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An Empirical Investigation on the Relationship between Digitization and Stakeholder Connections on SME Sustainability in the Suburbs of Malaysia.

Gopal Perumal
Segi University , Malaysia, gopalperumal@segi.edu.my
Co-author:
Dr.Kannan Loganathan
University of Cyberjaya, Malaysia
Dr.Kannan@cyberjaya.edu.my

Abstract: *The present study explores the relationship between digitization and stakeholder connections on the SME sustainability in the suburbs of Malaysia. This study uses digitization as a construct measured by digital productiveness, digital effectiveness and digital performance from TAM theory. Further, the study also investigates the mediating role stakeholder connections from stakeholders' theory on the SME sustainability in the suburbs of Malaysia. A structured questionnaire has been used for collecting the quantitative data from seven suburbs from Selangor, Malaysia. The proposed model has been analysed first order analysis and second order analysis using PLS-SEM. The study empirically demonstrated digitization has positive and significant relationship on SME sustainability. Digital productivity, digital effectiveness, digital performance shows non-significant on SME sustainability. Similarly, stakeholder connection also has a strong mediating role on the digitization, digital productivity, and digital performance on SME sustainability. However, the findings demonstrate empirically Digital effectiveness do not have significance neither direct nor indirect effect on SME sustainability. This study focuses exclusively on SME sustainability in suburbs of Malaysia, and this depicts its novelty.*

Key words: *SME Sustainability, digitisation, digital productivity, digital performance, stakeholder connection.*

1. INTRODUCTION

Small and Medium Enterprises (SMEs) are critical drivers of economic development across the globe. These enterprises which typically account for majority of businesses in both developed and developing economies significantly contribute to innovation, employment and GDP growth. Despite their undeniable importance, SMEs often encounter significant challenges when it comes to adaption and long-term growth, particularly in relation to modern technological shift. In a rapidly evolving global economy, SMEs are increasingly required to reframe their operations, business models and value propositions to stay relevant. This shift towards innovation, automation and advanced technology has become crucial not just for business growth but for ensuring sustainability. However, SMEs in many parts of the world particularly in developing economies, frequently fails to capitalize on such transformations. The push towards technological adoption for SMEs become even more critical in recent years as global trends highlights the direct link between technological innovation and sustainability. Beyond mere operational efficiencies, these innovations also offer solutions for environmental sustainability towards reducing waste, optimizing energy usage and adoption more sustainable practices throughout the supply chain. Despite the overwhelming benefits many SMEs fail to capitalize on these advancements due to limited awareness and infrastructure, creating a widening gap between SMEs in developed and developing countries.

From the perspective of leaders in developing economies the expectation is clear. SMEs must embrace technological transformation to enhance their productivity, environmental responsibility and competitiveness. For policymakers and business leaders in countries like Malaysia, Thailand, Indonesia and Indonesia, the central expectation is that SMEs will leverage innovation to drive economic growth and create new jobs while responding to broader sustainability goals.

Policymakers are thus investing in infrastructure, digital literacy programs and incentives to stimulate technological adaption with the belief that SMEs will be better portioned to compete in an increasingly interconnected global market.

However, the path to technological adoption and sustainability is not without its barriers. In some cases, the perceived cost of adoption or the complexity of new systems may outweigh the potential benefits.

The role of stakeholder connections in this process is of paramount importance. Stakeholders, including customers, employees, suppliers, industry partners, government bodies and even local communities play a vital role in facilitating or obstructing technological adoption. The expectations of these various stakeholders can serve as either a motivating factor or an obstacle in the digital transformation process. Employees seek environments that foster innovation and skill development, while suppliers and partners are increasingly relying on advanced technologies to manage supply chains and enhance collaboration.

