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Navigating Digitalization Advancement at SMEs: The Moderating Role of Government Policy in Emerging Markets

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ABSTRACT: This study investigates the influence of AI-driven automation and digital skill readiness on the digitalization process of SMEs in emerging economies, considering the moderating role of government policy. In light of the economic and infrastructural limitations common to these contexts, the study addresses a significant knowledge gap concerning how internal capabilities and external regulatory support affect SME digital transformation. Methodologically, a quantitative, survey-based research design was employed. A total of 385 respondents, including SME owners, IT specialists, HR managers, and government policymakers from Nigeria, India, Indonesia, and Vietnam, completed a 5-point Likert scale questionnaire to gather data. Stratified random sampling ensured representativeness across industries and geographic regions. Descriptive statistics, reliability testing, linear regression, and moderation analysis were conducted using SPSS. According to the study, digital skill readiness (β = 0.64) and AI-driven automation (β = 0.78) significantly enhance SME digitalization. Furthermore, the relationship between AI-driven automation and digital transformation is positively moderated by government policy (β = 0.63), which amplifies the benefits of regulatory support, incentives, and infrastructure investment. These findings emphasize the importance of external support and internal capabilities in driving sustainable digital growth among SMEs. By combining the Resource-Based View (RBV) theory with the Technology-Organization-Environment (TOE) framework, this study contributes to the growing body of research on SME digitalization. It presents a comprehensive model showing how workforce preparedness, policy environments, and technological competence influence digital transformation in SMEs. The findings help governments and SME leaders align technology adoption with workforce development and institutional support in emerging economies.

KEYWORDS: SME digitalization; AI-driven automation; Digital skill readiness; Government policy; Emerging economies.

1. INTRODUCTION

The research problem addresses the challenges of digitalization advancement in SMEs in emerging economies, focusing especially on AI-driven automation and digital skill readiness, while considering the moderating role of government policy. While digitalization is essential for SME competitiveness (Mikalef et al., 2019), emerging economies often face infrastructural deficits and skill shortages that hinder progress (Soto-Acosta, 2020). AI-driven automation can streamline operations, but its adoption involves substantial costs that may be prohibitive for many SMEs (Kar & Kushwaha, 2023). Similarly, digital skill readiness continues to be a significant challenge, as most SMEs lack the human capital needed to fully leverage digital tools (Ayyagari et al., 2014). Government policy plays a crucial role in overcoming these barriers; however, policy uncertainty and regulatory inefficiencies can impede digital adoption (Ta & Lin, 2023). Future research should explore contextual challenges such as cybersecurity risks and market volatility, which may further influence digital transformation in SMEs. Addressing these issues requires targeted policy interventions, financial support, and collaborative efforts between governments and industry stakeholders.

Past studies on SME digitalization have largely focused on developed economies, with limited attention to the distinct challenges faced by emerging economies (Vial, 2021). Recent studies emphasize technology adoption but often lack in-depth insights into the interplay between automation, digital skills, and policy systems (Ghobakhloo, 2020). Moreover, many do not account for sectoral differences among SMEs, particularly regarding digital readiness and the pace of transformation (Müller et al., 2018). This gap is addressed by the present study, which examines the extent to which AI-driven automation and digital skill

readiness influence SME digitalization, with government policy acting as a moderating factor. The study proposes an integrative framework that incorporates policy interventions tailored to the specific conditions of emerging markets (OECD, 2021). Additionally, cross-country comparisons enhance the generalizability of the findings and inform policy recommendations that address institutional barriers to digital transformation.

With a view to contributing to the body of theoretical knowledge in this field, the overarching research questions for this study are:

1. What is the effect of AI-driven automation on digitalization advancements at SMEs in emerging markets?
2. How does digital skill readiness among SME employees influence the success of digitalization initiatives?
3. To what extent does government policy towards digital transformation moderate the impact of AI-led automation on digitalization progress in SMEs in emerging economies?

Guided by these research questions, the study outlines three key objectives. The first objective is to explore the direct impacts of AI-driven automation and digital skill readiness on SME digitalization. The second objective is to evaluate the extent to which government policies enhance or hinder these developments. The final objective is to contribute theoretically and provide strategic recommendations to policymakers and entrepreneurs to foster an enabling digital ecosystem for SMEs in emerging economies.

2. LITERATURE REVIEW

2.1. Digitalization Advancements at Small & Medium Enterprises (SMEs)

Digitalization advancements among small and medium enterprises (SMEs) involve the introduction of digital technologies to enhance operations, increase productivity, and boost competitiveness (Nambisan, 2017). This includes adopting technologies such as cloud computing, artificial intelligence (AI), and data analytics to optimize processes and support quality decision-making (Vial, 2021). SMEs play a vital role in economic growth, particularly in developing countries, but often face challenges in digitalization due to funding constraints, limited expertise, and inadequate regulatory support (Guo et al., 2020). The significance of digitalization for SMEs lies in its ability to promote efficiency, drive innovation, and support business development. Evidence suggests that digitally empowered SMEs are more resilient to economic disruptions, including during the COVID-19 pandemic (Bai et al., 2020). However, the digital transition process varies across regions, depending on infrastructure, business environments, and government policy (Li et al., 2024).

