



DOI: <https://doi.org/10.38035/dijms.v7i6.7088>
<https://creativecommons.org/licenses/by/4.0/>

Digital Maturity and SME Economic Sustainability: A PRISMA-Based Systematic Review of the Role of Government Support

Bisri Bisri¹

¹Universitas Bina Sarana Informatika, Jakarta, Indonesia, bisri.bir@bsi.ac.id

Corresponding Author: bisri.bir@bsi.ac.id¹

Abstract: The digitalization of SMEs is a key driver of economic resilience and sustainability in the era of Industry 4.0. However, empirical insights into how digital maturity influences SME performance in developing economies remain fragmented. This systematic literature review, guided by the PRISMA framework, explores the relationship between digital maturity and economic sustainability, with government support as a moderating factor. The findings show that digital maturity enhances innovation, efficiency, financial access, and strategic agility, though these outcomes are shaped by internal capacities, policy environments, and digital literacy. Government support plays a critical role in amplifying digital transformation outcomes through regulatory incentives, infrastructure development, and capacity-building programs. The theoretical synthesis highlights a shift from traditional frameworks like RBV and TOE to integrative approaches such as dynamic capabilities theory and digital ecosystem perspectives. This review proposes a multi-level conceptual framework, identifies key research gaps, and offers actionable policy recommendations to support inclusive and adaptive SME digitalization.

Keyword: Digital Maturity SME Sustainability, Government Support, Fintech Adoption, Systematic Literature Review.

INTRODUCTION

The Fourth Industrial Revolution has transformed the global economy by embedding digital technologies in every facet of business operations. For SMEs, which often face constraints in capital, skilled labor, and infrastructure, digital maturity has become a decisive factor for competitiveness and sustainability (Tutak & Brodny, 2022). While earlier studies have explored digital transformation in large enterprises or developed markets, there remains a limited understanding of how digital maturity influences SME economic sustainability, particularly in developing countries with fragmented infrastructure and uneven policy implementation (Abu Afifa & Nguyen, 2024).

Existing literature often treats digital maturity as a static or linear construct, failing to capture its evolving nature in response to organizational learning, policy changes, and technological dynamics. Moreover, while frameworks such as the Resource-Based View (RBV), Technology-Organization-Environment (TOE), and Dynamic Capabilities Theory (DCT) have been extensively applied, few studies systematically synthesize how these

theoretical perspectives interact to explain performance heterogeneity in SMEs undergoing digital transformation (Kalender & Žilka, 2024; Ebhota et al., 2024).

A further limitation is the lack of integrative models that examine government support not merely as a contextual factor, but as a moderating variable that dynamically shapes the digital transformation-performance nexus. Although several empirical studies highlight the enabling role of public infrastructure, digital incentives, or training programs, there is still limited theoretical integration explaining when and how such support mechanisms amplify or constrain digital returns in different SME contexts (Sun & Zhang, 2024; Jorge-Vázquez et al., 2021).

Fintech innovation acts both as a driver and consequence of digital maturity. According to Kalender & Žilka, (2024), businesses that undergo structured digital transformation tend to integrate fintech systems more effectively. In return, fintech adoption supports SME performance by contributing to data transparency, improved financial access, and automation (Dorfleitner et al., 2022). However, access to finance remains an enduring barrier, especially among SMEs in developing countries due to regulatory gaps and digital illiteracy (Jiang et al., 2024).

Government support is thus central in determining the success of SME digitalization. Interventions such as digital subsidies, infrastructure investments, and regulatory reforms have been shown to mitigate market failures and accelerate digital transformation among micro and small enterprises (Tutak & Brodny, 2022).

Against this backdrop, this study conducts a systematic literature review (SLR) guided by the PRISMA framework to synthesize recent research (2020–2025) on the relationship between digital maturity and SME economic sustainability. This review not only maps the impact of digital maturity but also analyzes how government support moderates this relationship—offering a multi-level theoretical synthesis to inform future research and policy design.

In sum, this paper seeks to answer two main questions: (1) How does digital maturity affect SME economic sustainability? and (2) How does government support moderate this relationship? The answers to these questions are critical for shaping effective digitalization strategies and public policies tailored to the needs of SMEs in diverse contexts.

METHOD

Research Design

This study adopts a systematic literature review (SLR) methodology, guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. PRISMA provides a structured approach for identifying, screening, and analyzing relevant research articles in a transparent and replicable manner.

Literature Search Strategy

We searched for peer-reviewed articles published between January 2020 and March 2025 using the databases Scopus. Keywords used in the search included combinations of: "digital maturity", "SME economic sustainability", "digital transformation", "government support", "small and medium enterprises", and "technological adoption". Boolean operators (AND/OR) were used to enhance precision.

Inclusion and Exclusion Criteria

Articles were included if they met the following criteria: (1) published in peer-reviewed journals between 2020 and 2025, (2) focused on SMEs in developing or transitional economies, (3) discussed digital transformation or digital maturity in the context of economic sustainability, and (4) included empirical or conceptual insights into the role of government or

public policy. Articles were excluded if they focused solely on large firms, had no clear reference to digital maturity, or were editorial/opinion pieces

Literature Screening Process

From an initial pool of 2,506 records retrieved from the Scopus database, 2,334 were excluded during the title and abstract screening based on criteria such as subject irrelevance, non-English language, and lack of open access. This process yielded 172 full-text articles assessed for eligibility. Of these, 100 articles were excluded due to limited methodological rigor or lack of direct relevance to digital maturity in SMEs. Consequently, a total of 72 studies were included in the final qualitative synthesis. The PRISMA 2020 flow diagram below illustrates the complete selection process.

