
Digital Ecosystems and SME Competitiveness: A Conceptual Framework for Value Creation, Integration, and Policy Support

BOUKLIA Nawel

université d Alger 03

nawel.bouklia123@gmail.com

Received: 23/03/2026

TOUITOU Mohammed

université d Alger 03

touitoutouitou@yahoo.fr

Accepted: 01/05/2026

Published: 31/05/2026

Abstract:

This paper explores how digital ecosystems empower SMEs to develop capabilities and join platform networks. By bridging gaps in fragmented research, it proposes a unified framework connecting technology, governance, and institutional support to firm performance. The study provides a roadmap for policymakers and managers to design more inclusive and resilient digital environments. It concludes that integrating these factors is essential for boosting SME innovation and long-term competitiveness.

Keywords: Digital ecosystems for SMEs; SME competitiveness; platform governance; institutional support; digital transformation.

Jel Classification Codes: L86, D85, L26, M13, O33.

*Corresponding author

1. Introduction :

The accelerating digitalization of economic activities has fundamentally reshaped business models, value creation processes, and competitive dynamics across global markets. For small and medium-sized enterprises (SMEs), digital transformation has become essential for strengthening efficiency, innovation capacity, and resilience in increasingly turbulent environments. The emergence of digital ecosystems—interconnected networks of platforms, technologies, institutions, and actors—now constitutes a strategic foundation through which SMEs access resources, knowledge, and markets (Autio, Nambisan, Thomas, & Wright, 2018; Jacobides, Cennamo, & Gawer, 2018).

Despite the growing scholarly attention to digital ecosystems, the literature exhibits three persistent gaps. First, prior studies tend to examine isolated aspects of SME digitalization—such as technology adoption (Vial, 2019), platform participation (Cenamor, Parida, & Wincent, 2019), or digital capabilities (Warner & Wäger, 2019)—but rarely integrate these dimensions into a holistic conceptual architecture. Second, most existing research is situated within advanced economies, leaving limited understanding of how SMEs in emerging markets operate under constraints such as weak digital infrastructure, institutional uncertainty, and capability deficits (Li, Su, Zhang, & Mao, 2018; Nambisan et al., 2019). Third, the mechanisms through which digital ecosystems enhance SME competitiveness—through data-driven processes, value co-creation, platform governance, or institutional enablers—remain theoretically fragmented.

Addressing these gaps is crucial given the economic importance of SMEs, which represent over 90% of businesses globally and constitute a major source of innovation, employment, and social stability (OECD, 2021). However, SMEs face disproportionate challenges in digital transformation, including financial constraints, technological skill shortages, and difficulty integrating digital tools across organizational processes (López-Nicolás & Meroño-Cerdán, 2011; Marzanna et al., 2025). Understanding how digital ecosystems can mitigate these obstacles and unlock competitive advantages is therefore central to contemporary economic research and policy design.

This study aims to advance conceptual clarity by developing a multidimensional framework explaining how digital ecosystems contribute to SME competitiveness through technological integration, capability development, and ecosystem governance. Building on recent literature in digital innovation (Nambisan et al., 2017), platform strategy (McIntyre & Srinivasan, 2017), and institutional theory (Hinings, Gegenhuber, & Greenwood, 2018), the paper synthesizes current knowledge and formulates theoretical propositions to guide future empirical research.

Accordingly, the study addresses the following research questions: RQ1: How do digital ecosystems create value for SMEs through digital capability development and technological integration? RQ2: What ecosystem-level mechanisms—such as platform governance, data sharing, and institutional support—shape SME competitiveness? RQ3: How can policymakers and managers strengthen digital ecosystem conditions to accelerate SME innovation, performance, and resilience?

This paper contributes to the literature in three ways. First, it offers a consolidated conceptual model that integrates technological, organizational, and institutional perspectives into a unified explanation of SME engagement in digital ecosystems. Second, it proposes a structured set of testable theoretical propositions to support future quantitative or mixed-method empirical work. Third, it provides practical and policy-oriented insights relevant for promoting SME competitiveness across different institutional contexts, including emerging economies.

The remainder of the paper is structured as follows. Section 2 presents a comprehensive literature review on digital ecosystems, SME digital transformation, and platform-based value creation. Section 3 introduces the conceptual framework and theoretical propositions. Section 4 describes the methodological orientation of this conceptual study. Section 5 discusses strategic implications for practitioners and policymakers. Section 6 concludes with contributions, limitations, and directions for future research.