Despite the well-documented benefits, digitalization advancements among SMEs remain uneven, particularly in developing economies where technology adoption is hindered by socio-economic and regulatory challenges (Gong et al., 2024). Digital skill readiness and AI-driven automation are critical enablers of digitalization; however, SMEs in developing economies often lack the financial resources and technical expertise needed to adopt these technologies effectively (Guo et al., 2022). Government policies can either facilitate or hinder this transformation, depending on the extent of support provided through incentives, training programs, and investments in digital infrastructure (Bargoni et al., 2024).

SME digitalization can be effectively examined through the TOE framework and the RBV theory. The TOE framework (Tornatzky & Fleischer, 1990) posits that digitalization in SMEs is shaped by technological readiness, organizational characteristics, and external environmental factors. From a technological perspective, SMEs must adopt AI-driven automation and develop digital competencies to remain competitive. At the organizational level, factors such as leadership commitment, financial capacity, and internal skill sets play a critical role in digital transformation. Externally, institutional support, market dynamics, and government policy significantly influence the adoption of digital technologies. The RBV theory (Barney, 1991) complements TOE by highlighting the importance of unique internal resources—such as skilled personnel, robust technological infrastructure, and strategic know-how—in achieving digital success. SMEs with superior digital capabilities can gain a competitive advantage by fostering innovation and operational efficiency. However, in emerging economies, resource constraints present significant challenges, necessitating targeted government policies to support digital skills development and technology adoption. Together, TOE and RBV provide a comprehensive perspective on the enablers and barriers to SME digitalization.

2.2. Critical Analysis of Theoretical Frameworks

The study applies the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990) and the Resource-Based View (RBV) theory (Barney, 1991) to examine how SMEs respond to digitalization in emerging markets.

2.2.1. The Technology-Organization-Environment (TOE) framework

The Technology-Organization-Environment (TOE) framework serves as a key theoretical model for examining the determinants of SME digitalization, particularly in emerging economies. Developed by Tornatzky and Fleischer (1990), the framework posits that a firm's adoption of technology is influenced by three interrelated contexts: technological, organizational, and environmental. For SMEs, the technological dimension refers to AI-based automation and digital tools that enhance operational efficiency and

optimize business processes (Baker, 2011). AI-based automation, as an emerging technology, has a significant impact on SME operations by reducing manual tasks, improving decision-making, and fostering innovation (Westerman et al., 2014). However, its integration depends heavily on organizational readiness, which encompasses employee competence in digital capabilities (Zhu & Kraemer, 2005). As outlined in the TOE framework, firm-specific characteristics such as human capital, available resources, and strategic intent drive digital adoption. Digital readiness plays a pivotal role, as digitally literate personnel expand the organization's capacity to effectively leverage automation and digital tools (Schmidt et al., 2016). The environmental dimension is especially important in emerging economies, where government policy plays a central role in shaping digitalization decisions (Aboelmaged, 2014). Regulatory frameworks, financial incentives, and investment in digital infrastructure influence both the pace and scale of technology adoption among SMEs (Bharadwaj et al., 2013). Unlike larger firms, SMEs often lack the technical and financial resources to adopt advanced technologies independently. Therefore, government support through targeted digitalization policies can either facilitate or constrain SME digital transformation. Overall, the TOE framework offers a comprehensive perspective by linking technological capabilities, organizational preparedness, and external regulatory influences, providing a robust theoretical foundation for analyzing SME digitalization in emerging economies.

The TOE framework assumes that a firm's adoption of innovation is influenced by environmental conditions, technological capability, and organizational readiness. It is based on the rational evaluation of these interrelated factors, particularly in SMEs, where internal capabilities must align with external policy conditions. The model further suggests that digitalization outcomes in emerging markets are significantly shaped by institutional and infrastructural constraints. For digital adoption to succeed, alignment across environmental, organizational, and technological dimensions is essential (Tornatzky & Fleischer, 1990; Aboelmaged, 2014).

2.2.2. The Resource-Based View (RBV) theory

The Resource-Based View (RBV) theory complements the TOE model by emphasizing the internal resources that enable SMEs to achieve sustainable competitive advantage through digitalization. Originating from Barney's (1991) seminal work, RBV posits that firms gain a lasting edge by developing resources that are valuable, rare, inimitable, and non-substitutable (VRIN). In the context of digital transformation, AI-driven automation and digital skill readiness represent key internal resources that distinguish SMEs in their response to technological change (Grant, 1996). When effectively deployed, AI-driven automation enhances efficiency, reduces operational costs, and fosters innovation—aligning closely with the VRIN characteristics emphasized in RBV (Peteraf, 1993). However, its successful implementation depends on digital skill preparedness embedded in the workforce—an intangible yet essential resource for ongoing transformation (Teece et al., 1997). Compared to traditional assets, digital capacity among employees serves as a strategic resource that allows SMEs to implement AI-led automation and remain agile in fast-evolving markets (Wade & Hulland, 2004). Furthermore, RBV highlights the importance of path dependency, suggesting that SMEs with early investments in digital infrastructure and competencies are better positioned to reap the benefits of digitalization (Barney et al., 2001). The theory also underscores the interaction between firm-specific resources and external enablers such as government policy. While internal capabilities like digital readiness and automation are critical, their impact is shaped by the broader regulatory environment (Newbert, 2007). Government policy can serve as a catalyst by offering training programs, financial support, and regulatory guidance that empower SMEs to embrace digital transformation (Wernerfelt, 1984). Thus, RBV provides a valuable theoretical lens through which to understand how SMEs can leverage their internal strengths alongside supportive external policies to drive digital progress. This aligns with the study's focus on emerging markets, where institutional voids often require targeted public intervention to address technological gaps and enhance digital competitiveness.