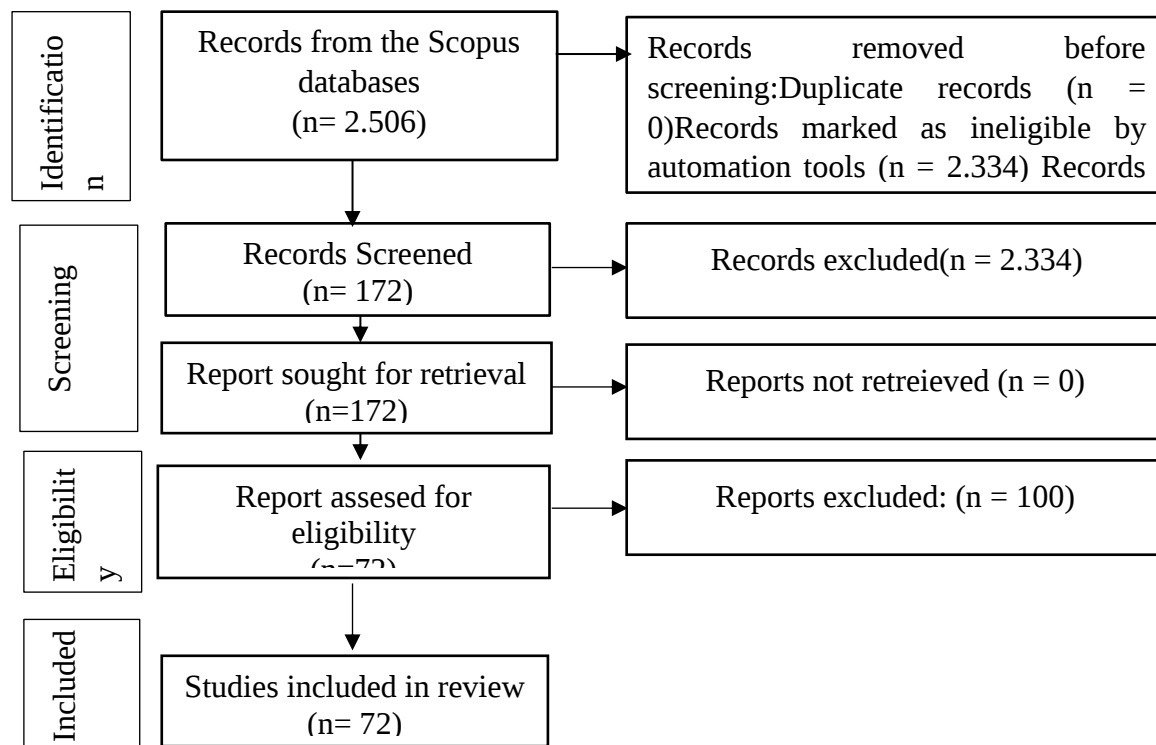


Figure 1. PRISMA Workflow Showing the Data Retrieval Process

Data Extraction and Synthesis

Data were extracted using a structured coding template covering: (1) author and year, (2) country/region of study, (3) methodology used, (4) definitions and indicators of digital maturity, (5) measured outcomes (e.g., economic sustainability, innovation, efficiency), and (6) evidence of government support. Thematic synthesis was applied to integrate key findings across studies and identify common patterns, divergences, and research gaps.

Quality Assessment

Quality and relevance of the selected articles were evaluated based on publication source, methodological rigor, and citation metrics. Studies with weak methodological clarity or lacking context-specific applicability were given lower weight in interpretation.

This methodological approach ensures transparency, replicability, and relevance in synthesizing the current literature on digital maturity and SME economic sustaibility.

RESULTS AND DISCUSSION

The study reveals that digital maturity plays a central role in enhancing SME economic sustainability, spanning financial, operational, and strategic dimensions. Across geographic contexts and industry sectors, digital maturity has been shown to increase productivity, enable cost optimization, facilitate innovation, and improve decision-making agility. These effects are evident both in developed economies and in emerging markets, though the intensity of impact varies based on contextual readiness and access to supporting infrastructure.

Digital maturity is positively correlated with enterprise competitiveness and business sustainability. Firms that adopt digital technologies—ranging from ERP and CRM systems to AI-based analytics—experience enhanced value creation. Several studies (e.g., Aziz et al., 2024; Yang et al., 2025) highlight how SMEs with high digital maturity navigated disruptions such as COVID-19 with greater resilience due to superior organizational responsiveness and situational awareness.

Financial and operational benefits of digital transformation are often contingent upon organizational readiness. Studies by Wahyono & Hutahayan (2021) and Ranjan (2024) emphasize that digital tools alone are insufficient unless accompanied by digital skills development and process reengineering. For SMEs in Southeast Asia, Latin America, and Sub-Saharan Africa, infrastructure limitations and digital illiteracy often hinder the realization of digital transformation benefits (Adel, 2024).

Digital maturity is also closely tied to improved access to finance. Digitally mature firms are more likely to maintain accurate and transparent financial records, which in turn increases their creditworthiness and access to funding. Research by Zhao et al. (2025) and Gosal & Nainggolan (2023) confirmed that digital financial infrastructure enhances SMEs' ability to apply for and manage financing, reducing risk perception among lenders.

From a strategic perspective, digital maturity fosters market expansion and customer relationship enhancement. Through digital marketing, data analytics, and platform-based sales models, SMEs are able to engage broader consumer bases, including those in rural and international markets. Studies from Ghana, Indonesia, and India provide evidence of SMEs leveraging digital tools to increase exports and diversify revenue streams (Quaye et al., 2024; Affandi et al., 2024; Singh et al., 2023).

However, not all SMEs benefit equally. Contextual enablers such as industry type, digital leadership, and organizational culture significantly influence transformation outcomes. For instance, Purba et al. (2025) and Bühler et al. (2023) argue that successful digital transformation requires not only financial capital but also internal alignment with long-term strategy and cultural openness to innovation. Resistance to change and lack of technical leadership can delay or derail digital initiatives.

Government support emerged as a consistently significant moderator of SME digital performance. Policies offering tax incentives, digital training, innovation grants, and broadband infrastructure investments amplify digital returns. In countries with coordinated and inclusive digital agendas—such as Estonia, and China—SMEs report higher digital adoption and better performance outcomes (Skare et al., 2023; Xiao et al., 2024).

Moreover, government-facilitated financial access mechanisms, particularly during periods of crisis, serve as buffers for digitally transitioning SMEs. Programs such as emergency credit guarantees, subsidized fintech platforms, and digital vouchers not only protect but accelerate SME innovation and competitiveness (Jorge-Vázquez et al., 2021).

