

Organizational Innovation in SMEs: A PRISMA-Based Review of Digital Transformation Research (2020–2024)

Digitalisation et innovation organisationnelle dans les PME : revue systématique selon le protocole PRISMA (2020–2024)

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Abstract

This article presents a PRISMA-based systematic literature review of 41 peer-reviewed studies published between 2020 and 2024, examining the impact of digitalization on organizational innovation in small and medium-sized enterprises (SMEs). The review reveals that digitalization is a multidimensional process influenced by internal capabilities, sectoral contexts, and ecosystem dynamics. Organizational innovation is the most prominent outcome, shaped by technologies such as AI, IoT, digital platforms, and blockchain. The review also uncovers enablers and barriers to innovation, and critically assesses the theoretical frameworks mobilized in the field. The study contributes by offering an integrated synthesis across four research questions and proposes a future research agenda to address identified gaps. The findings have both theoretical and managerial implications for academics, policymakers, and SME practitioners.

Keywords: SMEs, digitalization, organizational innovation, systematic literature review, PRISMA, AI, digital transformation.

Résumé

Cet article propose une revue systématique de la littérature, fondée sur la méthode PRISMA, portant sur 41 articles scientifiques publiés entre 2020 et 2024. Il analyse les effets de la digitalisation sur l'innovation organisationnelle dans les PME. L'étude montre que la digitalisation est un processus multidimensionnel, influencé par les capacités internes, les dynamiques sectorielles et les écosystèmes numériques. L'innovation organisationnelle s'impose comme la forme dominante d'innovation induite, sous l'effet de technologies telles que l'IA, l'IoT, les plateformes numériques et la blockchain. L'article identifie également les facteurs facilitateurs et les freins à l'innovation, tout en analysant de manière critique les cadres théoriques mobilisés. Cette revue contribue à structurer le champ de recherche et propose un agenda de recherche pour combler les lacunes existantes. Elle offre des implications théoriques et pratiques pour les chercheurs, les décideurs publics et les dirigeants de PME.

Mots-clés : PME, digitalisation, innovation organisationnelle, revue systématique, PRISMA, transformation digitale.

Introduction

In recent years, the digitalization has become a strategic imperative, pushing many small and medium-sized enterprises (SMEs) to reconsider how they operate and organize themselves. Digitalization can no longer be seen as the simple technology update but it is increasingly becoming realized as a major strategic shift that redefines not only the internal processes of an organization and the value-creation mechanism at the same time but it also reinvents relations with the external stakeholders (Muller et al., 2021; Elia et al., 2023). This perspective highlights the close interplay between digital technologies and firms' innovation capacity, especially in the setting where innovation has been made an essential pillar of sustainability in terms of competitive performance (Fraccascia et al., 2023; Lopes & Franco, 2023).

Research into the implementation of digital tools in the small and medium-sized enterprises (SMEs) is still expanding. Artificial intelligence, blockchain, cloud computing, the Internet of Things (IoT), and a plethora of digital platforms are finding their way into an increasingly broad range of industries, and have already started to rearrange innovation on various levels namely the realm of organizational architecture and production processes, as well as the business model redesign (Nguyen et al., 2023; Giones & Brem, 2023; Kreiterling, 2023). However, there is notable heterogeneity in the available literature, as there is significant diversity in terms of sectors, research frameworks, and methodological approaches followed. While some scholars point to favorable conditions such as strong leadership, digital awareness, and supportive ecosystems as essential to success (Chang et al., 2023; Mutahar & Alhawamdeh, 2022), others draw attention to persistent barriers. These include financial limitations, insufficient absorptive capacity, and resistance within organizations to embrace change (Mourtzis & Vlachou, 2022; Ullah et al., 2023).

This study aims to fill this gap by conducting a systematic literature review (SLR) guided by the PRISMA 2020 protocol, focusing on peer-reviewed articles published between 2020 and 2024. Specifically, the review addresses the following research questions:

- **RQ1:** What types of digital technologies are most frequently adopted by SMEs in the context of innovation?
- **RQ2:** What forms of organizational innovation are associated with digital transformation in SMEs?
- **RQ3:** What internal and external factors enable or hinder the successful implementation of digital innovation?
- **RQ4:** What theoretical frameworks are mobilized to explain these dynamics?

By analyzing a final corpus of 41 academic publications, this article contributes to the literature in three major ways. First, it offers a thematic synthesis of empirical and conceptual findings. Second, it proposes an integrated conceptual framework that bridges technological, organizational, and environmental perspectives. Third, it provides strategic insights for practitioners and policymakers seeking to foster innovation in digitally transforming SMEs. In doing so, the paper responds to calls for more nuanced context-sensitive, and interdisciplinary approaches to studying SME innovation in the digital era (Maroufkhani et al., 2023; Aagaard, 2023). The remainder of the article is structured as follows: Section 2 outlines the review methodology based on PRISMA. Section 3 presents the main findings grouped into four thematic areas. Section 4 discusses the theoretical and practical implications. Section 5 concludes with suggestions for future research.