Therefore, there is an impending need for SMEs to adopt a holistic stakeholder-driven approach to technological change. Rather than viewing technology as a mere operational tool, SMEs should recognize it as a strategic lever that can enhance stakeholder engagement and deliver with the support needed for the adoption of new systems, help to mitigate the risks of change and encourage collaboration that drives sustainable growth. long-term value to all parties involved. Strong relationships with stakeholders can provide SMEs sustainability of SMEs in suburban promote long term sustainability. This research aims to contribute to the growing body of knowledge on SMEs sustainability, offering practical recommendations towards the purpose.

2. LITERATURE REVIEW DEVELOPMENT

(a) Digitization

The digitization of SMEs is increasingly recognized as a management strategy for enhancing sustainability especially in developing regions like sub-urban Selangor, Malaysia. Successful implementation of digital transformation can significantly influence the sustainability of SMEs by improving operational efficiency, enhancing customer

engagement and fostering innovation. Garzoni et al., (2020) highlight a four-level approach to digital transformation that emphasises the importance of aligning digital initiatives with core business strategies to achieve sustainable outcomes. (Mladenova, 2024) discusses management support is vital in fostering a culture that embraces digital innovation which is essential for navigating the complexities of digital transformation. Furthermore, the relationship between digital capabilities and sustainable development is explored by (Xu et al., 2022) who argue that digital capabilities can significantly enhance socio-environmental value creation.

(b) Digital effectiveness

Martins, (2022) emphasizes that the integration of digitization with dynamic capabilities enhances SMEs organizational achievement, suggesting that firms that effectively sense and seize digital opportunities are better positioned to achieve sustainable outcomes. Moreover, the role of digital effectiveness in driving SMEs performance is

highlighted by Thathsarani et al., (2022) found that the adoption of digital financial tools achievement, suggesting that firms that effectively sense and seize digital opportunities are better positioned to achieve sustainable outcomes. Moreover, the role of digital effectiveness in driving SMEs performance is highlighted by Thathsarani et al., (2022) found that the adoption of digital financial tools

significantly also contributes to broader sustainability goals by improving access to financial resources, facilitating smoother cash flow and business advancement. (Foroudi et al., 2017) argue that digital effectiveness enhances marketing management capabilities enabling SMEs to innovate and grow by attracting and retaining customers more effectively. Sagala et al., (2024) conducted a systematic literature review identifying core success factors for SMEs digital transformation, emphasizing the importance of aligning digital strategies with organizational goals to achieve business success. Similarly, (Alzayani et al., (2023) explored the impact of smart technologies

positively affects profitability while supporting environmental and social performance. Furthermore, Sagala et al., (2024) proposed a digital transformation strategy framework for SMEs, suggesting that appropriate digital strategies can enhance resilience and antifragility. This leads to the following hypotheses.

> **H_2: There is a significant and direct relationship between digital effectiveness and SMEs sustainability in Malaysia.**

(c) Digital performance

Martins, (2022) emphasizes that the integration of dynamic capabilities with digitization significantly influences SMEs performance, suggesting that firms that adeptly sense and seize digital opportunities are better positioned to achieve sustainable outcomes. This aligns with findings by (Liu et al., 2023) who assert that a robust digital strategy which integrates digital technologies with business objectives is essential for driving organizational transformation and improving performance. This perspective is further supported by Xu et al., (2023) who note that digital transformation enhances market competitiveness and contributes significantly to sustainable operations and performance through improved information sharing. The findings of (Teng et al., 2022) indicate that investing in digital technologies and skills is crucial for SMEs to maintain sustainable development reinforcing the notion that digital performance is intrinsically linked to sustainability outcomes. However, (Brodeur et al., (2021) emphasizing that many SMEs lack the specialized resources and expertise necessary for successful implementation. This discussion leads to the development of the following hypotheses:

H3: There is a significant and direct relationship between digital performance and SMEs sustainability in Malaysia.