Overall, the SLR underscores that digital maturity should be approached as a holistic construct—comprising technological adoption, organizational learning, strategic alignment, and ecosystem engagement. The positive relationship between digital maturity and SME economic sustainability is robust but conditional upon mediating factors such as digital literacy, leadership, financing structure, and policy environment. Future studies should focus on longitudinal data and cross-sectoral comparisons to further unpack these dynamic interactions.

The evolution of theoretical frameworks in the domain of digital maturity and SME sustainability from 2020 to 2025 shows a progression from foundational organizational theories toward integrative and contextualized approaches. In the early part of the decade, Resource-Based View (RBV) and Technology-Organization-Environment (TOE) framework were prominently used to understand how internal capabilities and external environments drive digital transformation (e.g., Abu Afifa & Nguyen, 2024; Basnayake et al., 2024). These models emphasized digital capabilities, IT infrastructure, and institutional support as key drivers of performance.

As the digital economy matured, research began to incorporate Dynamic Capabilities Theory (DCT) and Institutional Theory to better capture how firms adapt and reconfigure resources in rapidly changing technological contexts. Studies such as Purba et al. (2025) and (Sun & Zhang, 2024) framed digital maturity as an evolving capability shaped by cultural readiness, leadership agility, and policy environments.

In parallel, the application of Contingency Theory gained momentum, particularly in studies that examined SMEs' economic sustainability across sectors and countries. These works argued that the impact of digital maturity is not uniform but contingent upon firm size, industry type, digital literacy, and regulatory settings (Robertsone & Lapina, 2022).

Behavioral theories and user-centered frameworks also emerged, especially in studies investigating digital adoption among SME employees and leaders. Constructs such as perceived ease of use, trust in technology, and user innovativeness were drawn from the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), enriching the understanding of internal adoption behavior (Nugraha et al., 2022).

Moreover, several studies adopted a hybrid or integrative framework, combining RBV, DCT, and Institutional Theory to model how digital maturity simultaneously involves asset mobilization, strategic alignment, and institutional interaction. This multidimensional perspective allows for a richer explanation of performance heterogeneity among digitally enabled SMEs.

Finally, a small but growing number of studies began employing ecosystem-based approaches and systems thinking, particularly in cooperative and rural SME contexts. These frameworks consider digital maturity not just as a firm-level capability, but as an emergent property of interconnected actors—government, fintech providers, NGOs, and community platforms—that co-create digital value (Zhao et al., 2025).

Overall, the evolution reflects a shift from static, firm-internal conceptualizations to dynamic, ecosystem-sensitive models. Future research should continue integrating multi-level frameworks to capture the interplay between technology, organizational learning, governance, and external digital ecosystems.

Complexity of the Triadic Relationship: Digital Maturity, SME Economic Sustainability, and Government Support

The relationship between digital maturity, SME economic sustainability, and government support is inherently complex and multi-layered. Digital maturity enables SMEs to adapt and innovate, but the extent to which this maturity translates into economic sustainability is shaped by a matrix of internal capacities and external support mechanisms. Many reviewed studies reveal that SMEs with similar levels of digital tools or infrastructure often show divergent performance outcomes—this suggests that digital maturity alone does not guarantee sustainability without the presence of enabling policies and contextual alignment (Robertsone & Lapina, 2022).

Economic sustainability in SMEs is not merely a function of profitability but reflects resilience, growth trajectory, and long-term stakeholder value. Digitally mature SMEs can automate operations, optimize resource use, and access broader markets. However, these

outcomes are heavily influenced by regulatory flexibility, fiscal support, and institutional trust. Government support in this triad functions as a catalyst, mitigating risks, reducing adoption costs, and offering incentives for digital investment (Jorge-Vázquez et al., 2021).

A significant challenge within this triadic relationship lies in policy misalignment and digital divides. Government initiatives may be well-intended but ineffective if not tailored to the digital literacy level, sector-specific needs, and resource capacity of SMEs. Studies highlight that rural and micro-sized enterprises, despite digital readiness, often struggle to engage with formal digital platforms due to lack of policy inclusion and infrastructural constraints (Basnayake et al., 2024; Xie et al., 2023).

Moreover, digital maturity should not be viewed as a binary state but as a continuum shaped by iterative learning, innovation feedback loops, and inter-organizational collaboration. Government policies that encourage ecosystem-wide transformation—through grants, capacity building, or public-private partnerships—are more likely to enhance both digital capacity and sustainability (Akhtar et al., 2024).

This triadic model also reflects a dynamic equilibrium: digital maturity drives innovation and operational efficiency, which in turn demands adaptive governance. As SMEs mature digitally, their expectations of policy frameworks evolve, requiring more agile, inclusive, and anticipatory public support systems. Conversely, sustained economic performance enables reinvestment into digital capabilities, creating a positive feedback cycle (Siddik et al., 2023; Chen et al., 2024).

Understanding this triadic complexity requires adopting a systems lens—where SMEs are not isolated entities but actors embedded within a digital ecosystem. The alignment between internal transformation, institutional context, and policy design determines the efficacy of digital investment. Therefore, future research should explore governance models that facilitate co-creation of digital infrastructure and localized support tailored to SME heterogeneity.

Emerging Models and Novel Approaches

In recent years, emerging models and novel approaches have begun to reshape the landscape of digital transformation in SMEs. One significant development is the integration of ecosystem-based models that emphasize the interplay between digital maturity and collective value creation. These models, such as the digital ecosystem resilience model Hafeez et al. (2025), focus on the interdependencies among SMEs, fintech providers, regulators, and community-based institutions to co-create sustainable digital solutions.

Another novel approach is the application of human-centric digital maturity models that place user readiness, digital inclusivity, and social context at the center of transformation efforts. For example, Ganlin et al., (2021) introduced a stakeholder-integrated model that balances technological advancement with the digital competencies of SME actors, ensuring that transformation is both equitable and sustainable.

Several studies have also adopted hybrid frameworks that blend qualitative and quantitative assessment tools, such as digital readiness indexes combined with participatory mapping and policy simulation. These allow for a more nuanced understanding of how digital tools interact with contextual barriers and enablers across regions and sectors (Wang & Zhang, 2024).