1. LITERATURE REVIEW

The digital transformation of small and medium-sized enterprises (SMEs) has become a central focus in recent management and innovation research. While SMEs often face resource constraints, their agility and proximity to customers offer strategic advantages in a rapidly digitalizing economy. Digital technologies such as AI, IoT, cloud computing, and blockchain are reshaping business models and organizational structures across sectors.

This review analyzes 41 peer-reviewed articles published between 2020 and 2024 to offer a critical and integrative understanding of how digitalization influences organizational innovation in SMEs. The literature reflects a growing complexity in the relationship between technological adoption and innovation outcomes, highlighting both theoretical fragmentation and practical diversity.

Figure 1 presents the conceptual map of the nine thematic pillars derived from the literature, emphasizing their interconnections and cumulative structure.

Figure 1: Thematic Map of the Literature on Digital Transformation and Organizational Innovation in SMEs (2020–2024)



Source: authors

1.1. Digital Technologies in SMEs

The adoption of digital technologies by SMEs has significantly increased over the past decade, becoming a strategic differentiator. These tools do more than automate tasks — they enhance learning, adaptability, and value creation. Cloud-based systems, for instance, decentralize knowledge access and improve decision-making (Durst et al., 2023), while 5G networks and IoT devices enable real-time responsiveness (Olokundun et al., 2023).

In the context of sustainability, technologies like blockchain and digital dashboards allow SMEs to monitor environmental impact, reinforcing their alignment with green innovation objectives (Pangarso et al., 2022). Furthermore, digital platforms are used to co-create value through personalized services, even under resource constraints (Akesson & Sundström, 2023). Post-crisis, virtual collaboration tools have also supported resilience and remote management (Castro & Moreira, 2024).

1.2. Theoretical Frameworks Explaining Digital Innovation in SMEs

The literature mobilizes a variety of frameworks to understand SME digitalization. The dynamic capabilities approach (Teece et al., 1997) is the most prominent, conceptualizing digital transformation as a continuous learning and reconfiguration process. Absorptive capacity, which reflects a firm's ability to integrate external knowledge, is also widely cited (Durst et al., 2023).

Other commonly used models include TOE (Technology–Organization–Environment), which explains how SMEs negotiate technical feasibility and institutional legitimacy (Pangarso et al., 2022), and paradox theory, which highlights tensions between innovation and operational stability (Castro & Moreira, 2024).

Adoption-focused models such as UTAUT, TAM, and Diffusion of Innovations help explain behavioral and contextual factors but often fail to capture the systemic and iterative nature of digitalization. As a whole, the literature suggests a trend toward theoretical pluralism, combining micro, meso, and macro-level perspectives to better grasp the complexity of SME innovation.

1.3. Enablers and Barriers to Digital Adoption in SMEs

The ability of SMEs to realize digital innovation is the result of the interdependent relationship between the internal capacities and the external environmental developments. In the intrinsic aspect, a number of enablers are always emphasized in the literature. Digital competence as the knowledge of companies to understand, use, and modify digital technologies continues to be one of the greatest determinants of effective processes of innovation. This ability goes hand in

hand with absorptive capacity which indicates the aptitude of an organization in the process of recognizing, analysing and incorporating external information to be utilized internally (Durst et al., 2023). Moreover, an entrepreneurial orientation with features of proactiveness, risk taking, and long-term commitment to innovation serve as a trigger of prolonged experimentation and strategic renewal.

From an external perspective, ecosystem-based factors such as access to collaborative platforms, innovation clusters, and public institutions provide essential resources and legitimacy. Government-sponsored programs, legal frameworks, and financial incentives play a critical role in reducing uncertainty and accelerating digital adoption. These mechanisms support SMEs by facilitating capacity-building, offering targeted training, and creating stable institutional environments conducive to experimentation. The presence of standardized regulatory systems and well-defined compliance protocols further enhances trust, encouraging SMEs to engage in more ambitious technological projects. When properly coordinated, these external enablers can compensate for internal limitations and serve as catalysts for innovation-oriented digital transformation. Nevertheless, even with the existence of a number of facilitating factors, SMEs face significant problems. The structural challenges that continue to hinder many firms in their endeavours to scale-up operations or implementing digital projects include scarcity of financial capital, ageing infrastructure and lack of cohesion between digital systems (Akersson and Sundström, 2023). Under these conditions, the need to maintain the current base of resources in the short term tends to inhibit the tendency to transform an organization on the long-term scale, and digital innovation becomes viewed as too risky or too costly.