(d) Digital productivity

Leveraging digital technologies and strategies SMEs can enhance their operational efficiency improve financial performance and ultimately
contribute to sustainability. Angelakis et al., (2025) highlighted that the effective adoption of digital technologies is crucial for productivity and sustainable growth in various sectors, including manufacturing, construction, agro-food production and retail trade. Similarly, Jamwal et al., (2025) propose a holistic framework for SMEs to enhance industry 4.0 adoption, addressing sustainability goals while improving competitiveness.

Based on these discussions, leads to the following hypotheses:

H4: There is a significant and direct relationship between digital productivity and SMEs sustainability in Malaysia.

(e) Stakeholder Connection

Tolossa et al., (2024) illustrate that entrepreneurial marketing practices when aligned with stakeholders' needs can lead to sustainable development in SMEs. This highlights the importance of aligning business objectives with stakeholder expectations to foster a sustainable business environment. Sawang et al., (2024) highlight the importance of regulatory pressure as a key driver for SMEs to adopt sustainable practices. Their research aligns with (Nguyen et al., 2021) which the necessity for effective stakeholder management to achieve SMEs sustainability goals. (Lizano et al., 2019) provide empirical evidence that understanding stakeholder dynamics is essential for SMEs to navigate resources constraints and enhance their sustainability outcomes. Based on these discussions, we propose the following hypothesis 5 to hypothesis 9:

Given this, the following hypothesis has been framed:

H5: Stakeholder connection mediates the relationship between digitization and SMEs sustainability in Malaysia.

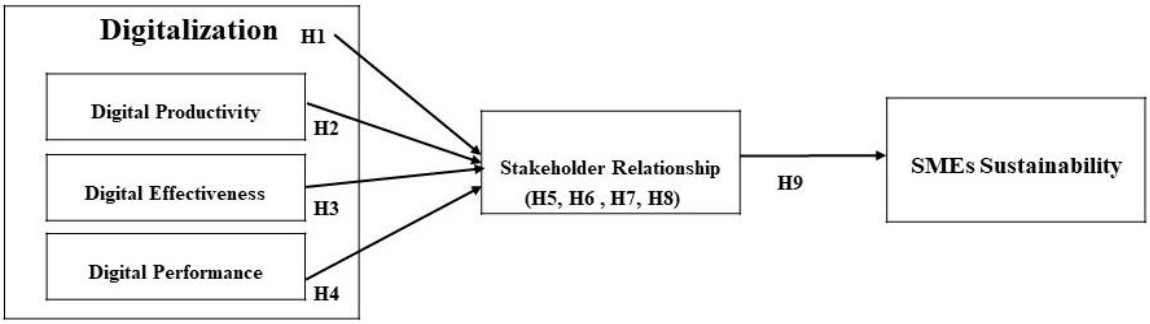
H6: Stake holder connection mediates the relationship between digital effectiveness and SMEs sustainability in Malaysia.

H7: Stakeholder connection mediates the relationship between digital performance and SMEs sustainability in Malaysia.

H8: Stakeholder connection mediates the relationship between digital productivity and SMEs sustainability in Malaysia.

H9: There is a significant and direct relationship between stake holder connection and SMEs sustainability in Malaysia.

Figure 1: Conceptual Model



3. RESEARCH METHODOLOGY

The Partial Least Square Structural Equation Modelling (PLS-SEM) technique was employed for predictive analysis in contexts for data analysis SmartPLS v4, given its suitability for predictive analysis in contexts characterized by high complexity and limited theoretical foundation Ishak et al., (2018). Compared to traditional econometric techniques, PLS-SEM offers a more robust approach, especially when relationship between variables are complex and multifaceted. PLS-SEM has been favoured due to its flexibility in handling a variety of data distribution as it does not impose stringent normality assumption (Hair Jr, et al., 2021). Additionally, it is highly effective in modelling complex relationships,