Artificial Intelligence and Machine Learning are increasingly being embedded into digital transformation frameworks to enhance adaptive capabilities. Models that utilize predictive analytics to inform resource allocation and customer targeting are helping SMEs scale operations more intelligently and responsively (Dinh & Vu, 2025).

Digital twin approaches—originally developed in manufacturing—have recently been adapted to SME management systems, allowing real-time tracking of performance metrics and scenario testing for resilience planning. These tools offer new ways to monitor the impact of digital maturity on performance under conditions of uncertainty.

Finally, the use of blockchain-enabled financial platforms is growing in literature as a mechanism to increase SME financial transparency, improve access to microcredit, and enhance trust in digital financial ecosystems. These decentralized systems provide an innovative foundation for rethinking governance in digital SME ecosystems (Hoque et al., 2024).

Together, these emerging models and approaches demonstrate a growing sophistication in how digital maturity and performance are conceptualized and operationalized in the SME context. Future research should focus on testing these frameworks in diverse institutional settings and refining their scalability for different SME typologies.

Conceptual Gaps and Future Directions

Despite the growing body of literature on digital maturity and SME performance, several conceptual gaps remain unaddressed. First, many studies fail to distinguish between digital maturity as a static capability and as a dynamic, evolving process. Few frameworks offer longitudinal assessments that can track how digital practices mature over time in relation to firm lifecycle or market disruptions.

Second, limited research integrates the perspective of micro-enterprises, informal SMEs, or enterprises operating in resource-constrained environments. Most dominant models are derived from formal sectors or developed country contexts, leading to a lack of contextual fit when applied in emerging markets (Anatan & Nur, 2023).

Third, while government support is widely acknowledged as a moderating factor, its operationalization remains vague. Future research must specify the types, scopes, and delivery mechanisms of government support—ranging from infrastructure and policy incentives to digital literacy training and access to capital.

Fourth, few studies explore how organizational culture, employee digital mindset, and internal leadership mediate the relationship between digital maturity and firm performance. These human and institutional variables represent a fertile ground for advancing theoretical development.

Fifth, there is a notable absence of comparative cross-national studies that evaluate how varying institutional environments influence the digital maturity-performance nexus. Comparative studies could help disentangle the effects of regulatory frameworks, digital infrastructure, and economic development levels.

Sixth, methodological gaps are evident in the predominance of survey-based studies with cross-sectional data. Greater use of longitudinal, mixed-methods, and experimental designs is needed to establish causality and context-sensitive insights.

Seventh, while ecosystem-based models have been proposed, few empirical studies test their applicability in real-world digital networks involving SMEs, government bodies, financial institutions, and technology providers. There is a need for system dynamics modeling and network analysis to validate these conceptual advances.

Future research should focus on developing adaptive, inclusive, and multi-level models that capture the interplay between technological, organizational, and institutional factors. Scholars should also prioritize participatory and locally grounded research designs that reflect the lived realities of digitally transforming SMEs. Table 1. Summary of Dominant Theoretical Frameworks in Sustainable Investment Literature

Table 1. Summary of Dominant Theoretical Frameworks in SME Economic Sustainable Literature

Theory / Framework	Key Focus	Strengths	Limitations	Representative Studies
Resource-Based View (RBV)	Internal resources as drivers of competitive advantage	Emphasizes firm-specific capabilities and strategic assets	Neglects external environment and dynamic adaptability	(Burinskienė & Seržantė, 2022; Ojah & Kodongo, 2022; Anatan & Nur, 2023; Ebhota et al., 2024)
Technology–Organization–Environment (TOE)	Adoption influenced by technological readiness, organizational capacity, and external environment	Broad, flexible, widely used across ICT adoption studies	Operationalization often inconsistent across studies	(Jiang et al., 2024; Abu Afifa & Nguyen, 2024; Cai et al., 2024; Hafeez et al., 2025; Tanapaisankit et al., 2024; Li et al., 2025; Cristobal-Fransi et al., 2020)
Dynamic Capabilities Theory (DCT)	Firm’s ability to adapt, integrate, and reconfigure resources in dynamic environments	Captures agility and strategic reconfiguration in changing contexts	Difficult to measure empirically	(Shirwa et al., 2025; Sharma et al., 2025; Khan et al., 2023; Mollah et al., 2024; Pampurini et al., 2024; Firmansyah & Imani, 2024)
Unified Theory of Acceptance and Use of Technology (UTAUT)	User-level behavioral intention to adopt and use technology	Strong behavioral focus, explains individual tech acceptance	Limited in explaining firm-wide or ecosystem-level changes	(Siddik et al., 2023; Amnas et al., 2024; Ratnawati et al., 2024; Jorge-Vázquez et al., 2021)
Digital Maturity Model (DMM)	Stages of organizational digital capability development	Practical, allows benchmarking across firms	Descriptive in nature, rarely linked to performance outcomes	(Tutak & Brodny, 2022; Tshikovhi et al., 2023; (Dirse & Japee, 2025; Wang & Zhang, 2024)
Digital Ecosystem Theory	Interdependencies among actors in digital innovation ecosystems	Emphasizes network collaboration and co-creation	Still conceptual; lacks empirical consensus and measures	(Q. Li et al., 2025; Zhang et al., 2025; Lu et al., 2024; Ullah & Begum, 2025; Tang, 2022)
Stakeholder-Centric Model	Multi-actor collaboration for inclusive digitalization	Promotes participatory and inclusive policymaking	Constructs are often vague and context-dependent	(Sun & Zhang, 2024); (Sun & Zhang, 2024); Mihy et al., 2023; Basnayake et al., 2024; Lyons et al., 2022; Hussain & Papastathopoulos, 2022)
System Dynamics Approach	Feedback loops, complexity, and simulation of long-term systemic interactions	Powerful for modeling complexity, policy scenarios	Requires extensive data and modeling expertise	(Akhtar et al., 2024; Chen et al., 2024; AlSuwaidi & Mertzanis, 2024; Robertsons & Lapina, 2022; Martos-Pedrero et al., 2025; Kurniasari et al., 2025)

The above table summarizes eight dominant theoretical frameworks employed in studies exploring SME digital transformation. These frameworks vary in scope, with RBV and DCT focusing on internal capabilities, TOE and Ecosystem Theory addressing environmental and network dynamics, and models like UTAUT emphasizing individual behavioral responses. Theoretical diversity reflects the multidimensional nature of digital maturity, indicating the need for integrated approaches that bridge firm-level agility, environmental readiness, and ecosystem interdependence.