Another factor that complicates the diffusion of new technologies is cultural resistance which is based on organizational norms. Factors like age discriminations, lack of faith in technological products, and fear of losing their jobs hinder the usage of new solutions. These dynamics are especially prominent when innovation programs are coupled with sustainability efforts, which usually require actions to have behavioral changes and cross-functional collaboration. Moreover, the regulatory uncertainty, especially in such areas as data governance, cybersecurity, and environmental compliance, further complicates the decision-making process and puts an investor off investing in emerging technologies.

Overall, existing literature is indicative of the fact that the successful digital innovation in SMEs depends on the simultaneous availability of the internal alignment of the enterprise, external collaboration systems and prudent measures to counter the structural and institutional barriers.

Successful change must therefore embrace a holistic shift between flexibility of operations, cultural sensitivity and ecosystem interaction.

Table 1. Summary of Enablers and Barriers Identified in the Literature

Factor	Key Insights	Representative Studies
Digital Leadership	Shapes strategic vision and fosters a digital transformation culture	Wamba-Taguimdje et al. (2020)
Organizational Readiness	Enhances internal alignment, agility, and learning capacity	Rashid et al. (2023)
External Partnerships	Facilitates knowledge transfer and collaborative innovation	Pérez-López et al. (2022)
Infrastructure & IT	Constrains or enables technological integration and scalability	Durst et al. (2024)
Human Capital	Determines digital skill levels and absorptive capacity	Yuwono et al. (2023)
Regulatory Environment	Introduces uncertainty and compliance-related constraints	Almeida et al. (2024)

Source: authors

1.4. Digital tools and Operational Agility

The acceleration of digitalization has brought a diverse set of tools to the forefront of operational strategy within SMEs. Technologies such as digital twins, business analytics, and virtual manufacturing are increasingly employed to enhance decision-making speed, data accuracy, and adaptive responsiveness. However, their implementation within resource-constrained SMEs introduces both technical and organizational challenges.

Huang et al. (2024) argue that digital twins, when integrated effectively, can simulate operations and optimize performance in real time—particularly in manufacturing-intensive SMEs. However, successful integration depends on system compatibility and the availability of real-time data infrastructure, which are often lacking in smaller firms. Similarly, Rashid et al. (2023) emphasize the strategic value of business analytics in enabling predictive capabilities, but highlight that many SMEs struggle with data quality and governance, limiting their ability to extract actionable insights.

Khorram and Chan (2023) explore the case of virtual manufacturing, showing how it allows SMEs to simulate production processes, test resource allocations, and minimize time-to-market. However, the effectiveness of these tools' hinges on internal change management capacity, particularly in fostering a culture of experimentation and digital literacy among staff.

What emerges from the literature is that while digital tools hold significant potential for operational agility, their transformative power is unevenly distributed. SMEs must not only invest in technological infrastructure, but also cultivate the absorptive capacity, leadership

alignment, and procedural flexibility necessary to translate digital inputs into organizational responsiveness. Future research could explore sector-specific strategies and modular toolkits tailored to SME capabilities, as well as the role of public support in reducing adoption asymmetries.

1.5. Sustainability, Green Innovation, and Digital Resilience

Over the past several years, the synergistic correlation between digital transformation and sustainability has been presented in scholarly discourse in the field of SME innovation. Contrary to the former research trends, which treated digital tools as purely efficiency tools, modern studies have become more inclined to view them as a means through which the environmental goals will be pursued, not to mention the expansion of the social responsibility agenda (Messina et al., 2024; Pangarso et al., 2022).

Pangarso et al. (2022) suggest an interesting theoretical framework by connecting digital maturity of a firm with its ecologically innovative potential. According to their empirical results, SMEs with implemented digital infrastructures are in a better position to undertake environmental-friendly activities, including installations of energy-monitoring system, paperless operations, and integration of circular-economy strategies. The innovations are especially useful in small business organizations that have limited physical resources and financial leeways. Messina et al. (2024) build on this track of study by analyzing the web of blockchain technology on ensuring traceability and environmental responsibility in supply chains. They draw attention to such areas as agri-food, textile production, and logistics, where SMEs are becoming more active in using blockchain to facilitate greater transparency and encourage consumer confidence. Blockchain combined with IoT devices and artificial intelligence-enabled analytics will provide real-time data about environmental performance and allow companies to quantify emissions, reduce waste, and make more responsible buying choices.

