting in $H2$ being unsupported. On the other hand, the environment shows a positive and significant impact on CRM adoption, with a β value of 0.391 and a p -value of 0.000, thereby supporting $H3$. The study also reveals that digital leadership has a positive and significant effect on CRM adoption decisions, with a β value of 0.336 and a p -value of 0.000, thus supporting $H4$.

Table 4. Assessment of the structural model

Hypotheses	Relations	Without controls*		With controls**		Results
		β	p -value	β	p -value	
$H1$	TEC \rightarrow AOC	-0.126	0.085	-0.091	0.175	ns
$H2$	ORG \rightarrow AOC	0.036	0.334	0.007	0.471	ns
$H3$	ENV \rightarrow AOC	0.391	0.000	0.432	0.000	s
$H4$	DLE \rightarrow AOC	0.336	0.000	0.302	0.000	s
$H5$	TEC \times DLE \rightarrow AOC	0.057	0.189	0.06	0.173	ns
$H6$	ORG \times DLE \rightarrow AOC	-0.151	0.004	-0.148	0.004	ns
<i>Control variable</i>						
	Gender \rightarrow AOC	—	—	-0.055	0.18	ns
	Age \rightarrow AOC	—	—	0.077	0.134	ns
	Education \rightarrow AOC	—	—	0.027	0.341	ns
	Operational \rightarrow AOC	—	—	-0.048	0.229	ns

Note(s): $*R^2 = 0.396$; $*Q^2 = 0.294$; $**R^2 = 0.357$; $**Q^2 = 0.302$; $p < 0.05$; ns = not supported; s = supported
Source(s): Software SmartPLS 3.0; table prepared by the authors

4.4.2 Moderating effect of digital leadership result. The role of digital leadership as a moderating variable was also tested. The findings indicate that digital leadership does not moderate the effect of technology on CRM adoption, with a p -value of 0.189, leading to the rejection of $H5$. Additionally, while digital leadership moderates the relationship between organization and CRM adoption, the effect is negative and significant, with a β value of -0.151 and a p -value of 0.004. Despite the significant relationship, the negative direction of the effect means $H6$ is not supported.

4.5 Discussion

4.5.1 Discussion of results. This research contributes to the TOE (Tornatzky and Fleischer, 1990) framework and our understanding of factors that influence CRM adoption by SMEs. The results show that technology does not significantly drive CRM adoption decisions, implying that non-technological factors may play a more critical role in SMEs' adoption of CRM. Moreover, although organizational factors such as organization readiness and top management support are in place, they are not sufficient to promote CRM adoption, suggesting that other organizational elements might be more influential. Based on statistical analysis showing that the item "CRM is easy to implement" has the lowest loading value in the technological context, it suggests that SMEs may be reluctant to adopt CRM because of the perceived difficulty in implementing it. This difficulty may stem from a lack of adequate infrastructure to support CRM use.

Meanwhile, the item "Competent staff for CRM" received the lowest loading value in the organizational context. This is understandable, given that SMEs are still small business units with limited human resource capacity. The findings underscore the importance of environmental factors in driving CRM adoption, such as competitive pressure from other businesses that have already adopted CRM and consumer demand. These results align with the studies by Qalati et al. (2021) and Religia (2022), which highlight that pressures from the operating environment strongly influence IT adoption decisions among SMEs.

The study also emphasizes the positive role of digital leadership in CRM adoption, reinforcing the need for leaders who are committed to integrating IT into business operations. As suggested by Borah et al. (2022) and Mo et al. (2023), there is a strong link between digital leadership and a company's innovation capabilities. However, even though digital leadership influences the relationship between technology or organization and CRM adoption, other factors may hinder CRM adoption decisions among SMEs more significantly. This suggests that CRM adoption is not solely driven by digital leadership but is also affected by broader factors. These theoretical implications provide a foundation for further theory development regarding CRM adoption by SMEs and offer guidance for future research on IT adoption in SMEs.