Theoretical Framework Synthesis

The systematic analysis of articles revealed a diverse set of theoretical frameworks employed to explore the relationship between digital maturity and SME economic sustainability. Eight dominant frameworks emerged from the review, each offering unique explanatory power.

The Resource-Based View (RBV) was frequently used to emphasize internal capabilities and tangible/intangible assets as drivers of competitive advantage (e.g., Tshikovhi et al., 2023; Martos-Pedrero et al., 2025). This theory's strength lies in its focus on firm-specific resources, although it often underestimates the influence of external dynamics. The Technology-Organization-Environment (TOE) framework appeared in multiple studies (e.g., Sharma et al., 2025; Tanapaisankit et al., 2024), offering a flexible lens that captures external, organizational, and technological conditions influencing digital adoption.

Dynamic Capability Theory (DCT) gained prominence in research on firms' ability to adapt to rapidly changing digital environments (e.g., Shirwa et al., 2025; Ebhota et al., 2024). UTAUT, although focused on individual-level adoption, was also applied in studies involving SME internal processes (e.g., Affandi et al., 2024; Choi et al., 2024). Newer frameworks such as Digital Ecosystem Theory and Stakeholder-Centric Models highlighted the role of inclusive, cross-sectoral collaboration (e.g., Santos et al., 2024; Hafeez et al., 2025). System Dynamics Approaches added value in studies examining long-term feedback loops (Dinh & Vu, 2025). The Digital Maturity Model (DMM), while descriptive, was commonly used to benchmark progression (Tutak & Brodny, 2022).

Figure 2 illustrates a focused theoretical pathway, emphasizing the dominant resource-based logic underlying the link between digital maturity and SME economic sustainability. While multiple frameworks were identified in the review, this model synthesizes the main process through which internal capabilities (RBV), innovation diffusion, and absorptive capacity interact—moderated by government support—to produce economic outcomes. The “Main Process” refers to the central transformation mechanisms that convert digital maturity into tangible benefits, while the “Integrative Approach” represents the confluence of theories (e.g., RBV, DOI, and absorptive capacity) that collectively explain this pathway.

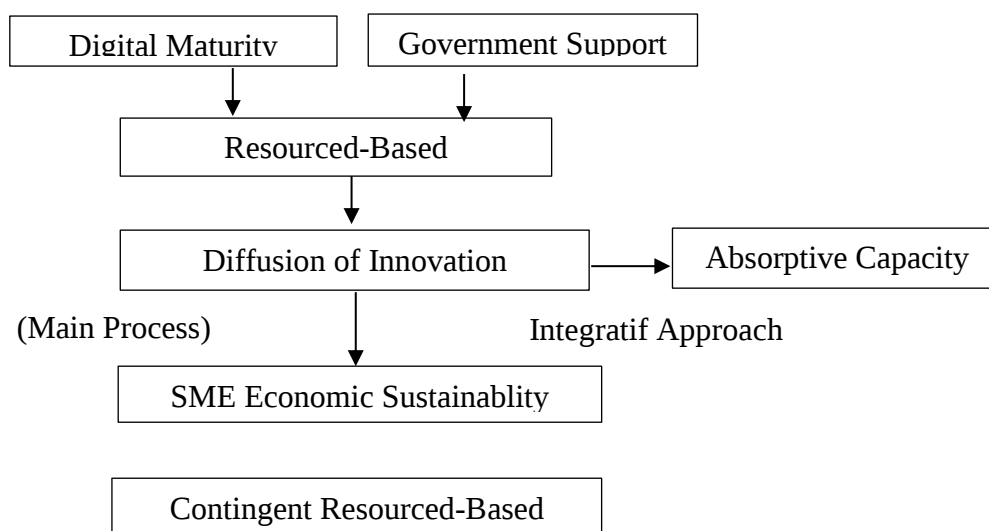


Figure 2. Theoretical Pathways from Digital Maturity to SME Sustainability: A Contingent Resource-Based Perspective

This synthesis highlights the evolution from single-lens models toward more integrative and contingent frameworks, particularly the Contingent Resource-Based View, which contextualizes digital transformation within policy and institutional environments.

CONCLUSION

This systematic literature review synthesized 72 peer-reviewed studies published between 2020 and 2025 to investigate how digital maturity influences SME economic sustainability, with government support as a moderating factor. The findings affirm that digital maturity is a critical enabler of innovation capability, operational efficiency, market expansion, and financial resilience. However, these benefits are contingent upon the presence of strategic leadership, employee readiness, digital infrastructure, and—most notably—targeted and consistent government support.

The review also uncovered a fragmented theoretical landscape. While Resource-Based View (RBV) and Technology-Organization-Environment (TOE) remain widely applied, there is increasing incorporation of ecosystem-oriented frameworks and system dynamics to explain the multifaceted and context-sensitive nature of SME digital transformation. This suggests a growing need for integrative, multi-level models that blend internal capabilities, environmental contingencies, and institutional collaboration.

From a policy standpoint, the results underscore the importance of enabling environments that do more than provide access to technology. Government support mechanisms—such as digital vouchers, innovation grants, digital infrastructure subsidies, and public-private partnerships—serve as key amplifiers of digital transformation outcomes. Effective interventions must be inclusive, context-sensitive, and responsive to sectoral and regional disparities among SMEs.

For researchers, this review highlights several conceptual and methodological gaps, including limited cross-national comparisons, underrepresentation of micro and informal enterprises, and a lack of longitudinal and mixed-methods designs. Future research should prioritize ecosystem-based modeling, participatory research, and theory-building that captures the evolving and interactive nature of digital transformation.