Constructs	Meaning	Role	Number of items	Modified from
Digitization	Adoption of digital technologies to improve SMEs performance.	Independent Variable	3	Venkatesh et al. (2000)
Digital Productivity	The efficiency gained by SMEs through digital tools and processes.	Independent Variable	3	Venkatesh et al. (2000)
Digital Effectiveness	The ability of SMEs to achieve business goals using digital solutions.	Independent Variable	3	Marakarkandy et al. (2017)
Digital Performance	SMEs' overall success in utilizing digital innovations for growth.	Independent Variable	3	Chin et al. (2022)
Stakeholder Connections	The interaction and engagement between SMEs and key stakeholders.	Mediator Variable	7	Donaldson et al. (1995)
SMEs Sustainability	Long-term viability of SMEs in economic, social, and environmental aspects.	Dependent Variable	3	Elkington (1994)
Social	SMEs' contributions to societal well-being and corporate social responsibility.	Independent Variable	3	Elkington (1994)
Economy	The financial stability and growth potential of SMEs in the market.	Independent Variable	3	Dyllick et al. (2002)

allowing for the estimation of both direct and indirect effects within the nuanced influences of contextual factors in this study (Limayem et al., 2007).

3.1. Questionnaire development

This study is based on a primary survey

and adopts a quantitative method, uses questionnaire to collect data required. The SMEs business owners and managers involved in SMEs business operating in Sub Urban of Selangor Malaysia are the target population here. Respondent units have been selected following the stratified random method. The sample size determined by way of employing G*Power software, has received validation in numerous peer-reviewed studies as a dependable instrument for conducting power analysis and determining sample size (Faul et al.,2007). Hair et al., (2021) has recommended an essential reference for PLS-SEM, highlight the significance of an adequate sample size. The critical F-value is 2.683, which is the threshold for determining statistical significance at alpha α=0.05 with 3 numerator degrees of freedom and 115 denominator degrees of freedom (Faul, 2007). The researcher distributed survey questionnaires via hard copy and digital circulation personally to the SMEs located in sub-urban areas in Selangor from January 15, 2025 to April 25, 2024.

Table 2: Demographic profile of the respondents.

Constructs	Category	Frequency	Percent
Gender	Male	87	72.5
	Female	33	25.5
Age	25 years old & below	21	17.5
	26-35 years old	36	30.0
	36-45 years old	21	17.5
	46-55 years old	18	15.0
	56-65 years old	15	12.5
	65 years old and above	9	7.5
Ethnicity	Malay	60	50.0
	Chinese	42	35.0
	Indian	18	15.0
Education	Primary school & below	9	7.5
	Lower secondary	18	15.0
	SPM/STPM/Diploma	30	25.0
	Bachelor degree	30	25.0
	Master's degree	15	12.5
	PhD/DBA & Above	18	15.0
Designation	Officer / Executives	24	20.0
	Manager / Assist Manager	30	25.0
	General Manager	18	15.0
	CEO / Director	24	20.0
	Owner	24	20.0
Decision Maker	Yes	120	100.0
	No	0	0.0
Experience in SME	Below 5 years	24	20.0
	6-10 years	24	20.0
	11-15 years	18	15.0
	16-20 years	24	20.0

	21 years and above	30	25.0
Category	Services sector	102	85.0
	Manufacturing sector	18	15.0
No of workers	5 to 30 people	54	45.0
	31 to 75 people	36	30.0
	76 to 200 people	24	20.0
	More than 201 people	6	5.0
SME Location	Ampang	15	12.5
	Batu Caves	18	15.0
	Bangi	18	15.0
	Bandar Sunway	18	15.0
	Kota Damansara	15	12.5
	Puchong	21	17.5
	Sepang	15	12.5

4. RESULTS

Table 2 presents a demographic profile of the respondents. As per the recommendation of Anderson et al., (1988), a two-step approach was followed. The first step was to examine the measurement model to test the survey instrument for its reliability and validity. This was followed by evaluating the structural model for hypothesis testing measurement model. Internal consistency was assessed using Cronbach's alpha (CA) and composite reliability (CR). CR and CA of all the latent variables are more significant than the critical values (CR > 0.7, CA > 0.8), as per Nunnally and Bernstein (1994), factor loading of 0.6 also acceptable indicating an excellent internal consistency.