The study reveals that neither the technological nor the organizational contexts have a significant direct or moderating effect on CRM adoption via digital leadership. In the context of technology moderated by digital leadership, the leadership focus is more on the overall vision of digital innovation rather than specifically supporting the implementation of CRM. Without a clear implementation strategy, the potential of the technology cannot be maximized. Meanwhile, in the context of organizations moderated by digital leadership, if the organization lacks competent human resources to manage CRM, the leader's digital vision and resource capacity may become misaligned, hindering CRM adoption. While these findings might be unexpected, they highlight the importance of using control variables to isolate the true impact of one construct on another (Hair et al., 2014, 2021). Incorporating control variables ensures consistent results and eliminates the influence of extraneous

factors. The consistency of the findings, whether or not control variables are used, bolsters confidence in the conclusions.

Understanding the factors influencing CRM adoption decisions is crucial for SME owners and stakeholders. SME owners should look beyond technological factors such as relative advantage, compatibility and ease of use when developing CRM adoption strategies. In the organizational context, while support from top management and organizational readiness are necessary, SMEs should also consider other organizational factors that may support CRM adoption. Additionally, SMEs must be responsive to environmental factors, such as competitive pressures from businesses that have already adopted CRM and consumer demand for CRM adoption. Recognizing the crucial role of digital leadership in CRM adoption is also essential. Leaders who are committed to utilizing IT in business processes can help SMEs adopt CRM more effectively. Finally, SMEs must continually adapt to changing business environments, including consumer demands and increased competition, to remain competitive and ensure long-term sustainability. By considering these factors, SMEs can develop more effective and sustainable CRM adoption strategies.

4.5.2 Research limitations and suggestions. This study is not without limitations. One major limitation is the sample size, which was drawn from a single institutional source, potentially limiting the generalizability of the findings and reducing the diversity of the research results. Future research should aim to expand the sample size to improve external validity and consider using secondary data to provide a more comprehensive understanding. The lack of a significant effect of the technological context on CRM adoption among the sampled SMEs could be due to the widespread availability and familiarity with certain technologies in the sample region, reducing perceived differences in ease of use or relative advantage.

Alternatively, other factors, such as cost or technical support, might play a more significant role in SMEs' CRM adoption decisions. Furthermore, the negative influence of digital leadership on the organizational impact on CRM adoption highlights the complexity of these relationships, which the existing TOE framework may not fully capture. Therefore, the TOE framework requires further refinement to incorporate these factors and provide a more comprehensive understanding of CRM adoption by SMEs.

5. Conclusion

This study enhances our understanding of the factors driving CRM adoption among SMEs in developing countries by utilizing the TOE framework and examining the role of digital leadership. The research underscores the significant impact of environmental elements, such as competitive pressures and consumer demands, in motivating SMEs to adopt CRM systems. It also emphasizes the vital role of digital leadership in this process; SMEs with leaders who are committed to integrating IT into their operations are more likely to successfully implement CRM systems.

The findings challenge traditional interpretations of the TOE framework by revealing that technological and organizational contexts did not significantly influence CRM adoption in this study. This surprising result suggests that other factors, beyond just technological readiness and organizational support, might be more crucial in determining SMEs' decisions to adopt CRM systems in developing countries. Moreover, the study reveals an unexpected negative moderating effect of digital leadership on the relationship between organizational context and CRM adoption. This unexpected result underscores the necessity for additional research to investigate the underlying dynamics and possible contextual factors that could be contributing to this negative moderation.

The results of this study provide significant theoretical contributions to the TOE framework by highlighting that technological and organizational factors do not significantly influence

CRM adoption among SMEs, indicating the need for a reinterpretation of this framework to incorporate other factors, such as environmental pressures and digital leadership. These findings also emphasize the critical role of digital leadership in facilitating CRM adoption, although its effectiveness remains limited without adequate human resource competencies. Additionally, the study reinforces the understanding that competitive pressures and consumer demands are primary drivers in CRM adoption decisions, shifting the focus from internal elements to external influences. These implications encourage further theoretical development by integrating mediation and moderation dynamics in the relationships between technological, organizational, leadership and environmental factors in CRM adoption among SMEs.