2. Literature Review

2.1. Digital Ecosystems: Concepts, Structures, and Theoretical Foundations

Digital ecosystems have become a central analytical lens for understanding the evolving interdependence between firms, technologies, platforms, and institutional arrangements within the digital economy. Early conceptualizations described digital ecosystems as complex socio-technical environments composed of interconnected actors who collaborate and co-create value by leveraging shared digital infrastructures and interoperable technologies (Adner, 2017; Jacobides, Cennamo, & Gawer, 2018). This perspective emphasizes that digital ecosystems function not merely as technological systems but as coordinated structures that integrate heterogeneous capabilities, resources, and innovation processes across organizational boundaries. Their effectiveness relies on complementarities among participants, on modular and flexible architectures that facilitate adaptation, and on governance arrangements that define how interactions, data flows, and value distribution are managed (Autio, Nambisan, Thomas, & Wright, 2018).

A key distinction between digital ecosystems and traditional value chains lies in the nature of coordination and innovation. Whereas value chains rely on linear, sequential flows of activities governed by hierarchical arrangements, digital ecosystems operate through networked interactions and decentralized innovation

dynamics (Gawer & Cusumano, 2014). Participation is typically mediated by digital platforms that provide standardized interfaces, data exchange mechanisms, and algorithmic coordination tools. These platforms—ranging from digital marketplaces to logistics networks, financial infrastructures, and cloud-based service environments—act as foundational enablers that allow participants to integrate resources, access complementary services, and scale operations efficiently across markets and geographic boundaries (Parker, Van Alstyne, & Choudary, 2016). Consequently, the success of an ecosystem hinges on the platform's ability to attract diverse participants, facilitate value co-creation, and maintain stable governance rules that sustain trust and cooperation.

Scholarly work increasingly highlights the layered structure of digital ecosystems, which operates simultaneously at technological, organizational, and governance levels. At the technological level, digital infrastructures and computational resources—such as cloud computing, APIs, big data analytics, and artificial intelligence—provide the foundation for interoperability, scalability, and rapid experimentation (Yoo, Henfridsson, & Lyytinen, 2010). At the organizational level, the ecosystem comprises firms with heterogeneous capabilities and complementary assets that engage in collaborative innovation and mutual value enhancement (Cennamo, 2021). At the governance level, rules, standards, and institutional arrangements establish the formal and informal mechanisms that regulate interactions, coordinate incentives, and safeguard data and intellectual property (Williamson & De Meyer, 2012).

These layered dimensions collectively shape the opportunities available to small and medium-sized enterprises (SMEs) seeking to integrate into digital ecosystems. SMEs may benefit from access to advanced technological tools, expanded markets, and collaborative networks, yet they also face institutional and infrastructural constraints that can limit their participation—particularly in emerging economies where digital capabilities, regulatory systems, and technological infrastructures remain unevenly developed. As a result, the structure of digital ecosystems plays a pivotal role in determining whether SMEs can effectively leverage digital transformation for enhanced competitiveness, innovation, and long-term resilience.

2.2. Digital Transformation and SME Competitiveness

Digital transformation has become a decisive catalyst for strengthening the competitiveness of small and medium-sized enterprises (SMEs) by reshaping how they organize operations, innovate, and interact with markets. SMEs have traditionally been constrained by limited financial resources, technological vulnerability, and insufficient organizational capabilities. However, the diffusion of digital technologies has enabled these firms to mitigate such disadvantages by automating routine tasks, enhancing data-driven decision-making, and

accessing digital platforms that expand market reach and operational capacity (López-Nicolás & Meroño-Cerdán, 2011; Marzanna et al., 2025). As digital technologies democratize access to information and reduce the costs of experimentation and coordination, SMEs increasingly gain opportunities to compete with larger firms despite their structural limitations.

Empirical evidence consistently shows that SMEs adopting digital tools experience improvements in operational performance, strategic agility, and innovation outcomes. Research by Chang et.al (2025) demonstrates that digitalization enhances process efficiency and accelerates the development of new products and services, ultimately improving competitiveness. Similarly, digital maturity has been associated with measurable gains in productivity, more rapid responsiveness to market changes, and stronger customer engagement, particularly in firms capable of integrating digital tools into their core business processes (Agostini & Filippini, 2019). These transformations enable SMEs to operate with greater flexibility, thereby facilitating adaptation to volatile environments.

Despite these benefits, the literature also points to several persistent barriers that hinder the digital transformation of SMEs. Many firms struggle with limited digital skills and expertise, which restricts their ability to deploy and maintain advanced technologies. High implementation costs, cybersecurity vulnerabilities, and organizational resistance to change further complicate digital adoption efforts (Mittal et al., 2018). These challenges underscore the fact that digital transformation is not solely a technological process but also an organizational and strategic undertaking that requires reconfiguring routines, capabilities, and mindsets.