Since the factor loading of the reported items are more than 0.6, others were dropped from the final model. Convergent validity is assessed by factor loading of each item and average variance extracted (AVE). AVE estimates for each
construct should be greater than 0.5 (Fornell & Larcker, 1981), and the factor loadings of each item should the bench mark for a satisfactory convergent validity.

Variables	Items	Loadings	CA	Rho_a	CR	AVE
D Productiveness	DPro1	0.870	0.812	0.816	0.889	0.727
	DPro2	0.851				
	DPro3	0.836				
D Performance	DPer1	0.808	0.853	0.858	0.911	0.774
	DPer2	0.900				
	DPer3	0.927				
D Effectiveness	DEff1	0.868	0.868	0.807	0.862	0.676
	DEff2	0.804				
	DEff3	0.794				
	DEff1	0.868	0.836	0.839	0.877	0.505

		DEff2	0.804				Internal
Consistency		DEff3	0.794				
	Stakeholder	DEff4	0.804				
	connections	DEff5	0.794				
		DEff6	0.804				
		DEff7	0.794				
	SMEs Sustainability	SSEc1	0.870	0.874	0.887	0.91	0.535
		SSEc2	0.851				
		SSEc3	0.836				
		SSEc4	0.808				
		SSen2	0.900				
		SSen3	0.927				
		SSs1	0.868				
		SSs3	0.804				

Table:4.1.1 First Order Analysis: Reliability and validity

Construct	Items	Loadings	CA	Rho_a	CR	AVE
Digitization	DPro1	0.776	0.893	0.903	0.913	0.538
	DPro2	0.678				
	DPro3	0.700				
	DPer1	0.717				
	DPer2	0.802				
	DPer3	0.807				
	DEff1	0.701				
	DEff2	0.687				
	DEff3	0.720				
Stakeholder Connections	SR1	0.652	0.836	0.840	0.877	0.505
	SR2	0.719				
	SR3	0.633				
	SR4	0.735				
	SR5	0.754				
	SR6	0.759				
	SR7	0.712				
SMEs Sustainability	SSEc1	0.802	0.874	0.888	0.901	0.535
	SSEc2	0.817				
	SSEc3	0.843				
	SSEc4	0.795				
	SSen2	0.666				

SSen3	0.604
SSs1	0.606
SSs3	0.673

Table:4.1.2 Second Order Analysis: Reliability and validity

	DEffectiveness	DPerformance	DProduct	SMEs Sustainability	Stakeholders relationship
DEffectiveness					
DPerformance	0.797				
DProduct	0.853	0.633			
SMEs Sustainability	0.309	0.445	0.316		
Stakeholders relationship	0.5	0.57	0.511	0.828	

Keys: DEffectiveness = Digital Effectiveness, DPerformance = Digital Performance, DProductiveness = Digital Productiveness, SMEs = Small and Medium Enterprises.

Table:4.2.1 First Order Analysis: Discriminant Validity HTMT

	DEffectiveness	DPerformance	DProductivity	SMEs Sustainability	Stakeholder Relations
DEffectiveness	0.822				
DPerformance	0.664	0.88			
DProductivity	0.67	0.527	0.853		
SMEs Sustainability	0.27	0.396	0.26	0.732	
Stakeholder Relations	0.421	0.492	0.423	0.724	0.71

DEffectiveness = Digital Effectiveness, DPerformance = Digital Performance, DProductiveness = Digital Productiveness, SMEs = Small and Medium Enterprises.