This study also provides practical implications for SME owners and managers by recommending strategies to create a supportive business environment, promote digital literacy and develop robust digital leadership capabilities within SMEs. Additionally, policymakers are encouraged to design training programs and incentives to support the development of digital leadership and to create an ecosystem that fosters sustainable digital transformation among SMEs. This aims to strengthen the role of leaders in integrating digital technologies into business operations and enhancing the competitiveness of SMEs in the digital era.

Future research should investigate the specific mechanisms through which digital leadership affects CRM adoption and explore the potential moderating or mediating roles of other factors such as organizational culture, resource availability and industry dynamics. Additionally, conducting longitudinal studies or cross-country comparisons could offer deeper insights into the temporal and contextual variations in the determinants of CRM adoption among SMEs in developing countries.

References

- Abdurrahman, A., Gustomo, A., & Prasetyo, E. A. (2024). Impact of dynamic capabilities on digital transformation and innovation to improve banking performance: A TOE framework study. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1), 100215, <https://doi.org/10.1016/j.joitmc.2024.100215>.
- Abed, S. S. (2020). Social commerce adoption using TOE framework: an empirical investigation of Saudi Arabian SMEs. *International Journal of Information Management*, 53(1), 102118, <https://doi.org/10.1016/j.ijinfomgt.2020.102118>.
- Al-Gasawneh, J. A., Anuar, M. M., Dacko-Pikiewicz, Z., & Saputra, J. (2021). The impact of customer relationship management dimensions on service quality. *Polish Journal of Management Studies*, 23(2), 24–41, <https://doi.org/10.17512/pjms.2021.23.2.02>.
- Al-Hiyari, A., Kolsi, M. C., & Mas'ud, A. (2024). Antecedents and consequences of automated VAT solution adoption in Gulf cooperation countries: The case of the United Arab Emirates. *Journal of Financial Reporting and Accounting*, <https://doi.org/10.1108/JFRA-10-2023-0617>.
- Ali, O., Shrestha, A., Osmanaj, V., & Muhammed, S. (2020). Cloud computing technology adoption: an evaluation of key factors in local governments. *Information Technology & People*, 34(2), 666–703, <https://doi.org/10.1108/ITP-03-2019-0119>.
- Aligarh, F., Sutopo, B., & Widarjo, W. (2023). The antecedents of cloud computing adoption and its consequences for MSMEs' performance: A model based on the Technology-Organization-Environment (TOE) framework. *Cogent Business & Management*, 10(2), 2220190, <https://doi.org/10.1080/23311975.2023.2220190>.
- AlQershi, N., Mokhtar, S. S. M., & Abas, Z. B. (2020). Innovative CRM and performance of SMEs: the moderating role of relational capital. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 155, <https://doi.org/10.3390/joitmc6040155>.