Scholars increasingly highlight that SME competitiveness in the digital era depends on several interconnected capability domains. Digital capabilities—such as the ability to integrate technological tools, reconfigure business processes, and leverage data analytics—constitute a foundational competency that supports effective digital transformation (Warner & Wäger, 2019). These capabilities are complemented by dynamic capabilities, including agility, continuous learning, and the capacity to reconfigure resources in response to market shifts, which enable SMEs to exploit digital opportunities (Teece, Peteraf, & Leih, 2016). Innovation orientation also plays a critical role, as SMEs that embrace experimentation and are willing to adopt new digital business models tend to outperform those with more conservative approaches (Bharadwaj et al., 2013). Moreover, external environmental conditions—including competitive pressures, customer expectations, and broader market volatility—shape how and to what extent SMEs utilize digital tools to enhance their performance (Bourhlal & Alhaderi, 2025).

While the literature provides compelling evidence of the positive association between digital transformation and SME competitiveness, the extent of these benefits varies significantly across regions and sectors. SMEs in advanced economies typically operate within mature digital infrastructures and supportive institutional frameworks, conditions that facilitate deeper and more successful digital integration. In contrast, SMEs in emerging economies often contend with fragmented infrastructures, institutional uncertainty, and skill deficits, which limit their ability to extract consistent value from digital technologies. This uneven distribution of digital transformation outcomes highlights the critical importance of ecosystem-level factors—such as infrastructure quality, institutional support, and platform availability—that operate beyond the boundaries of individual firms and profoundly influence their digital trajectories. Understanding how these ecosystem factors interact with firm-level capabilities is therefore essential for developing a more complete explanation of SME competitiveness in the digital age.

2.3. Platform Economy and Value Co-Creation for SMEs

The rise of the platform economy has profoundly altered how small and medium-sized enterprises (SMEs) access markets, collaborate with partners, and engage in value creation processes. Digital platforms function as intermediaries that connect diverse actors—customers, suppliers, service providers, and complementary innovators—thereby enabling SMEs to participate in networks of value creation that would otherwise remain inaccessible due to resource and capability constraints. Research shows that platforms provide SMEs with expanded market reach, opportunities for partnership formation, and access to data-driven insights that enhance strategic and operational decision-making (Cenamor, Parida, & Wincent, 2019). By offering standardized technological infrastructures, platforms help SMEs integrate third-party services, streamline operations, and coordinate activities across geographical and organizational boundaries (Constantinides, Henfridsson, & Parker, 2018).

The mechanisms through which platforms generate value for SMEs operate along several interrelated dimensions. One fundamental mechanism is the ability of platforms to reduce entry barriers and transaction costs, allowing SMEs to access broader customer bases and participate more effectively in digital markets. This process democratizes market participation by lowering the fixed costs associated with market expansion and enabling even resource-constrained firms to scale their operations efficiently (Parker, Van Alstyne, & Choudary, 2016). A second mechanism concerns the facilitation of co-creation processes. Platforms serve as collaborative environments where SMEs can innovate jointly with platform providers and complementary actors, including software developers, logistics firms, and financial service providers. These collaborative dynamics support the emergence of new products, services, and business models, thereby enhancing innovation capacity and market

differentiation (Nambisan, Lyytinen, Majchrzak, & Song, 2017). A third mechanism relates to the data-intensive nature of digital platforms. Through their ability to collect, process, and analyze digital traces, platforms offer SMEs powerful analytical tools that support more informed decision-making, facilitate customer profiling, optimize supply chains, and enhance overall competitiveness (Chen, Chiang, & Storey, 2012).

Despite these advantages, participation in digital platforms is not without risks. Scholars increasingly highlight concerns regarding platform dependency, especially when SMEs rely heavily on a dominant platform for market access, revenue generation, or critical services. Such dependency can expose firms to unilateral changes in platform policies, fee structures, or algorithms that directly affect their visibility and profitability (Foerderer, Kude, Schuetz, & Heinzl, 2018). Power asymmetries may also arise when platforms exert significant control over data governance, limiting the autonomy of participating SMEs and constraining their ability to appropriate value from their own data. These challenges are particularly pronounced in emerging markets, where institutional safeguards such as strong regulatory frameworks, competition policies, and data protection rules may be less developed. Under such conditions, SMEs face amplified vulnerabilities, including exposure to exploitative practices, reduced bargaining power, and heightened uncertainty regarding long-term platform participation.