In summary, while digital maturity is increasingly essential for SME resilience and growth, it is not a panacea. It must be embedded within a broader system of learning, leadership, financing, and policy coordination to achieve sustainable impact.

REFERENCE

- Abu Afifa, M., & Nguyen, N. M. (2024). Corporate performance modeling through disclosure quality at the level of developing countries in Southeast Asia. *Economic Research-Ekonomska Istrazivanja*, 37(1). <https://doi.org/10.1080/1331677X.2024.2341215>
- Adel, N. (2024). The Impact of Digital Literacy and Technology Adoption on Financial Inclusion: Evidence from Emerging Economies in Africa, Asia, and Latin America. *Heliyon*, 10(24), e40951. <https://doi.org/10.1016/j.heliyon.2024.e40951>
- Affandi, Y., Ridhwan, M. M., Trinugroho, I., & Hermawan Adiwibowo, D. (2024). Digital adoption, business performance, and financial literacy in ultra-micro, micro, and small enterprises in Indonesia. *Research in International Business and Finance*, 70(PB), 102376. <https://doi.org/10.1016/j.ribaf.2024.102376>
- Akhtar, M., Salman, A., Abdul Ghafoor, K., & Kamran, M. (2024). Artificial intelligence, financial services knowledge, government support, and user innovativeness: Exploring the moderated-mediated path to fintech adoption. *Heliyon*, 10(21), e39521. <https://doi.org/10.1016/j.heliyon.2024.e39521>
- AlSuwaidi, R. A., & Mertzanis, C. (2024). Financial literacy and FinTech market growth around the world. *International Review of Financial Analysis*, 95(PB), 103481. <https://doi.org/10.1016/j.irfa.2024.103481>
- Amnas, M. B., Selvam, M., & Parayitam, S. (2024). FinTech and Financial Inclusion: Exploring the Mediating Role of Digital Financial Literacy and the Moderating Influence

- of Perceived Regulatory Support. *Journal of Risk and Financial Management*, 17(3). <https://doi.org/10.3390/jrfm17030108>
- Anatan, L., & Nur. (2023). Micro, Small, and Medium Enterprises' Readiness for Digital Transformation in Indonesia. *Economies*, 11(6). <https://doi.org/10.3390/economies11060156>
- Aziz, F. A., Utami, H. T., Wanojaleni, K., & Edy, S. C. (2024). Towards economic stability: Analysis of Msme business sustainability in central Java province post the COVID-19 pandemic. *Edelweiss Applied Science and Technology*, 8(5), 1854–1879. <https://doi.org/10.55214/25768484.v8i5.1919>
- Basnayake, D., Naranpanawa, A., Selvanathan, S., & Bandara, J. S. (2024). Financial inclusion through digitalization and economic growth in Asia-Pacific countries. *International Review of Financial Analysis*, 96(PA), 103596. <https://doi.org/10.1016/j.irfa.2024.103596>
- Bühler, M. M., Calzada, I., Cane, I., Jelinek, T., Kapoor, A., Mannan, M., Mehta, S., Mookerje, V., Nübel, K., Pentland, A., Scholz, T., Siddarth, D., Tait, J., Vaitla, B., & Zhu, J. (2023). Unlocking the Power of Digital Commons: Data Cooperatives as a Pathway for Data Sovereign, Innovative and Equitable Digital Communities. *Digital*, 3(3), 146–171. <https://doi.org/10.3390/digital3030011>
- Burinskienė, A., & Seržantė, M. (2022). Digitalisation as the Indicator of the Evidence of Sustainability in the European Union. *Sustainability (Switzerland)*, 14(14). <https://doi.org/10.3390/su14148371>
- Cai, H., Wang, Z., Ji, Y., & Xu, L. (2024). Digitalization and innovation: How does the digital economy drive technology transfer in China? *Economic Modelling*, 136(October 2023). <https://doi.org/10.1016/j.econmod.2024.106758>
- Chen, L., Tu, R., Huang, B. X., Zhou, H., & Wu, Y. (2024). Digital transformation's impact on innovation in private enterprises: Evidence from China. *Journal of Innovation and Knowledge*, 9(2), 100491. <https://doi.org/10.1016/j.jik.2024.100491>
- Choi, Y., Han, S., & Lee, C. (2024). Exploring drivers of fintech adoption among elderly consumers. *Technology in Society*, 78(December 2023), 102669. <https://doi.org/10.1016/j.techsoc.2024.102669>
- Cristobal-Fransi, E., Montegut-Salla, Y., & ... (2020). Rural cooperatives in the digital age: An analysis of the Internet presence and degree of maturity of agri-food cooperatives' e-commerce. *Journal of Rural* <https://www.sciencedirect.com/science/article/pii/S0743016719305716>
- Dinh, T. Le, & Vu, M. (2025). Artificial Intelligence in SMEs : Enhancing Business Functions Through Technologies and Applications. *Information*, 1–22.
- Dirse, M. T., & Japee, G. P. (2025). Funding sources and their implications for the long-term financial sustainability of saving and credit cooperatives in Ethiopia. *Journal of Co-Operative Organization and Management*, 13(1), 100258. <https://doi.org/10.1016/j.jcom.2024.100258>
- Dorfleitner, G., Forcella, D., & Nguyen, Q. A. (2022). The digital transformation of microfinance institutions: an empirical analysis. *Journal of Applied Accounting Research*, 23(2), 454–479. <https://doi.org/10.1108/JAAR-02-2021-0041>
- Ebhota, O. S., Hongxing, Y., & Sampene, A. K. (2024). Investigating the influence of digital transformation, budgeting and budgetary control on the financial performance of SMEs. *Scientific African*, 26, e02429. <https://doi.org/10.1016/j.sciaf.2024.e02429>