- AlQershi, N. A., Mokhtar, S. S. M., & Abas, Z. B. (2022). CRM dimensions and performance of SMEs in Yemen. *Journal of Intellectual Capital*, 23(3), 516–537, <https://doi.org/10.1108/JIC-05-2020-0175>.
- Amini, M., & Jahanbakhsh, J. N. (2023). A multi-perspective framework established on diffusion of innovation (DOI) theory and technology, organization and environment (TOE) framework toward supply chain management system based on cloud computing technology for small and medium enterprises. *International Journal of Information Technology Innovation Adoption*, 11(8), 1217–1234.
- Barkley, E., & Jokonya, O. (2024). Factors affecting SMEs emerging technologies adoption in developing countries: A literature review. *Procedia Computer Science*, 239, 1966–1973, <https://doi.org/10.1016/j.procs.2024.06.381>.
- Bass, B. M., & Avolio, B. J. (1990). Developing transformational leadership: 1992 and Beyond. *Journal of European Industrial Training*, 14(5), <https://doi.org/10.1108/03090599010135122>.
- Bening, S. A., Dachyar, M., Pratama, N. R., Park, J., & Chang, Y. (2023). E-Commerce technologies adoption strategy selection in Indonesian SMEs using the decision-makers, technological, organizational and environmental (DTOE) framework. *Sustainability*, 15(12), 9361, <https://doi.org/10.3390/su15129361>.
- Bhatiasevi, V., & Naglis, M. (2018). Elucidating the determinants of business intelligence adoption and organizational performance. *Information Development*, 36(1), 78–96, <https://doi.org/10.1177/0266666918811394>.
- Borah, P. S., Iqbal, S., & Akhtar, S. (2022). Linking social media usage and SME's sustainable performance: The role of digital leadership and innovation capabilities. *Technology in Society*, 68, 101900, <https://doi.org/10.1016/j.techsoc.2022.101900>.
- Brunner, M., Gonzalez-Castañé, G., & Ravesteijn, P. (2021). How digital leadership competences and IT capabilities affect an organization's ability to digitally transform and adopt new technologies. *Journal of International Technology and Information Management*, 30(4), 139–156, <https://doi.org/10.58729/1941-6679.1526>.
- Daood, R. M., Oppong, E. O., & Wang, J. (2024). Determinants of social media adoption among SMEs in Syria: Analyzing depth of usage through the TOE framework. *Open Journal of Business and Management*, 12(04), 2754–2786, <https://doi.org/10.4236/ojbm.2024.124142>.
- Das, K., Gryseels, M., Sudhir, P., & Tan, K. T. (2016). *Unlocking Indonesia's digital opportunity*, Jakarta: McKinsey & Company.
- Davis, F. D. (1986). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340, <https://doi.org/10.2307/249008>.
- De Waal, B., Van Outvorst, F., & Ravesteyn, P. (2016). Digital leadership: The objective-subjective dichotomy of technology revisited. *Proceedings of the 12th European Conference on Management, Leadership and Governance*. Bucharest, Romania, pp. 52–60.
- Dea, V. (2019). An overview of support for women entrepreneurs in Indonesia and Canada: Focus on SMEs and Start-Ups. Canada-Indonesia Trade Private Sector Assistance Project. Jakarta.
- Effendi, M. I., Sugandini, D., & Istanto, Y. (2020). Social media adoption in SMEs impacted by COVID-19: The TOE model. *The Journal of Asian Finance, Economics and Business*, 7(11), 915–925, <https://doi.org/10.13106/jafeb.2020.vol7.no11.915>.
- Filipe, P., Ruivo, P., & Oliveira, T. (2023). Assessing machine learning adoption at the firm level: The moderating effect of the environmental context. *Procedia Computer Science*, 219, 1034–1042, <https://doi.org/10.1016/j.procs.2023.01.381>.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*, Los Angeles: SAGE Publications.
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: a workbook*, London: Springer Nature.