According to RBV, organizations possess heterogeneous internal resources, and those that are valuable, rare, inimitable, and non-substitutable (VRIN) form the basis of sustained competitive advantage. The theory posits that organizations with prior technology investments are better positioned to benefit from innovation, and that intangible assets such as digital skills constitute strategic resources. Additionally, RBV emphasizes that external support—such as government policy—is essential to fully realize the value of internal capabilities, as internal resources alone may be insufficient (Barney, 1991; Newbert, 2007).

2.3. The Impact of AI-driven automation on Digitalization Advancement at SMEs

AI-driven automation refers to the application of artificial intelligence (AI) technologies, such as machine learning, robotic process automation (RPA), and predictive analytics, to automate business processes, enhance operational efficiency, and support data-driven decision-making (Roszelan & Shahrom, 2025; Makridakis, 2017). AI-powered automation mimics cognitive functions, enabling systems to learn, adapt, and improve over time without explicit programming (Brynjolfsson & McAfee, 2017). In small and medium-sized enterprises (SMEs), AI-driven automation facilitates digitalization by optimizing production processes, improving customer experiences, and supporting data-driven competitive strategies (Bughin et al., 2018). Its role in SME

digitalization is closely associated with economic trends, technological paradigms, and institutional conditions. Therefore, it is imperative to analyze its impact within the context of technological determinism and contemporary capitalism.

From the perspective of technological determinism, AI-driven automation is often viewed as a powerful force propelling SME digitalization, reshaping business models, and redefining competitive advantage in the digital economy (Chandler, 2009). This viewpoint holds that technology evolves autonomously, driving economic and social transformations independently of human agency. As AI-driven automation is integrated into SME operations, it pressures businesses to adapt to remain competitive, reinforcing the belief that technological innovation determines business success. Empirical evidence shows that AI-based automation significantly enhances productivity, with some SMEs achieving gains of up to 40% in operational processes (Duan et al., 2019). Furthermore, AI-driven automation promotes scalability, enabling SMEs to expand their market reach through online marketplaces and intelligent supply chain systems (Nadkarni & Prügl, 2021). Yet, while technological determinism emphasizes the centrality of AI's innovative potential, it tends to downplay the roles of human agency, regulatory frameworks, and organizational readiness in shaping digital outcomes. Technological innovation alone does not dictate AI adoption among SMEs; factors such as compatibility with existing business processes, workforce digital competencies, and supportive government policies also influence adoption (Burda & Gavrikova, 2024). Thus, the deterministic view that AI alone drives SME digitalization should be tempered by an understanding of institutional constraints and the adaptive capacity of human actors.

From the capitalist perspective, AI automation is a double-edged sword that enhances efficiency while transforming labor relations within SMEs. Capitalist systems prioritize profit maximization, resource optimization, and competitive advantage; thus, AI serves as a means of reducing operational costs and maximizing output (Smith, 1937). By automating repetitive tasks, AI reduces reliance on human labor, enabling SMEs to operate with leaner workforces without compromising productivity (Bughin et al., 2018). Evidence suggests that AI-driven automation can reduce business costs by 20–30%, eliminate inefficiencies, increase precision, and minimize downtime (Chui et al., 2018). Moreover, AI-driven insights support informed decision-making, streamline supply chain management, and personalize customer experiences, thereby advancing the capitalist goal of enhancing market competition through efficiency (Loonam et al., 2018). However, capitalism's relentless pursuit of cost reduction through automation raises concerns about job displacement and wage suppression, particularly in emerging economies where SMEs are major employers (Vo Thai et al., 2024). The drive for productivity may marginalize low-skilled labor, exacerbate economic inequality, and contribute to structural unemployment in economies heavily reliant on SMEs (Burda & Gavrikova, 2024). Therefore, while capitalism promotes AI adoption for maximum returns, it also necessitates parallel investments in workforce reskilling and policy interventions to mitigate displacement effects.

The characteristics of AI-driven automation in SME digitalization highlight a complex interplay between technological capabilities, economic constraints, and institutional arrangements. SMEs in emerging markets face distinct challenges in adopting AI, including budget limitations, infrastructure shortfalls, and regulatory barriers (Da Rocha et al., 2024). Unlike large multinational firms with significant AI investment capabilities, SMEs have limited access to AI expertise and digital transformation resources (Agostini & Nosella, 2020). Heavy reliance on AI automation as the central driver of digitalization necessitates careful consideration of each SME's business environment, technological readiness, and external policy support (Nadkarni & Prügl, 2021). Moreover, ethical concerns surrounding AI adoption, such as data protection, cybersecurity, and algorithmic bias, add further complexity to SME digital transformation efforts (Duan et al., 2019). While AI-driven automation is reshaping SME operations, governments are responsible for mitigating its effects by enacting supportive policies, facilitating workforce upskilling and reskilling, and establishing regulations that ensure the ethical deployment of AI (Vo Thai et al., 2024). The relationship between AI adoption and SME digitalization is thus neither a purely technological imperative nor a straightforward, one-way process, but rather a choreographed economic transformation shaped by institutions, market dynamics, and firm-level strategic decisions.