Overall, the platform economy presents a dual reality for SMEs: while it offers unprecedented opportunities for growth, innovation, and market integration, it also introduces structural risks that must be carefully managed. Understanding how SMEs navigate these opportunities and constraints is essential for developing a comprehensive view of digital ecosystem participation and for informing policies that foster equitable and sustainable platform-based value creation.

2.4. Institutional and Policy Enablers in Digital Ecosystems

Institutions play a pivotal role in shaping the structure, functioning, and performance of digital ecosystems, particularly through the formal and informal rules that govern technological development, market participation, and inter-organizational collaboration. Strong institutional foundations—such as well-developed digital infrastructure, coherent regulatory frameworks, robust intellectual property protection, and reliable data governance systems—create an enabling environment in which firms, including SMEs, can participate confidently and effectively in digital ecosystems. Such institutional support reduces uncertainty, safeguards transactions, and encourages innovation by providing clear expectations and protections for ecosystem actors (Hinings, Gegenhuber, & Greenwood, 2018; OECD, 2021). When these conditions are present, SMEs are better positioned to leverage digital tools, adopt new technologies, and engage in platform-mediated value creation.

However, the institutional landscape is highly uneven across countries, and SMEs operating in emerging economies often face significant barriers to digital integration. Studies highlight persistent weaknesses such as insufficient broadband penetration, inadequate digital skills, limited access to finance, and fragmented or underdeveloped regulatory frameworks that fail to keep pace with technological change (Li et al., 2018). These deficiencies create structural impediments that inhibit ecosystem participation and restrict the ability of SMEs to fully exploit digital opportunities. In such contexts, public policy becomes a critical lever for change. Effective policies aimed at expanding digital infrastructure, subsidizing technology adoption, offering targeted SME support programs, and fostering public–private partnerships can substantially accelerate digital transformation and reduce disparities in ecosystem participation. International organizations, including UNCTAD, increasingly emphasize the need for coordinated policy interventions that strengthen digital readiness and enhance institutional capacities in emerging regions (UNCTAD, 2022).

Beyond infrastructural and regulatory considerations, the institutional perspective underscores the central importance of governance within digital ecosystems. Governance structures shape how value is created, distributed, and appropriated among participants; they also determine how conflicts are resolved, how standards are negotiated, and how participation rules are enforced. Williamson and De Meyer (2012) argue that governance mechanisms—whether market-based, hierarchical, or ecosystem-based—fundamentally influence the degree of trust, transparency, and collaboration among actors. In digital ecosystems, governance affects critical issues such as data ownership, interoperability, access rights, platform neutrality, and incentive alignment. These factors directly influence the willingness of SMEs to engage in ecosystem activities and the extent to which they can benefit from participation.

In emerging markets, where institutional safeguards and legal protections may be less robust, governance challenges can create additional risks for SMEs, including exposure to opportunistic behavior, dependency on dominant platforms, and limited recourse in cases of conflict or data misuse. Strengthening governance arrangements—both at the ecosystem level and through national regulatory systems—is therefore essential for enabling inclusive and sustainable digital participation. The quality of institutional and governance environments ultimately determines whether digital ecosystems function as engines of SME competitiveness or as structures that reinforce existing inequalities.

2.5. Synthesis and Research Gap

The growing body of literature reviewed above provides a consistent and compelling account of the transformative potential of digital ecosystems for enhancing SME competitiveness. Scholars broadly agree that

digital ecosystems serve as powerful engines of value creation by connecting firms through interoperable technologies, collaborative platforms, and shared data infrastructures. At the firm level, SMEs stand to benefit substantially from digital tools that enhance operational efficiency, promote innovation, and enable participation in broader networks of value co-creation. Research further demonstrates that platforms play a critical role in facilitating these advantages by expanding market access, lowering transaction costs, and enabling collaborative innovation processes supported by real-time data analytics. Complementing these firm-level and technological insights, institutional studies underscore the importance of regulatory clarity, infrastructure development, and governance mechanisms in shaping the extent to which SMEs can engage effectively in digital ecosystems.

Despite this rich and interdisciplinary evidence base, several important gaps remain. One major limitation of the current literature is its fragmented theoretical landscape. While studies from information systems, strategy, entrepreneurship, and institutional theory provide valuable insights, they often address isolated dimensions of digital ecosystems without integrating the technological, organizational, and institutional mechanisms that jointly influence SME competitiveness. This fragmentation has resulted in conceptual silos that hinder the development of a holistic understanding of how digital ecosystems function and how they create value for SMEs in different contexts.