- Hassan, M. F. A., Ngah, A. H., & Tio, M. B. Y. (2023). Third-party logistics intention to provide cold transportation services: The mediating effect of top management support and organizational readiness in TOE framework. *OPSEARCH*, 60(4), 1603–1625, <https://doi.org/10.1007/s12597-023-00683-8>.
- Himawan, E. N., Djuwaini, A., & Darmawan Putra, A. (2024). Adoption of E-Commerce in small and medium-sized enterprises in Bogor district. *International Journal of Science, Technology & Management*, 5(1), 211–219, <https://doi.org/10.46729/ijstm.v5i1.1050>.
- Hussain, A., Shahzad, A., & Hassan, R. (2020). Organizational and environmental factors with the mediating role of E-Commerce and SME performance. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 196, <https://doi.org/10.3390/joitmc6040196>.
- Jameson, J., Rumyantseva, N., Cai, M., Markowski, M., Essex, R., & McNay, I. (2022). A systematic review and framework for digital leadership research maturity in higher education. *Computers and Education Open*, 3, 100115, <https://doi.org/10.1016/j.caeo.2022.100115>.
- Kajla, T., Sood, K., Gupta, S., Raj, S., & Singh, H. (2023). Identification and prioritization of the factors influencing blockchain adoption in the banking sector: Integrating fuzzy AHP with TOE framework. *International Journal of Quality & Reliability Management*, <https://doi.org/10.1108/IJQRM-03-2023-0079>.
- Kam, A. J. Y., & Tham, S. Y. (2022). Barriers to e-commerce adoption: Evidence from the retail and food and beverage sectors in Malaysia. *Asian-Pacific Economic Literature*, 36(2), 32–51, <https://doi.org/10.1111/apel.12365>.
- Kaufmann, L., & Gaeckler, J. (2015). A structured review of partial least squares in supply chain management research. *Journal of Purchasing and Supply Management*, 21(4), 259–272, <https://doi.org/10.1016/j.pursup.2015.04.005>.
- Khawji, A., Alsahafi, Y., & Hussain, F. K. (2022). Conceptual Framework of Blockchain Technology Adoption in Saudi Public Hospitals Using TOE Framework. *Proceedings of the International Conference on Network-Based Information Systems, Kwansei Gakuin University, Japan*, 78–89.
- Kumar, A., & Shankar, A. (2024). Building a sustainable future with enterprise metaverse in a data-driven era: A technology-organization-environment (TOE) perspective. *Journal of Retailing and Consumer Services*, 81, 103986, <https://doi.org/10.1016/j.jretconser.2024.103986>.
- Mihardjo, L., Sasmoko, S., Alamsjah, F., & Elidjen, E. (2019). Digital leadership role in developing business model innovation and customer experience orientation in industry 4.0. *Management Science Letters*, 9(11), 1749–1762, <https://doi.org/10.5267/j.msl.2019.6.015>.
- Mo, Z., Liu, Y., Lu, C., & Yu, J. (2023). Influences of industrial internet platform firms' ESG performance and digital leadership on user firms' innovation performance: The mediating role of inter-firm trust. *Journal of Digital Economy*, 2(1), 204–220, <https://doi.org/10.1016/j.jdec.2024.01.002>.
- Muafi, M., Religia, Y., & Ramawati, Y. (2024). Identification of green E-Commerce adoption among SMEs based on the TOE framework with demographics as control variables. In P. Ordóñez de Pablos, M. Anshari, & Almunawar, M. (Eds), *Harnessing green and circular skills for digital transformation*, PA: IGI Global Scientific Publishing, 108–126, <https://doi.org/10.4018/979-8-3693-2865-1.ch007>
- Muhamad, N. (2023). Tamatan tingkat pendidikan warga Indonesia terbanyak dari SMA pada maret 2023. *Mei*, Retrieved from <https://databoks.katadata.co.id/datapublish/2023/11/27/tamatan-tingkat-pendidikan-warga-indonesia-terbanyak-dari-sma-pada-maret-2023>
- Naim, A., & Alqahtani, K. J. P. (2021). Role of information systems in customer relationship management. *International Journal of Intelligent Communication, Computing, and Networks*, 2(3), 34–45, <https://doi.org/10.51735/ijiccn/001/37>.
- Ninčević Pašalić, I., & Čukušić, M. (2024). Understanding E-participation adoption: Exploring technological, organizational, and environmental factors. *Technological Forecasting and Social Change*, 207, 123633, <https://doi.org/10.1016/j.techfore.2024.123633>.