This paper argues that AI-powered automation is an inevitable driving force behind the digitalization of SMEs, offering operational efficiency, scalability, and data-driven competitiveness. From a technological determinism perspective, AI is perceived as an autonomous force that drives business transformation, compelling organizations to adapt or risk obsolescence. In contrast, from a capitalist standpoint, AI adoption is primarily guided by economic imperatives, raising concerns about labor displacement and social inequality. However, this article contends that AI-driven digitalization in SMEs is not a one-size-fits-all strategy; rather, it must be strategically aligned with organizational capacity, workforce readiness, and policy frameworks that promote sustainable technology adoption. While AI enhances SME performance and market responsiveness, this paper maintains that its long-term benefits hinge on balancing technological progress with economic equity. Therefore, the dividends of digitalization must go beyond profit maximization to include skill development, equitable access to AI-enabled resources, and the responsible governance of AI systems. Ultimately, this paper argues that by embedding AI adoption within a robust policy framework tailored to SMEs, governments and business leaders can realize the benefits of automation without triggering socio-economic dislocations. In the long term, this approach fosters a more inclusive and sustainable digital economy in emerging markets.

Guided by the underlying theoretical framework, we establish the rationale leading to hypothesis one as follows:

H1: AI-driven automation has a positive impact on Digitalization Advancement at SMEs in emerging markets.

2.4. The Impact of Digital Skill Readiness on Digitalization Advancement at SMEs

Digital skill readiness refers to the extent to which employees and organizations possess the necessary competencies to adapt to, absorb, and effectively utilize digital technologies (Izzaty Roszelan, & Shahrom, 2025; Oberländer et al., 2021). For small and medium-sized enterprises (SMEs), digital skill preparedness includes technical competencies in areas such as artificial intelligence (AI), cloud computing, cybersecurity, and data analytics, alongside adaptive skills that enable employees to navigate evolving digital environments (Gusenbauer et al., 2025). The ability of SMEs to leverage digital tools depends on digital literacy, training investment, and employee technological expertise. As digitalization accelerates, digital skill readiness becomes a key driver of SME competitiveness, operational efficiency, and integration into the digital economy (Dabić et al., 2021). However, its contribution to SME digital transformation is not purely technical; it also hinges on broader economic systems, institutional support, and workforce development policies. Drawing from institutional and socio-technical systems (STS) perspectives, this paper explores how digital skill preparedness facilitates SME digitalization while also raising issues related to labor force readiness and policy alignment.

From an institutionalist perspective, digital skill readiness is not merely a matter of organizational or individual attributes, but is significantly shaped by broader institutional factors such as education systems, government policies, and market conditions (North, 1990). Institutions—defined as the formal and informal rules, norms, and structures that govern economic and social behavior—play a critical role in shaping the digital competence levels of SMEs. National education curricula, vocational training programs, and policy incentives for digital upskilling are shaped by governments and industry bodies, which, in turn, foster digital preparedness (Dabić et al., 2021). Empirical research shows that SMEs operating in regions with strong institutional support for digital training exhibit higher levels of digital adoption and technological innovation (Buck & Eder, 2018). Moreover, institutional environments influence the availability of digital skills and resources, particularly in developing economies where disparities in education systems and infrastructure contribute to digital skill shortages, thereby hindering SME digitalization (Cestero et al., 2023). Digital skill preparedness is thus not an isolated variable but an outcome of systemic institutional interactions that either facilitate or constrain digital transformation. In the absence of well-structured institutional support, SMEs may struggle to address skill gaps, limit their ability to leverage digital tools effectively and participate in global value chains.

The socio-technical systems (STS) view provides a complementary lens for examining the relationship between digital readiness competencies and SME digitalization through its emphasis on the co-evolution of technology and human skills (Trist & Bamforth, 1951). While technological determinism attributes digital uptake primarily to access to technology, the STS perspective contends that successful digitalization requires coordinated development of technological systems, human capabilities, and organizational structures (Baxter & Sommerville, 2011). From an STS perspective, digital readiness extends beyond technical competence to include cultivating a culture of digital resilience, continuous learning, and collaborative problem-solving within SMEs (Duan et al., 2019). For example, AI-based business processes not only require employees to learn how AI software operates but also to critically reflect on its influence on decision-making and workflow efficiency (Makridakis, 2017). The STS perspective asserts that SMEs embracing comprehensive digital proficiency, including both strategic and technical digital literacy, are better positioned to achieve meaningful digital transformation. It also emphasizes the role of organizational structure in fostering digital preparedness, where SMEs are encouraged to develop learning-oriented and innovative environments that support experimentation, mutual knowledge sharing, and incremental improvement in the digital implementation process (Cestero et al., 2023).