Table:4.2.2 Second Order Analysis: Discriminant validity – Fornell Lacker

	Digitalization	SMEs Sustainability	Stakeholder relationship
Digitalization			
SMEs Sustainability	0.398		
Stakeholder relationship	0.584	0.828	

Table:4.3.1 Second Order Analysis: Discriminant Validity HTMT

	Digitalization	SMEs Sustainability	Stakeholder relationship
Digitalization	0.733		
SMEs Sustainability	0.369	0.732	
Stakeholder relationship	0.521	0.725	0.711

Table:4.3.2 Second Order Analysis: Discriminant validity – Fornell Lacker

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Discussion: Assessment of Structural Model

In PLS-SEM the structural model represents the relationship between the constructs employed in the study. The assessment of the structural model evaluates how well the independent constructs Digitization and its measurement variables Digital productivity, Digital effectiveness and Digital performance explain the dependent construct SMEs sustainability and how strong the relationships between these constructs. Path coefficients represent the strength and direction of the relationship between constructs. The magnitude of these coefficients show how much influence one construct has on another. The study findings are encouraging, and the proposed model has good explanatory power. The results of the study support five and reject four hypotheses.

Hypothesis

Direct effect	Relationship	Sign	Original Sample	p-values	Result
H1	Digitization →SME	+	0.369	0	Accepted
H2	DPro → SME	+	-0.060	0.213	Rejected
H3	DEff → SME	–	-0.075	0.281	Rejected
H4	DPer → SME	+	0.123	0.103	Rejected
H9	SR→ SME	+	0.732	0	Accepted
Indirect effects					
H5	Digitization→SR→ SME	+	0.381	0	Accepted
H6	DPro →SR→ SME	+	0.147	0.018	Accepted
H7	DEff →SR→ SME	+	0.038	0.559	Rejected
H8	DPer →SR→ SME	+	0.252	0	Accepted

DEff = Digital Effectiveness, DPer = Digital Performance, DPro = Digital Productiveness, SME = Small and Medium Enterprises' Sustainability, SR = Stakeholder connections

Table: 7. Path coefficient for direct effect and Specific indirect effects mediation.

The H1 findings of this study is in line with the conventional assumption that digitization directly enhances SMEs sustainability although

SMEs business operations located at suburbs of Selangor Malaysia. The H9 results strongly reveal that Stakeholder Connections is the primary enabler of digital transformation's success in the suburban SME sector of Selangor Malaysia. This aligns with Freeman's (1999) Stakeholder Theory, which posits that businesses must actively engage their stakeholders to achieve sustainable outcomes. Furthermore, the results support Technology Acceptance Model (Davis, 1989) by demonstrating that technological adoption does drive sustainability directly and indirectly. The rejection of direct effects in H2 to H4 indicates that digital productiveness, digital performance and digital effectiveness do not directly enhance SME

sustainability. This contradicts prior research that suggests a positive impact of these variables on business performance

Bharadwaj, (2000). However, the significant indirect effects in H5, H6 and H8 confirm that digitization fosters greater contribution to sustainability when mediated by stakeholder engagement. In addition to that, Digital productivity and digital performance only contribution to sustainability when mediated by stakeholder engagement. This finding is consistent with Rana et al., (2022), who argued that digital transformation alone is insufficient without overall organizational support and external stakeholders support. The significant role of stakeholder connections (H5) indicates that business sustainability is a function of collaborative engagement rather than

technological investment alone. This supports the work of Porter and Kramer (2011), who emphasized that shared value creation among stakeholders enhances business success. The lack of significance in H7 further reinforces that digital effectiveness, and digital performance. The study highlighted an important area of weakness in the digital effectiveness, which is an important strategic concern for long term survival of SME business. without proper total quality management where total organizational commitment and effective stakeholder integration, does not contribute to SMEs sustainability.

6. IMPLICATIONS OF STUDY

The current study offers various practical,
policy and academic implications based on the findings.