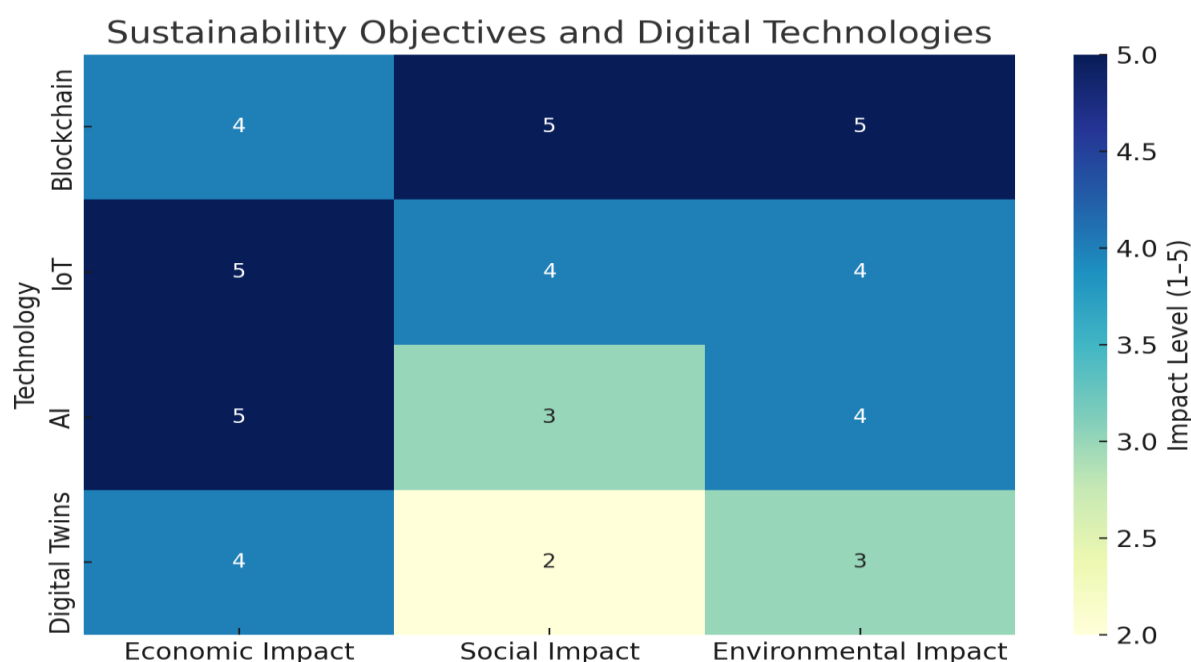
In parallel, the literature links digitalization to resilience-building capacities. Studies by Almeida et al. (2024) and Castro & Moreira (2024) explore how SMEs have responded to exogenous shocks—most notably the COVID-19 pandemic—by accelerating digital adoption. Their findings suggest that SMEs engaging in paradox management (i.e., managing tensions between short-term survival and long-term innovation) demonstrate higher agility and adaptability when supported by digital tools.

As summarized in Table 2, different digital technologies contribute unevenly to economic, social, and environmental outcomes. Blockchain and digital twins offer high environmental

benefits through traceability and simulation, while AI and IoT provide stronger economic value but require complementary capabilities for inclusive deployment.

Despite these opportunities, significant challenges remain. Many SMEs lack the absorptive capacity or institutional support to implement such technologies meaningfully. Future research should explore how sustainability and digitalization can be jointly embedded into SME business models, possibly through public-private partnerships, modular toolkits, or industry-specific roadmaps aligned with the Sustainable Development Goals (SDGs).

Table 2: Sustainability Objectives and Digital Technologies Supporting Them



Source : authors

1.6. Future Research Agenda

Building on the theoretical gaps, contextual limitations, and methodological constraints identified across the literature, several promising research directions emerge:

- ❖ Develop integrative frameworks that bridge digital transformation, ecological responsibility, and entrepreneurial dynamics, offering multi-level and cross-sectoral perspectives.
- ❖ Explore the temporal dynamics of value capture, particularly in open and platform-based ecosystems, to understand how SMEs transition from experimentation to monetization.
- ❖ Examine SME digital leadership within diverse institutional and cultural contexts, assessing how strategic intent, regulatory environments, and societal norms influence transformation trajectories.

- ❖ Investigate adaptive governance mechanisms for managing complexity in crowdsourcing platforms, digital twin environments, and virtualized production systems, focusing on coordination, trust, and decision rights.
- ❖ Prioritize longitudinal and comparative studies on digital resilience and recovery in post-crisis scenarios, paying attention to how SMEs evolve their routines, partnerships, and innovation pathways over time.

These avenues would not only address unresolved tensions in the existing literature but also contribute to more context-sensitive, theoretically grounded, and practice-relevant understandings of SME digitalization and innovation.

This literature review reveals that digital transformation in SMEs is far from a monolithic phenomenon. Instead, it constitutes a multifaceted process of strategic, technological, and cultural adaptation, shaped by sectoral conditions, institutional environments, and evolving stakeholder expectations. Across the nine thematic domains analyzed, digitalization emerges as both a catalyst for innovation and a source of organizational tension—forcing SMEs to balance ambition with feasibility, exploration with exploitation, and agility with coherence.

Far from being passive adopters of technology, SMEs are shown to actively reconfigure their business models, governance structures, and knowledge systems through iterative processes of experimentation and learning. However, this transformation is uneven: it is mediated by internal capabilities (e.g., absorptive capacity, digital literacy, entrepreneurial orientation) and external enablers (e.g., platforms, ecosystems, regulatory contexts).