Digital skill readiness is a critical component of SME digitalization, offering both opportunities and challenges. Digitally prepared SMEs enhance operational efficiency, improve customer experiences, and enable data-informed decision-making (Oberländer et al., 2021). Digital preparedness may increase productivity by up to 25% through more effective use of technology and workflow optimization (Dauvergne, 2022). Moreover, digital literacy allows SMEs to leverage e-commerce, cloud collaboration, and AI-driven analytics to remain competitive in global markets (Dabić et al., 2021). Adaptable, digitally skilled employees contribute to organizational technology resilience (Gurbaxani & Dunkle, 2019). However, digitalization also requires substantial investment in continuous training, particularly in low-resource economies, where skill development remains uneven (Buck & Eder, 2018). Ongoing technological advancement necessitates continuous upskilling to keep pace with industry standards (Oberländer et al., 2021). Institutional support, public-private partnerships, and digital learning platforms in the workplace are essential for facilitating SME digital transformation (Duan et al., 2019).

This article argues that digital skill readiness is a key enabler of SME digitalization, as it allows firms to adopt, absorb, and fully utilize digital technologies. From an institutionalist perspective, it can be argued that education systems, policy frameworks, and

market institutions play a critical role in shaping digital competencies—supporting the view that skill readiness should not be seen merely as an organizational issue, but as a systemic economic priority. Complementing this, the STS approach emphasizes the integration of technology with human capabilities, suggesting that successful digital transformation requires work environments conducive to continuous digital learning and strategic adaptation. While this paper acknowledges that SMEs with advanced digital competencies gain competitive advantages in efficiency and market responsiveness, it also highlights the persistent digital divide in emerging markets, which calls for targeted investments in digital education, training infrastructure, and SME-focused policy measures. This research confirms that by cultivating a digitally literate workforce and aligning institutional structures with SME digitalization goals, policymakers and business leaders can ensure that digital transformation is both technologically feasible and economically inclusive. Ultimately, this paper concludes that with such a strategy, SMEs can be positioned at the forefront of driving the global digital economy.

With reference to the underlying theoretical perspectives, this article aligns the perspectives to validate the second hypothesis as follows:

H2: Digital Skill Readiness has a positive impact on Digitalization Advancement at SMEs in emerging markets.

2.5. Moderating Role of Government Policy

Government digital transformation policy refers to government-implemented incentives and guidelines designed to promote the adoption of digital technologies, particularly for SMEs in emerging economies (Peretz-Andersson et al., 2024). It encompasses legislation, economic incentives, and educational initiatives that create an enabling environment for innovation and broader economic development (Succurro & Donati, 2025). These policies are critical for addressing the specific challenges SMEs face on their digitalization journeys. Government policy also shapes how AI-based automation affects SME digitalization in emerging markets. Research shows that robust policy frameworks significantly enhance the positive impact of AI technologies on SME digital transformation. In particular, SMEs that understand regulatory frameworks and expected digital standards experience more rapid digitalization processes (Succurro & Donati, 2025). Moreover, regulatory awareness strengthens the link between strategic planning and digital implementation, further accelerating digital transformation in firms adopting cutting-edge technologies.

Government incentives, policy guidance, and even regulatory constraints have significantly supported digital transformation and innovation adoption in SMEs (Wu et al., 2024). In particular, governments facilitate resource sharing and cooperative development through digital transformation platforms, which is crucial for SMEs that lack the capacity to identify customers and partners in competitive digital markets (Wu et al., 2024). This moderating role operates through various mechanisms. For example, governments establish standardized, shareable digital transformation frameworks that help SMEs overcome resource constraints associated with cutting-edge technologies (Moreira et al., 2025). They also provide incentives and fiscal subsidies to reduce economic barriers to AI-driven automation, fostering innovative green business models (Wu et al., 2024). Government-led education and training programs on environmental and digital development further enable AI adoption across production, management, and research functions within SMEs (Wahab & Radmehr, 2024). These efforts—comprising robust regulations, financial incentives, targeted skills programs, and infrastructure investments—create an environment where SMEs can leverage AI analytics to accelerate digital transformation and strengthen their position in global value chains (Schwaeke et al., 2024).

Based on the guiding theoretical framework and perspectives, the reasoning for hypothesis three is articulated below:

H3: Government policy positively moderates the impact of AI-driven automation on Digitalization Advancement at SMEs in emerging markets.

2.6. Conceptual framework

By anchoring the hypotheses within robust theoretical foundations, this study enhances its ability to offer a significant contribution to academic scholarship through the proposed conceptual framework.