6.1. Practical implications

This study has several noteworthy practical implications as for the general development of SMEs sustainability, business community should encourage industry-wide digital collaboration. Business associations must promote digitization as a business culture via industry partnerships to ensure strategies are aligned with market needs (Chatterjee et al, 2021). Greater events and networking platform can help SMEs exchange best practises and align with stakeholder's expectations (Westerman et al., 2014). SMEs business owners should develop and tactfully implement structured stakeholder engagement strategies to involve suppliers, customers and government agencies in digital transformation efforts (Freeman, 1999). SMEs may adopt collaboration platform. Utilizing tools such as CRM, ERP and cloud based collaboration software can enhance stakeholders' communication and business efficiencies (Chatterjee et al., 2021). Specific efforts towards digital integration training, digital literacy and stakeholder management effectiveness for SME employees (Westerman et al., 2014).

6.2. Policy implications

Firstly, taking cue from the finding, we suggest that the Government agencies that responsible towards developing SME business sector should enlarge incentives for digital adoption. Policymakers should consider providing specific grants and tax reliefs, and flexi-loan repayment facilities with stringent follow-up and periodical assessment mechanisms. As to transform Digital effectiveness, greater efforts towards establishing and regulating effective digital business policy, standardised regulations for digital transactions, cybersecurity and e-commerce frameworks to enhance trust and motivation between SME and stakeholders (Bharadwaj, 2000).

6.3. Academic implications

The study also provides significant academic contributions. First, the study adopts a multi-theory approach, integrates TAM and stakeholder theory, hence proposes a serious need to adopt stakeholder connections. Second, the present study accounts for drivers adopt digitization specifically towards digital productivity and digital performance for SME sustainability.

7. Concluding Remarks.

This study examines the relationship between digitization and stakeholder connections in shaping the sustainability of SMEs in suburban Malaysia. The study provides significant practical implication policy implication, and academic contributions. First, the study adopts a multi-theory approach, integrates TAM and stakeholder theory, and proposes a serious need to adopt stakeholder connections. Second, the present study demonstrate that digitization enhance SME sustainability directly and indirectly mediated by stakeholder connections. Although digital productivity and digital performance does not exhibit a significant directly. The study further reveals that digital effectiveness statistically does not exhibit a significant results directly or indirectly. These results underscore the necessity of integrating stakeholder perspectives into digitization strategies, supporting the theoretical underpinning of the Technology Acceptance Model and Stakeholder Theory.

Despite its contribution, this study has certain limitations that warrant further exploration. First, the research focuses exclusively on suburban areas of Selangor, Malaysia, which may limit the generalizability of the findings to urban and rural business environments. Further studies, can be extended the scope to encompass diverse geographical and economic contexts to provide a more comprehensive understanding of SME digitization and sustainability strategy.

Second, the study primarily evaluates the mediating role of stakeholder connections without considering other potential mediating variables such as financial access, regulatory policies and market competition, Future research can incorporate these factors to enrich the theoretical model and offer a comprehensive view of the digitization and sustainability link. Additionally, while this study assesses digital adoption the SME level, it does not account for industry specific variations.

Given that SME operate across different sectors with varying levels of digital integration, future studies should explore sector-specific effects to enhance applicability. Furthermore, the digital transformation landscape continues to evolve with emerging technologies such as artificial intelligence, block chain and big data analytics reshaping business models. Future research can investigate the impact these advanced technologies on SME sustainability, particularly in conjunction with stakeholder engagement. Finally, while this study adopts an SME-centric perspective, the SME digitization ecosystem involves a broader scope, hence multi stakeholder analysis would provide a deeper insight into the systemic challenges and opportunities to SME digitization. Additionally, a cross-national comparative study could reveal how cultural and institutional dereferences influence the relationship between digitization and SME sustainability. By addressing these gaps, future research can offer more comprehensive insight into the digital transformation of SMEs, equipping policymakers and business leaders with actionable strategies to foster long-term sustainability in an increasingly digitized economy.

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