The integration of sustainability and resilience perspectives further underscores the interdependence of digital, ecological, and social logics in shaping the future of SME innovation. From green blockchain applications to adaptive digital governance, the literature reflects a paradigm shift toward more systemic and purpose-driven models of value creation.

2. Methodology

To ensure methodological rigor and transparency, this article employs the PRISMA 2020 protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to conduct a systematic literature review. The updated 2020 guidelines emphasize clarity, completeness, and reproducibility in reporting. This method enables the structured identification, screening, eligibility assessment, and synthesis of relevant scientific studies addressing the digital transformation of SMEs and its effects on organizational innovation from 2020 to 2024.

2.1. Research Questions

This review is structured around the following four research questions:

RQ1: What types of digital technologies are most frequently adopted by SMEs in the context of innovation?

RQ2: What forms of organizational innovation are associated with digital transformation in SMEs?

RQ3: What internal and external factors enable or hinder the successful implementation of digital innovation?

RQ4: What theoretical frameworks are mobilized to explain these dynamics?

2.2. Inclusion and Exclusion Criteria

Inclusion Criteria

To maintain quality and relevance, the following criteria were applied:

- Peer-reviewed journal articles published between 2020 and 2024
- Studies explicitly addressing digitalization or digital transformation of SMEs
- Research examining organizational innovation as an outcome or related construct
- Empirical designs (qualitative, quantitative, mixed-methods) or systematic reviews
- Publications written in English

Exclusion Criteria

- Conference proceedings, editorials, book chapters, theses
- Conceptual papers without empirical grounding or practical SME application
- Studies focused exclusively on large enterprises
- Duplicate records

2.3. Data Sources and Search Strategy

The databases used include Scopus, ScienceDirect and Springer. Keywords were combined using Boolean operators such as:

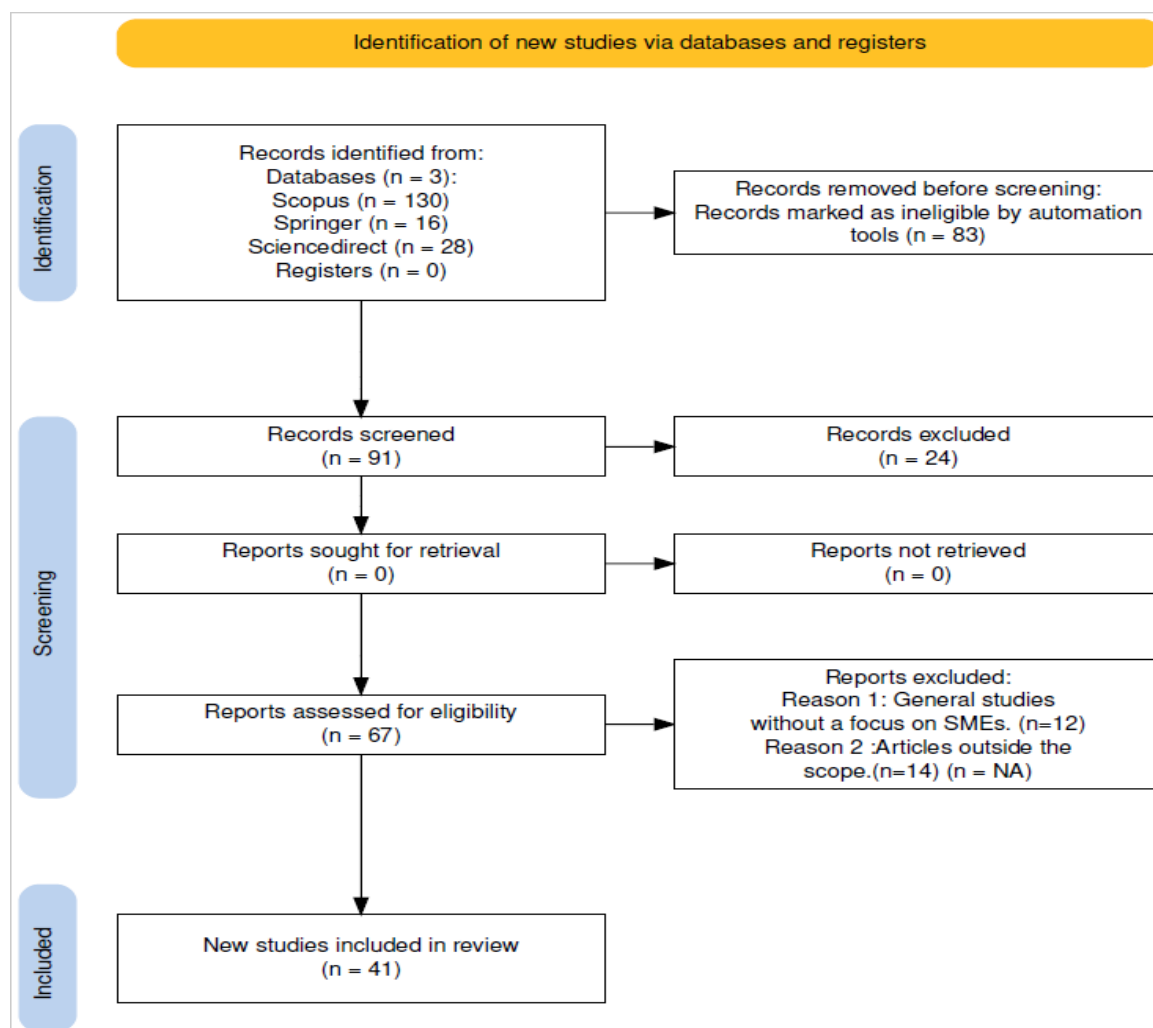
("digital transformation" OR "digitalization") AND ("SME" OR "small and medium enterprises") AND ("innovation" OR "organizational change")