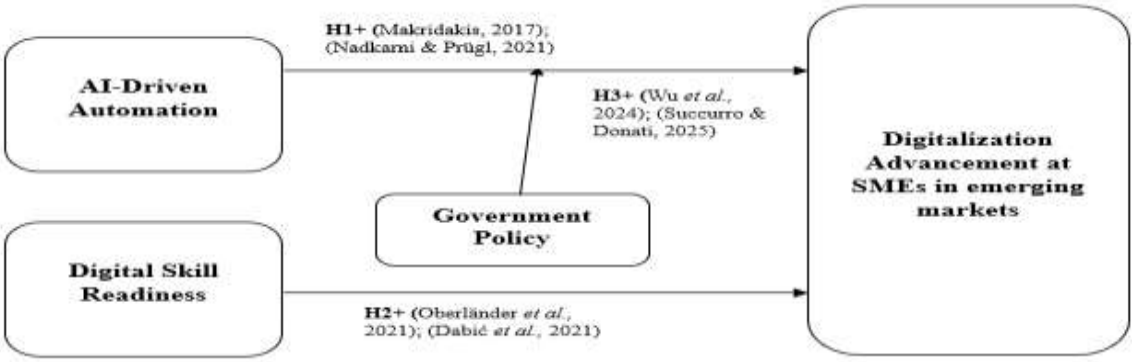

Figure 1. The Proposed Conceptual Framework

3. METHODS

3.1. Research approach and strategy

A quantitative method was adopted for this study as it facilitates the collection and analysis of numerical data to identify and confirm trends (Creswell & Creswell, 2017). To ensure objective examination of the data and produce quantitative results, statistical analysis was employed (Babbie, 2010). This strategy was chosen to effectively address the study objectives and investigate the relationships between key factors. Furthermore, the study employs a deductive approach compatible with quantitative research, allowing for hypothesis testing, predictive analysis, and drawing conclusions from statistical data.

3.2. Participants

This study employs random sampling to ensure accuracy and representativeness (Bryman, 2012). A 5-point Likert scale was utilized in the survey to gather data, with respondents rating their agreement on a scale from 1 ('strongly disagree') to 5 ('strongly agree') (Brown, 2011). To capture diverse regional contexts and professional perspectives from emerging markets, a stratified sampling technique was applied. Four respondent groups, each representing 25% of the sample size, were randomly selected from the target population: SME owners or founders, IT or digital transformation managers, HR and training coordinators, and government officials or policy advisers. Each of the four emerging market economies, Nigeria, India, Indonesia, and Vietnam, contributed equally to the sample. These countries were selected based on their active engagement in government innovation programs and SME digital transformation. SME owners provided firsthand accounts of their digital transformation efforts and AI implementation challenges. IT managers contributed technical and infrastructure insights, while HR coordinators assessed organizational readiness and digital skills gaps. Finally, government officials and policy advisors evaluated state-led strategies for their effectiveness in guiding SME technological innovation.

A simple random sample of 385 respondents was selected proportionately from each stratified group and country. Surveys were distributed online via SME forums, trade associations, and LinkedIn, and in person through entrepreneurial networks and government-sponsored digital transformation events. This cross-national design captures variation in AI-driven automation, digital skill readiness, and the moderating role of government policy across emerging markets, ensuring a robust and representative dataset.

4. RESULTS

4.1. Reliability analysis

Table 1. Reliability analysis of the dependent variable "Digitalization Advancement"

Reliability Statistics

Cronbach's Alpha	N of Items
.725	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DA1	8.638	9.630	.659	.707
DA2	8.652	10.992	.635	.667
DA3	7.063	8.389	.691	.704
DA4	8.307	9.588	.689	.728

Source: *(The authors, 2025)*

Where DA1, DA2, DA3, DA4 are coded for survey questions 1, 2, 3, 4 of Digitalization Advancement at SMEs in emerging markets respectively.

As indicated in Table 1, all items measuring the dependent variables exhibited adjusted item-total correlation coefficients of at least 0.3. The overall Cronbach's alpha was 0.725, exceeding the commonly accepted minimum threshold of 0.6 and surpassing the alpha values that would result from omitting any item. Additionally, for each dependent variable, Cronbach's alpha consistently remained higher than the respective adjusted item-total correlations, even when individual items were excluded. Therefore, no items were removed. Similar reliability patterns were observed for the Cronbach's alpha values of the other constructs.

4.2. Exploratory Factor Analysis (EFA)

Table 2. Rotated Component Matrix for the 2 independent variables.

Rotated Component Matrix[a] Component with loading factors	
1	2
AI1 .597 AI2 .675 AI3 .664 AI4 .712	DSR1 .568 DSR2 .527 DSR3 .618 DSR4 .737
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.	
a. Rotation converged in 4 iterations.	

Source: *(The authors, 2025)*

Where AI1, AI2, AI3, AI4; DSR1, DSR2, DSR3, DSR4 are coded for survey questions 1, 2, 3, 4 of AI-driven automation and Digital Skill Readiness respectively.

As presented in Table 2, the rotated component matrix grouped the eight dependent variables into two distinct factors, retaining all variables. Each variable exhibited a factor loading greater than 0.5, indicating strong alignment with the extracted components. Additionally, a comparative analysis was conducted to examine relationships between the dependent and moderator variables.

4.3. Multiple linear regression model

Table 3. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.225	.753		3.691	.000
	AI	.758	.578	.780	3.475	.000
	DSR	.627	.652	.640	3.667	.000

a. Dependent Variable: DA

Source: *(The authors, 2025)*

Where **DA**: mean of DA1, DA2, DA3, DA4; **AI**: mean of AI1, AI2, AI3, AI4; **DSR**: mean of DSR1, DSR2, DSR3, DSR4

Table 3 reveals that the significance values (Sig.) obtained from the t-tests for the variables were .000 and .000, respectively, both below the conventional alpha threshold of 0.05. These findings indicate that the independent variables, AI-driven automation and digital skill readiness, have a statistically significant effect on the dependent variable, digitalization advancement at SMEs in emerging markets. Consequently, both proposed hypotheses are supported.