- Firmansyah, D., & Imani, L. (2024). Development and Sustainability in Economics and Finance Sustainability in small and medium sized enterprises (SME) financing. *Development and Sustainability in Economics and Finance*, 2–4(September), 100031. <https://doi.org/10.1016/j.dsef.2024.100031>
- Ganlin, P., Qamruzzaman, M. D., Mehta, A. M., Naqvi, F. N., & Karim, S. (2021). Innovative finance, technological adaptation and smes sustainability: The mediating role of government support during covid-19 pandemic. *Sustainability (Switzerland)*, 13(16). <https://doi.org/10.3390/su13169218>
- Gosal, G. G., & Nainggolan, R. (2023). The Influence of Digital Financial Literacy on Indonesian SMEs' Financial Behavior and Financial Well-Being. *International Journal of Professional Business Review*, 8(12), e04164. <https://doi.org/10.26668/businessreview/2023.v8i12.4164>
- Hafeez, S., Shahzad, K., & De Silva, M. (2025). Enhancing digital transformation in SMEs: The dynamic capabilities of innovation intermediaries within ecosystems. *Long Range Planning*, 58(3), 102525. <https://doi.org/10.1016/j.lrp.2025.102525>
- Hoque, M. M., Kummer, T.-F., & Yigitbasioglu, O. (2024). How can blockchain-based lending platforms support microcredit activities in developing countries? An empirical validation of its opportunities and challenges. *Technological Forecasting and Social Change*, 203, 123400. <https://doi.org/https://doi.org/10.1016/j.techfore.2024.123400>
- Hussain, M., & Papastathopoulos, A. (2022). Organizational readiness for digital financial innovation and financial resilience. *International Journal of Production Economics*, 243(February 2021), 108326. <https://doi.org/10.1016/j.ijpe.2021.108326>
- Jiang, M., Li, J., & Mi, Y. (2024). Farmers' cooperatives and smallholder farmers' access to credit: Evidence from China. *Journal of Asian Economics*, 92(April), 101746. <https://doi.org/10.1016/j.asieco.2024.101746>
- Jorge-Vázquez, J., Chivite-Cebolla, M. P., & Salinas-Ramos, F. (2021). The digitalization of the european agri-food cooperative sector. Determining factors to embrace information and communication technologies. *Agriculture (Switzerland)*, 11(6). <https://doi.org/10.3390/agriculture11060514>
- Kalender, Z. T., & Žilka, M. (2024). A Comparative Analysis of Digital Maturity Models to Determine Future Steps in the Way of Digital Transformation. *Procedia Computer Science*, 232, 903–912. <https://doi.org/10.1016/j.procs.2024.01.090>
- Khan, H. H., Khan, S., & Ghafoor, A. (2023). Fintech adoption, the regulatory environment and bank stability: An empirical investigation from GCC economies. *Borsa Istanbul Review*, 23(6), 1263–1281. <https://doi.org/10.1016/j.bir.2023.10.010>
- Kurniasari, F., Abd Hamid, N., & Lestari, E. D. (2025). Unraveling the impact of financial literacy, financial technology adoption, and access to finance on small medium enterprises business performance and sustainability: a serial mediation model. *Cogent Business and Management*, 12(1). <https://doi.org/10.1080/23311975.2025.2487837>
- Li, N., Yao, Q., Tang, H., & Lu, Y. (2025). Is digitalization necessary? Configuration of supply chain capabilities for improving enterprise competitive performance. *Journal of Business Research*, 186. <https://doi.org/10.1016/j.jbusres.2024.114972>
- Li, Q., Zhong, Z., & Ge, Q. (2025). Digital finance and sustainable development of commercial banks; insights from listed commercial banks. *International Review of Financial Analysis*, 104(PA), 104209. <https://doi.org/10.1016/j.irfa.2025.104209>

- Lu, Z., Li, H., & Wu, J. (2024). Exploring the impact of financial literacy on predicting credit default among farmers: An analysis using a hybrid machine learning model. *Borsa Istanbul Review*, 24(2), 352–362. <https://doi.org/10.1016/j.bir.2024.01.006>
- Lyons, A. C., Kass-Hanna, J., & Fava, A. (2022). Fintech development and savings, borrowing, and remittances: A comparative study of emerging economies. *Emerging Markets Review*, 51(PA), 100842. <https://doi.org/10.1016/j.ememar.2021.100842>
- Martos-Pedrero, A., Cortés-García, F. J., Abad-Segura, E., & Belmonte-Ureña, L. J. (2025). Internationalization, innovation, and resilience: Financial performance of agricultural cooperatives in southeastern Spain's rural economy. *Journal of Rural Studies*, 117(January). <https://doi.org/10.1016/j.jrurstud.2025.103682>
- Mihu, C., Pitic, A. G., & Bayraktar, D. (2023). Drivers of Digital Transformation and their Impact on Organizational Management. *Studies in Business and Economics*, 18(1), 149–170. <https://doi.org/10.2478/sbe-2023-0009>
- Mollah, M. A., Ibrahim, Masud, A. Al, & Chowdhury, M. S. (2024). How does digital leadership boost competitive performance? The role of digital culture, affective commitment, and strategic agility. *Heliyon*, 10(23), e40839. <https://doi.org/10.1016/j.heliyon.2024.e40839>
- Nugraha, D. P., Setiawan, B., Nathan, R. J., & Fekete-Farkas, M. (2022). Fintech Adoption Drivers for Innovation for SMEs in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(4), 208. <https://doi.org/10.3390/joitmc8040208>
- Ojah, K., & Kodongo, O. (2022). Effective financial inclusion and the need to put the horse before the cart: Saving! *International Review of Financial Analysis*, 96(PB), 103737. <https://doi.org/10.1016/j.irfa.2024.103737>
- Pampurini, F., Pezzola, A., & Quaranta, A. G. (2024). Lending business models and FinTechs efficiency. *Finance Research Letters*, 65(May), 105519. <https://doi.org/10.1016/j.frl.2024.105519>
- Purba, M. H. Y., Sirait, N. N., Siregar, M., & Harianto, D. (2025). Unequal regulation in partnerships between MSMEs and large enterprises in Indonesia. *Problems and Perspectives in Management*, 23(1), 424–436. [https://doi.org/10.21511/ppm.23\(1\).2025.32](https://doi.org/10.21511/ppm.23(1).2025.32)
- Quaye, W., Akon-Yamga, G., Akuffobe-Essilfie, M., & Onumah, J. A. (2024). Technology adoption, competitiveness and new market access among SMEs in Ghana: What are the limiting factors? *African Journal of Science, Technology, Innovation and Development*, 1338. <https://doi.org/10.1080/20421338.2024.2414949>
- Ranjan, P. (2024). Unraveling the mystery of the link between digital orientation and innovation performance: The interplay of digital business capability and environmental dynamism. *Technovation*, 131(January), 102966. <https://doi.org/10.1016/j.technovation.2024.102966>
- Ratnawati, K., Koval, V., Arsawan, I. W. E., Kazancoglu, Y., Lomachynska, I., & Skyba, H. (2024). Leveraging Financial Literacy Into Sustainable Business Performance: a Mediated-Moderated Model. *Business, Management and Economics Engineering*, 22(2), 333–356. <https://doi.org/10.3846/bmee.2024.21449>
- Robertson, G., & Lapina, I. (2022). *Digital Transformation in Higher Education: Drivers, Success Factors, Benefits and Challenges*. December 2022, 152–168. <https://doi.org/10.22364/htqe.2022.11>