Initial search results yielded 1,042 articles across all databases.

2.4. PRISMA Flow Diagram

A total of 174 articles were retained after removing duplicates. After title and abstract screening, followed by full-text reading, 41 articles met the eligibility criteria and were included in the final synthesis.

Figure 2. Selection Process of Articles Following the PRISMA Protocol (2020)



Source: Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022).

2.5. Data Extraction and Analysis

The selection process excluded articles that were out of scope, not accessible in open access, or that did not meet academic rigor standards. For each selected article, the following information was systematically extracted:

- ❖ Publication details (authors, year, journal)
- ❖ SME context (industry, region, firm size)
- ❖ Technologies examined
- ❖ Type of organizational innovation described
- ❖ Theoretical frameworks used

A critical analysis matrix was then developed to identify patterns, contradictions, dominant themes, and gaps. This matrix served as the foundation for the thematic structuring of the Literature Review.

2.6. Limitations

Although the PRISMA protocol ensures transparency and replicability, this review is subject to several limitations. First, it is constrained by a **language restriction**, as only studies published in **English** were included. Second, the **time frame** was limited to publications between **2020 and 2024**, which may exclude relevant studies published before this period. Third, the **database coverage** was restricted to three platforms: Scopus, ScienceDirect, and SpringerLink.

In addition, **grey literature**, reports, and other **non-academic sources** were deliberately excluded in order to maintain a strict focus on peer-reviewed scientific contributions.

While this review is not without its limitations, the application of the PRISMA methodology strengthens its credibility by ensuring methodological transparency and analytical depth. By offering a clear and replicable framework, it supports a more coherent synthesis of the otherwise scattered literature on SME digital transformation and its impact on organizational innovation.

3. FINDINGS

This section presents the key findings of the PRISMA-based systematic review, structured around four research questions. Drawing from 41 peer-reviewed articles, the analysis identifies dominant technologies, forms of innovation, enabling conditions, and theoretical perspectives relevant to SME digitalization.

Summary of Core Findings from the 41 Reviewed Articles Aligned with Research Questions (RQ1–RQ4)

N	Article Title	Authors/Y ear	Objectives	Methodolo gy	Key Findings	Digital Technologie s Discussed (RQ1)	Innovation Types (RQ2)	Enablers / Barriers (RQ3)	Theoretical Contributions (RQ4)
1	Approaches for data collection and process standardizatio n in smart manufacturing : Systematic literature review	Schlemitz & Mezhuyev (2024)	To evaluate current standards, reference models, and approaches in smart manufacturing , with a focus on OPC UA and AAS.	Systematic Literature Review	Identified challenges in integrating legacy systems and assessed the success of communicatio n standardizatio n through OPC UA and data modeling with AAS.	OPC UA, Industrial IoT, AAS	Process standardizatio n and interoperabilit y improvement	Enablers: Standardizatio n frameworks; Barriers: Legacy system integration	Contributes to interoperability frameworks and communication standards within Industry 4.0
2	A Systematic Literature Review on Flexible Strategies and Performance Indicators for Supply Chain Resilience	Paul, A., & Saha, S. C. (2025)	To explore how flexible strategies affect supply chain resilience and identify performance indicators	Systematic Literature Review (SLR)	Flexible strategies improve resilience, but there are research gaps in performance linkages and decision-	Not the main focus; indirect mention through strategic tools	Strategic innovation in supply chain design.	Enablers: flexibility, strategy design; Barriers: lack of comparative studies, unclear	Suggests need for theory-driven empirical studies; under-theorized domain.