4.4. Moderator analysis

Table 4. Results Analysis of Government Policy

Model: 1 Y: DA X: AI W: GP Sample Size: 385

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OUTCOME VARIABLE: DA Model Summary

R	R-sq	MSE	F	dl1	dl2	p
.702	.688	.403	6.347	3.000	381.000	.000

Model

	coeff	se	t	p	LLCI	ULCI
constant	4.854	.246	74.568	.000	5.568	5.121
AI	.685	.345	3.953	.000	.355	.385
GP	.621	.582	4.358	.000	.273	.265
Int_1	.630	.330	4.805	.000	.377	.347

Source: (The authors, 2025)

Where **GP**: mean of GP1, GP2, GP3, GP4

In Table 4, the p-value for the interaction term (Int_1) is 0.000, which is significantly below the 0.05 threshold, indicating a statistically significant interaction between government policy (GP) and AI-driven automation (AI) in influencing digitalization advancement at SMEs in emerging markets (DA). The interaction coefficient of 0.630 suggests that stronger government policy amplifies the positive impact of AI-driven automation on SME digitalization. Thus, hypothesis H3 is supported.

5. DISCUSSION

5.1. Summary Results

Linear regression findings indicate that digitalization advancement in SMEs in emerging economies is most strongly influenced by AI automation (β = 0.78), followed by digital skill readiness (β = 0.64). Furthermore, government policy moderates the relationship between AI automation and digitalization advancement, with a moderation effect size of β = 0.63. Thus, all three research questions are supported by the findings.

5.2. Theoretical Implications

The conclusion confirms that AI automation is a key driver of SME digitalization in developing economies and offers strong empirical support for technological determinism (Makridakis, 2017; Duan et al., 2019). It challenges Burda and Gavrikova's (2024) assertion that the power of AI is primarily dependent on contextual factors such as labor and regulatory preparedness. This study aligns with Nadkarni and Prügl (2021), who posit AI as an essential enabler of digitalization, and partially supports Brynjolfsson and McAfee's (2017) view that AI adoption inevitably enhances performance. At the same time, it reflects the constraints posed by an uneven technological base in SMEs, as highlighted by Agostini and Nosella (2020). Furthermore, the findings challenge the extreme capitalist notion (Smith, 1937) that focuses exclusively on cost-effectiveness, emphasizing instead that automation must be guided by inclusive policy frameworks to ensure sustainability. While AI is found to be highly effective, a balanced evaluation that considers institutional support and ethical implementation is essential for enabling automation-driven digital transformation, as advocated in this study.

Empirical evidence convincingly attests to the contribution of preparedness to digital skills development in SMEs and supports assumptions in the socio-technical systems theory (Trist & Bamforth, 1951) and institutionalist theory (North, 1990). The findings align with Dabić et al. (2021) and Oberländer et al. (2021) in emphasizing the central role of employee competence in internalizing digital technologies. At the same time, the study challenges enterprise-centric views of preparedness, such as those proposed by Buck & Eder (2018), which downplay systemic constraints. Instead, it substantiates the argument that digital skills are shaped by institutional environments that embed and distribute them. The study also supports Gusenbauer et al. (2025), who highlight the role of external infrastructure, education systems, and public-private partnerships in shaping digital preparedness. While partially consistent with the socio-technical systems (STS) approach (Baxter & Sommerville, 2011) in recognizing the importance of human-technology fit, the study extends this view by arguing that preparedness alone is insufficient. Without macro-level, high-intervention policies and corresponding micro-level adaptability, digital readiness remains limited in practice. Thus, digital skill preparedness should be understood not merely as an internal organizational attribute, but as a socio-politically constructed outcome, contingent upon institutional configurations shaping SME capacity in emerging digital economies.

This study presents evidence that state intervention plays a critical moderating role in amplifying the impact of AI automation on the digitalization of SMEs. The findings support the arguments of Succurro and Donati (2025) and Wu et al. (2024), who emphasize placing state intervention at the center of technological innovation, particularly through strategic regulation and incentives. Our results reinforce these claims, showing that well-designed policy regimes enhance the value proposition of AI for SMEs. In contrast, the findings challenge the overly optimistic view presented by Moreira et al. (2025), which assumes that favorable frameworks alone will automatically drive transformation. Instead, our evidence aligns with Wahab and Radmehr (2024), who advocate for adaptively calibrated policies that match the capabilities and constraints of SMEs. This study also challenges the notion that policy is an invisible, background facilitator. Rather, it positions policy as a visible, cooperative, and directive force in shaping how technology is applied. Without agile, inclusive policymaking that explicitly addresses the fragmented and under-resourced nature of emerging market institutions, the transformative potential of AI automation is unlikely to be fully realized.

5.3. Practical Implications

The results indicate that AI-driven automation (**H1**) has the strongest influence on SME digitalization and value transformation (β = 0.78). This suggests that SMEs must invest in AI to automate business processes, manage data efficiently, and enhance customer analytics. Given their limited resources, small firms would benefit from lean AI solutions and subsidized training platforms (Bughin

et al., 2018). Collaborations with AI providers and public support are essential to implementing scalable technologies while reducing implementation costs (Wahab & Radmehr, 2024).

Digital skill preparedness (**H2**) also plays a critical role, with a similarly strong effect size (β = 0.64). Building internal capacity through continuous reskilling, on-the-job digital training, and peer learning networks should be a top priority for SMEs. Governments and NGOs can support this by establishing regional digital expertise centers, particularly in rural or under-resourced areas (Gusenbauer et al., 2025).