- Pratiwi, M., & Arsyah, U. I. (2021). The effectiveness of the concept of CRM application for SMEs during the COVID-19 pandemic. *Journal of Physics: Conference Series*, 1933(1), <https://doi.org/10.1088/1742-6596/1933/1/012026.012026>.
- Qalati, S. A., Li, W., Ahmed, N., Mirani, M. A., & Khan, A. (2021). Examining the factors affecting SME performance: The mediating role of social media adoption. *Sustainability*, 13(1), 1–24, <https://doi.org/10.3390/su13010075>.
- Raj, A., & Jeyaraj, A. (2023). Antecedents and consequents of industry 4.0 adoption using technology, organization and environment (TOE) framework: A meta-analysis. *Annals of Operations Research*, 322(1), 101–124, <https://doi.org/10.1007/s10479-022-04942-7>.
- Religia, Y. (2022). The effect of environmental pressures and the COVID-19 pandemic on the adoption of TikTok by MSMEs: Can MSME engagement moderate? *Journal of International Conference Proceedings*, 5(5), 285–300, <https://doi.org/10.32535/jicp.v5i5.2031>.
- Religia, Y., Ekhsan, M., Huda, M., & Fitriyanto, A. D. (2023). TOE framework for E-Commerce adoption by MSMEs during the COVID-19 pandemic: Can trust moderate? *Applied Information System and Management (AISM)*, 6(1), 47–54, <https://doi.org/10.15408/aism.v6i1.30954>.
- Religia, Y., Surachman, S., Rohman, F., & Indrawati, N. (2021). E-commerce adoption in SMEs: A literature review. *Proceedings of the 1st International Conference on Economics Engineering and Social Science, Bekasi, Indonesia*, 1-9, <https://doi.org/10.4108/eai.17-7-2020.2302969>.
- Salah, O. H., Yusof, Z. M., & Mohamed, H. (2021). The determinant factors for the adoption of CRM in the Palestinian SMEs: The moderating effect of firm size. *Plos One*, 16(3), e0243355, <https://doi.org/10.1371/journal.pone.0243355>.
- Samal, A. (2021). Drivers, barriers, advantages of customer relationship management and customer behaviour-a study with reference to private commercial banks at Bengaluru. *Turkish Online Journal of Qualitative Inquiry*, 12(7).
- Stevens, J. (1996). *Applied multivariate statistics for the social sciences*, Mahwah, NJ: Lawrence Erlbaum Associates.
- Sugandini, D., Effendi, M. I., Istanto, Y., & Arundati, R. (2022). Social media adoption on SMEs in Indonesia: TOE model. In B. Alareeni, A. Hamdan (Eds), *Financial technology (FinTech), entrepreneurship, and business development. ICBT 2021. Lecture notes in networks and systems*, Cham: Springer, Vol. 486, https://doi.org/10.1007/978-3-031-08087-6_55.
- Sun, S., Hall, D. J., & Cegielski, C. G. (2020). Organizational intention to adopt big data in the B2B context: an integrated view. *Industrial Marketing Management*, 86, 109–121, <https://doi.org/10.1016/j.indmarman.2019.09.003>.
- Tiwari, A. K., Marak, Z. R., Paul, J., & Deshpande, A. P. (2023). Determinants of electronic invoicing technology adoption: Toward managing business information system transformation. *Journal of Innovation & Knowledge*, 8(3), 100366, <https://doi.org/10.1016/j.jik.2023.100366>.
- Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation*, Lexington: Lexington Books.
- Wessels, T., & Jokonya, O. (2022). Factors affecting the adoption of big data as a service in SMEs. *Procedia Computer Science*, 196, 332–339, <https://doi.org/10.1016/j.procs.2021.12.021>.
- Yasiukovich, S., & Haddara, M. (2021). Social CRM in SMEs: a systematic literature review. *Procedia Computer Science*, 181, 535–544, <https://doi.org/10.1016/j.procs.2021.01.200>.
- Yopan, M., Kasali, R., Balqiah, T. E., & Pasaribu, M. (2022). The role of digital leadership, customer orientation and business model innovation for IoT companies. *International Journal of Business*, 27(2), 1–22.
- Zahra, A. M., Dhewanto, W., & Utama, A. A. (2021). Boosting emerging technology adoption in SMEs: a case study of the fashion industry. *International Journal of Applied Business Research*, 169–185, <https://doi.org/10.35313/ijabr.v3i2.155>.

Zhu, J., & Huang, F. (2023). Transformational leadership, organizational innovation, and ESG performance: Evidence from SMEs in China. *Sustainability*, 15(7), 5756, <https://doi.org/10.3390/su15075756>.

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