					making models.			performance links	
3	Blockchain revolution in the tourism industry: A semi-systematic literature review	González-Mendes, S., García-Muiña, F. E., & González-Sánchez, R. (2024)	To assess blockchain use in tourism and define future research agenda	Semi-systematic literature review	Blockchain offers sustainability potential and operational transparency; requires better legal and regulatory integration	Blockchain, Smart Contracts, Integration with IoT and AI	Process innovation, green innovation, service innovation	Enablers: tech integration, sustainability push; Barriers: legal uncertainty, underdeveloped frameworks	Identifies five dimensions; calls for regulatory frameworks and interdisciplinary studies
4	Crowdsourcing and open innovation: a systematic literature review	Cricelli, Grimaldi & Vermicelli (2019)	To explore the relationship between open innovation and crowdsourcing through a joint review.	Systematic Literature Review; bibliometric analysis (co-citation, co-word analysis)	Identified four dimensions: strategic, managerial, behavioral, and technological; proposed integrated framework.	Crowdsourcing platforms, open innovation tools	Collaborative and open innovation	Collaboration intensity; lack of coordination across innovation boundaries	Conceptual framework on OI and crowdsourcing interplay
5	Data sharing in Industry 4.0: AutomationML, B2MML and International Data Spaces-	Czvetkó & Abonyi (2023)	To assess data-sharing standards in Industry 4.0 and their contribution to smart	Systematic Literature Review using PRISMA	Highlighted standardization's role in enabling interoperability in data ecosystems.	AutomationML, B2MML, International Data Spaces, ISA-95	Process and data-driven innovation	Standardization, data ecosystems vs. trust and cultural readiness	None explicitly; practical insights on integration challenges

Source: authors

3.1. Digital Technologies Used in SMEs (RQ1)

The literature shows that the digital technologies adopted by SMEs follow a complex and evolving pattern. This reflects not only the diversity in their levels of digital maturity, but also a broader strategic shift in how these firms rethink and reshape their business models. Among the most frequently cited technologies are artificial intelligence (AI), digital platforms, the Internet of Things (IoT), blockchain, and cloud computing.

Among these works, a noticeable variant is that more SMEs are turning to AI and data analytics in decision making and operations. Gao et al. (2022) and Gregersen and Li Ying (2023), e.g., emphasize increased importance of the digital innovation management, assisted with AI-enabled tools. Horani et al. (2023) also showcase the ability of business analytics systems to foster a competitive advantage, especially in conditions that the budding SMEs have to operate through resource limitations.

Its digital platforms are on the one hand, framed as a tool and on the other as a setting of innovation. The articles by Gong et al. (2024) and da Rocha et al. (2024) discuss the role of such platforms in supporting internationalization and expanding in the market. They also facilitate new types of customer interactions and the massive data collection, which is also critical to the product customization and the responsiveness of innovation (Jayawardena et al., 2024).

3.2. Forms of Organizational Innovation (RQ2)

SMEs engage in various forms of organizational innovation catalyzed by digital transformation. Four major types are identified:

1. **Process innovation:** streamlining workflows and improving real-time performance (Cosa & Torelli, 2024).
2. **Business model innovation:** reconfiguring value creation and customer relationships (Gregersen & Li Ying, 2023).
3. **Product–service systems (PSS):** offering personalized, service-integrated solutions via IoT and AI (Akesson & Sundström, 2024).
4. **Governance and knowledge systems:** adopting open innovation and collaborative structures (Durst et al., 2023).

However, these transformations are uneven. Many SMEs face structural barriers such as limited resources or absorptive capacity (Pangarso et al., 2022), which hinder the scalability of innovation.

3.3. Enablers and Barriers to Digitalization in SMEs (RQ3)

Digital innovation in SMEs results from the interplay between internal capacities and external environmental conditions. Internally, digital competence and absorptive capacity are repeatedly cited as key enablers, fostering a firm's ability to identify, assimilate, and exploit technological knowledge (Durst et al., 2023). An entrepreneurial orientation — characterized by proactiveness and risk-taking — further supports strategic experimentation and long-term renewal.

Externally, collaborative ecosystems, government programs, and financial incentives act as catalysts for digital adoption. These frameworks provide legitimacy, resources, and targeted capacity-building opportunities. However, structural limitations such as inadequate infrastructure, financial constraints, and system fragmentation persist as critical barriers (Akesson & Sundström, 2023).

Cultural resistance also poses a challenge. Factors like generational divides, skepticism toward digital tools, and job insecurity can obstruct change. Additionally, regulatory ambiguity in areas such as data governance and cybersecurity often heightens uncertainty, especially in SMEs lacking dedicated legal or compliance units.

In sum, successful digital adoption requires a balanced configuration of internal readiness, external support, and adaptive governance to mitigate systemic constraints and encourage innovation.

3.4. Theoretical Contributions and Conceptual Perspectives (RQ4)

The review identifies four dominant theoretical perspectives:

1. **Technology adoption models** (UTAUT, TAM, TOE) clarify adoption drivers but often lack systemic depth.
2. **Resource-based view (RBV)** and **dynamic capabilities** explain how firms leverage internal strengths for innovation.
3. **Open innovation frameworks** explore collaborative knowledge flows and co-creation dynamics (Bertello et al., 2024).
4. **Institutional and ecosystem logics** account for the broader contexts shaping SME digital behaviors (Messina et al., 2024).