The moderating effect of government policy (β = 0.63) highlights that policy frameworks (**H3**) have a direct and significant influence on SMEs' ability to leverage AI and invest in digital skills. Regulatory bodies should issue sector-specific digital transformation roadmaps, align fiscal incentives, and promote public-private partnerships to foster inclusive digital ecosystems (Succurro & Donati, 2025). Governments might also consider developing AI-readiness indices to help benchmark and track SME progress in digital transformation. Without coordinated institutional support, SME digitalization will remain fragmented and uneven. Therefore, this study calls for an integrated approach in which technological capabilities, human capital, and adaptive policy frameworks converge to enable inclusive and sustainable SME digitalization.

5.4. Limitations

This study has several limitations. First, by focusing exclusively on SMEs in emerging economies, its findings may not be generalizable to firms in more developed markets. Second, the use of cross-sectional survey data precludes analysis of digitalization's long-term effects. Third, reliance on self-reported measures introduces potential biases, including social desirability and respondents' varying understanding of AI concepts. Finally, this research does not account for industry- or sector-specific differences in digital skill readiness or automation uptake, which may influence how policy interventions should be tailored.

5.5. Future Directions for Research

Future research should adopt longitudinal studies to examine the impact of AI-based automation and digital readiness on firm growth over time. This should be complemented by comparative research across different institutional contexts, such as Southeast Asia and Sub-Saharan Africa, to understand how variations in government support and digital infrastructure shape digitalization pathways. Qualitative studies, including interviews with policymakers and entrepreneurs, would generate valuable insights into the determinants of success and failure in local contexts. Finally, future studies should explore the ethical dimensions of AI adoption in SMEs, focusing on issues such as algorithmic bias, data privacy, and the digital labor divide.

6. CONCLUSION

This study significantly advances our understanding of how AI-driven automation, digital skill readiness, and government policy jointly drive SME digitalization in emerging markets. The empirical findings confirm that AI automation exerts the strongest influence, yet its success depends heavily on workforce preparedness and supportive policy frameworks. Digital skill readiness emerges as a key internal asset for SMEs to adopt new technologies competitively. Government policy also plays a pivotal role—without adequate structural support, even the most robust technological and human strategies may falter. These insights align with both the TOE and RBV frameworks, underscoring the importance of internal capabilities and external institutions for effective digital transformation. Although our findings offer actionable guidance for practitioners and policymakers, their applicability is limited by the study's focus on emerging markets, highlighting the need for broader empirical validation. Ultimately, sustainable SME digitalization requires a coordinated approach that balances technological innovation, workforce development, and institutional resilience in today's digital economy.

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Appendix A

MAIN SURVEY QUESTION			
Variables	**Coding**	**Survey content**	**Sources**
Digitalization Advancement at SMEs	DA1	Our company has integrated digital platforms to improve operations.	(Nambisan, 2017)
	DA2	We use AI, cloud services, or data analytics to support business decisions.	(Vial, 2021)
	DA3	Digital technologies have increased our responsiveness to market changes.	(Guo et al., 2020)
	DA4	Digitalization has helped us become more resilient to external shocks.	(Bai et al., 2020)
AI-driven Automation	AI1	Our company uses AI-based tools to automate tasks and enhance productivity.	(Makridakis, 2017)
	AI2	AI-driven automation reduces our reliance on manual processes.	(Brynjolfsson & McAfee, 2017)
	AI3	We apply predictive analytics or intelligent systems to optimize workflows.	(Bughin et al., 2018)
	AI4	AI implementation allows us to scale and reach broader markets.	(Nadkarni & Prügl, 2021)
Digital Skill Readiness	DSR1	Our employees have adequate skills in AI, data, and digital tools.	(Oberländer et al., 2021)
	DSR2	We have regular digital training to improve our workforce's digital capacity.	(Dabić et al., 2021)
	DSR3	Staff can adapt to new digital technologies quickly and efficiently.	(Gusenbauer et al., 2025)
	DSR4	We foster a culture of continuous digital learning.	(Gurbaxani & Dunkle, 2019)
Government Policy on Digital Transformation	GP1	Our government provides incentives that encourage digital transformation.	(Wu et al., 2024)

	GP2	There are clear digital policies that support SME innovation.	(Succurro & Donati, 2025)
	GP3	We receive regulatory guidance on AI and digital adoption.	(Moreira et al., 2025)
	GP4	Public training programs help SMEs improve digital capabilities.	(Wahab & Radmehr, 2024)

	BACKGROUND INFORMATION					
1	What is the size of your enterprise?	Micro (1–10 employees)	Small (11–50)	Medium (51–200)		
2	What is your primary business sector?	Manufacturing	Services	Retail	Technology	Other
3	What is your role in the organization?	Owner	Manager	IT Staff	General Employee	Other
4	How many years has your business been in operation?	Less than 1 year	1–3 years	4–10 years	Over 10 years	
5	Have you received any form of government support for digital transformation in the past 2 years?	Yes	No			

Survey link:
https://docs.google.com/forms/d/e/1FAIpQLSeIt8OGXCw0w1NUZjte-TkUPORKrzqgjGgDSGcSzvUswjq3mg/viewform?usp=dialog