- Santos, F. J., Guzmán, C., & Ahumada, P. (2024). Assessing the digital transformation in agri-food cooperatives and its determinants. *Journal of Rural Studies*, 105(November 2023). <https://doi.org/10.1016/j.jrurstud.2023.103168>
- Sharma, A., Mohan, A., Johri, A., & Asif, M. (2025). Determinants of financial technology (FinTech) adoption by the farmers in agrarian economy. *Social Sciences and Humanities Open*, 11(January), 101370. <https://doi.org/10.1016/j.ssaho.2025.101370>
- Shirwa, A. M., Hassan, A. M., Hassan, A. Q., & Kilinc, M. (2025). A cooperative governance framework for sustainable digital transformation in construction: The role of digital enablement and digital strategy. *Results in Engineering*, 25(January), 104139. <https://doi.org/10.1016/j.rineng.2025.104139>
- Siddik, A. B., Rahman, M. N., & Yong, L. (2023). Do fintech adoption and financial literacy improve corporate sustainability performance? The mediating role of access to finance. *Journal of Cleaner Production*, 421(March 2022), 137658. <https://doi.org/10.1016/j.jclepro.2023.137658>
- Singh, N., Munjal, S., Kundu, S., & Rangarajan, K. (2023). Platform-Based Internationalization of Smaller Firms: The Role of Government Policy. *Management International Review*, 63(1), 91–115. <https://doi.org/10.1007/s11575-022-00492-z>
- Skare, M., Obesso, M. M. de, & ... (2023). Digital transformation and European small and medium enterprises (SMEs): A comparative study using digital economy and society index data. *International Journal of ...* <https://www.sciencedirect.com/science/article/pii/S0268401222001281>
- Sun, J., & Zhang, J. (2024). Digital Financial Inclusion and Innovation of MSMEs. *Sustainability (Switzerland)*, 16(4). <https://doi.org/10.3390/su16041404>
- Tanapaisankit, R., Sirisunhirun, S., Amornsiriphong, S., Rugchatjaroen, K., & Ploywan, P. (2024). How Could Digital Transformation Help Medium-Sized Enterprises Access Thailand's New Capital Market Financing (LiVEx) to Support Sustainable Growth in the Digital Economy Era? *Sustainability (Switzerland)*, 16(8). <https://doi.org/10.3390/su16083470>
- Tang, X. (2022). New Schemes for Investment in of Small and Medium-Sized Enterprises of China: Role of Access to Finance, Innovation, and Sustainability. *Frontiers in Psychology*, 13(April), 1–16. <https://doi.org/10.3389/fpsyg.2022.857193>
- Tshikovhi, N., More, K., & Cele, Z. (2023). Driving Sustainable Growth for Small and Medium Enterprises in Emerging Urban–Rural Economies. *Sustainability (Switzerland)*, 15(21), 1–11. <https://doi.org/10.3390/su152115337>
- Tutak, M., & Brodny, J. (2022). Business Digital Maturity in Europe and Its Implication for Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1), 27. <https://doi.org/10.3390/joitmc8010027>
- Ullah, S., & Begum, M. (2025). FinTech and financial sustainability: A mediating role of financial inclusion. *Technological Forecasting and Social Change*, 217(April), 124129. <https://doi.org/10.1016/j.techfore.2025.124129>
- Wahyono, & Hutahayan, B. (2021). The relationships between market orientation, learning orientation, financial literacy, on the knowledge competence, innovation, and performance of small and medium textile industries in Java and Bali. *Asia Pacific Management Review*, 26(1), 39–46. <https://doi.org/10.1016/j.apmr.2020.07.001>
- Wang, S., & Zhang, H. (2024). Inter-organizational cooperation in digital green supply chains: A catalyst for eco-innovations and sustainable business practices. *Journal of Cleaner Production*, 472(August). <https://doi.org/10.1016/j.jclepro.2024.143383>

- Xiao, D., Zhang, C., & Huang, Y. (2024). Digital economy policy and enterprise digital transformation: Evidence from innovation and structural effect. *Managerial and Decision Economics*, 45(4), 2348–2359. <https://doi.org/https://doi.org/10.1002/mde.4144>
- Xie, X., Zhang, H., & Blanco, C. (2023). How organizational readiness for digital innovation shapes digital business model innovation in family businesses. *International Journal of Entrepreneurial* <https://doi.org/10.1108/IJEBR-03-2022-0243>
- Yang, Y., Shen, L., Sang, M., & Ding, X. (2025). The impact of digitalization on urban sustainable development – An economic perspective. *Technological Forecasting and Social Change*, 212(January), 124005. <https://doi.org/10.1016/j.techfore.2025.124005>
- Zhang, Q., Guo, L., Chen, D., & Lei, S. (2025). Does mobile access to the internet increase household financial literacy? *International Review of Financial Analysis*, 98(December 2024), 103894. <https://doi.org/10.1016/j.irfa.2024.103894>
- Zhao, J., Li, A., Roh, T., & Su, M. (2025). Escaping regulation or embracing innovation? Substantive green Innovation's role in moderating environmental policy and outward foreign direct investment. *Energy*, 316(October 2024). <https://doi.org/10.1016/j.energy.2025.134547>