Despite their individual value, these frameworks are rarely integrated. This fragmentation limits explanatory power. The review calls for more holistic, multi-level conceptual models that bridge technological, organizational, and institutional dimensions — especially in emerging and resource-constrained contexts.

4. DISCUSSION

4.1. Summary of Key Findings

This review confirms that digitalization in SMEs is a multifaceted process shaped by internal capabilities, external enablers, and sectoral dynamics (Leipziger & Kanbach, 2024; Garrido et al., 2024). Technologies such as AI, blockchain, and digital platforms act both as catalysts and sources of tension. Among innovation outcomes, organizational innovation emerges as the most prominent form, surpassing product and process innovation (Gong et al., 2024; D'Angelo et al., 2024).

4.2. Interpretation in Light of Existing Literature

A growing emphasis on incremental strategies and business model transformation reflects a risk-averse approach common in resource-constrained environments (Leipziger & Kanbach, 2024). Digitalization is increasingly embedded in managerial and cultural practices, yet core concepts such as absorptive capacity and dynamic capabilities remain underexplored empirically (Monson, 2024; Meyer et al., 2023). While models like TOE and RBV dominate, they are often deployed without full theoretical depth (Grooss et al., 2022).

4.3. Theoretical Contributions

This review makes three theoretical contributions:

- ❖ It provides a structured synthesis along four dimensions - technologies (RQ1), innovation types (RQ2), enablers/barriers (RQ3), and theoretical anchoring (RQ4)-

echoing the multidimensional nature of digital innovation (Cosa & Torelli, 2024; Gao et al., 2022).

- ❖ It highlights the coexistence of technology-push (e.g., AI, IoT) and capability-pull (e.g., leadership, digital literacy) logics (Feser, 2023; El Jaouhari et al., 2024).
- ❖ It identifies a critical research gap in the longitudinal understanding of innovation processes in SMEs, a concern echoed in calls for dynamic, context-aware models (Miklian, 2021; Castro & Moreira, 2024).

4.4. Managerial Implications

SME leaders must view digitalization not merely as technology adoption but as a broader capability-building exercise. Investing in leadership, learning culture, and strategic alignment is essential (Durst et al., 2023). Successful firms combine marketing and digital integration (Behl et al., 2024) and cultivate ambidextrous capabilities (Han et al., 2024). Policymakers should move beyond tool-based incentives and support ecosystem embedding and organizational preparedness (Michelotto & Joia, 2024; Bertello et al., 2024).

4.5. Future Research Directions

Several research avenues emerge:

- ❖ Employ longitudinal, multi-level designs to trace innovation pathways (Gao et al., 2022; Gong et al., 2024).
- ❖ Investigate adoption patterns in low-tech and creative sectors (Da Rocha et al., 2024; González-Mendes et al., 2024).
- ❖ Examine how open innovation ecosystems strengthen SME capabilities (Toroslu et al., 2023; Bertello et al., 2024).
- ❖ Explore hybrid innovation models linking digital transformation to sustainability goals (Pangarso et al., 2022; Messina et al., 2024).

CONCLUSION

This PRISMA-based systematic review offers a comprehensive synthesis of 41 peer-reviewed articles examining how digitalization influences organizational innovation within SMEs. The findings underscore that digital transformation is not a linear or isolated process; rather, it is shaped by internal capabilities (e.g., absorptive capacity, digital literacy), external factors (e.g., ecosystems, regulatory frameworks), and strategic orientations.

Organizational innovation emerges as the most frequently stimulated form, enabled by digital tools such as artificial intelligence, cloud platforms, and the Internet of Things (IoT). However,

its effective implementation is strongly mediated by managerial agility, cultural adaptability, and innovation readiness.

From a theoretical standpoint, this review highlights the plurality of frameworks mobilized to study SME digitalization—ranging from UTAUT and TAM to RBV, TOE, and the dynamic capabilities approach. Despite this diversity, significant gaps persist in longitudinal research, sector-specific insights, and contextualized models tailored to SMEs in developing economies. Practically, the review stresses that digital innovation within SMEs cannot be reduced to technological adoption alone. It demands leadership commitment, change management capacity, and policy-level support, especially in contexts marked by resource constraints. For Moroccan SMEs in particular, these insights offer critical implications for digital policy, capability-building programs, and ecosystem design.

Future research should seek to address the identified limitations by:

- ❖ Conducting longitudinal and mixed-method studies;
- ❖ Comparing cross-cultural and inter-sectoral variations;
- ❖ Deepening the understanding of innovation pathways in SMEs from the Global South.

While this review maps a rich and evolving research landscape, it also invites scholars and practitioners to pursue more integrated, interdisciplinary, and impact-oriented inquiries into digital transformation and innovation capacity within SMEs.

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