A second gap concerns the geographical and developmental bias of existing research. Much of the empirical evidence is derived from advanced economies with mature digital infrastructures and stable institutional environments. As a result, the unique challenges faced by SMEs in emerging markets—such as infrastructural deficits, skill shortages, financing constraints, and institutional uncertainties—remain insufficiently theorized. This imbalance limits the global applicability of current models and overlooks the conditions under which digital ecosystems may fail to support, or even disadvantage, SMEs in less developed contexts.

A third limitation arises from the scarcity of multidimensional conceptual frameworks capable of capturing the complex interactions between platform governance, digital capabilities, and institutional enablers. Although numerous studies explore these components individually, few attempts have been made to articulate an integrated framework that explains how these forces combine to shape SME outcomes within digital ecosystems. The absence of such a framework restricts theoretical advancement and leaves a gap for research attempting to synthesize insights across disciplinary boundaries.

These unresolved issues highlight the need for a comprehensive conceptual framework that brings together technological infrastructures, firm-level capabilities, platform dynamics, and institutional conditions in a coherent and multidimensional model. The following section addresses this need by proposing an integrative

conceptual framework that explains how digital ecosystems influence SME competitiveness and outlines theoretical propositions to guide future empirical research.

3. Conceptual Framework

Building on the synthesis of existing literature, this study develops a conceptual framework that explains how digital ecosystems contribute to SME competitiveness through the interaction of technological infrastructures, firm-level digital capabilities, platform governance, and institutional enablers. The framework integrates insights from digital innovation theory (Nambisan et al., 2017), platform ecosystem research (Gawer & Cusumano, 2014; Jacobides et al., 2018), and institutional theory (Hinings et al., 2018) to provide a multidimensional understanding of the mechanisms that underpin value creation for SMEs in digital environments.

The conceptual framework rests on the premise that digital ecosystems operate as layered socio-technical systems in which technological, organizational, and institutional elements jointly shape firm behavior and strategic outcomes. At the core of the framework is the technological infrastructure that enables interoperability, data exchange, and scalable integration of digital solutions. This includes cloud computing services, application programming interfaces (APIs), data analytics tools, and platform architectures that facilitate connectivity and innovation across different stakeholders (Yoo et al., 2010). SMEs that effectively leverage these technological resources are better positioned to overcome traditional constraints related to size, resource scarcity, and limited market reach.

Firm-level digital capabilities constitute the second dimension of the framework. These capabilities reflect the extent to which SMEs can assimilate, apply, and reconfigure digital technologies to enhance operational efficiency, stimulate innovation, and create new forms of value. Prior research underscores that digital transformation outcomes depend not merely on the adoption of individual technologies but on the development of integrated digital capabilities that support learning, adaptability, and strategic renewal (Warner & Wäger, 2019; Teece et al., 2016). SMEs that cultivate such capabilities are more likely to exploit digital ecosystems effectively and translate ecosystem resources into competitive advantages.

Platform governance represents the third dimension of the framework. Digital platforms serve as the structural hubs of ecosystems, coordinating interactions among diverse actors and facilitating value co-creation through standardized interfaces and rule-based coordination mechanisms (Parker et al., 2016). Governance mechanisms—such as access rules, data policies, pricing structures, and algorithmic control—shape the incentives and constraints for SMEs participating in platform-mediated activities. Effective governance promotes trust, transparency, and collaboration, thereby enhancing SMEs' ability to innovate and compete. Conversely,

weak or opaque governance may lead to dependency, power asymmetries, and restricted value appropriation (Foerderer et al., 2018).

Institutional enablers form the fourth dimension of the conceptual model. Institutions—comprising regulatory frameworks, infrastructure investments, financial support mechanisms, and policy interventions—create the broader environment in which digital ecosystems operate. Strong institutional support reduces uncertainty, enhances digital readiness, and fosters equitable participation across firms (OECD, 2021; UNCTAD, 2022). In emerging economies, these enablers are particularly critical, as SMEs often face infrastructural gaps, limited digital skills, and weaker legal protections. The model posits that institutional enablers moderate the relationship between digital ecosystem participation and SME competitiveness by shaping access to resources, capabilities, and opportunities.

The interplay of these four dimensions—technological infrastructures, digital capabilities, platform governance, and institutional enablers—ultimately determines the extent to which SMEs can integrate into digital ecosystems and achieve competitive advantages. The model suggests that SME competitiveness is not an automatic outcome of digital participation but rather emerges from the alignment between firm-level capabilities, platform-level coordination mechanisms, and macro-level institutional conditions. In this sense, the conceptual framework provides an integrated lens through which to analyze the determinants of SME performance in the digital age.

Theoretical Propositions

Based on the logic of the conceptual framework and supported by empirical and theoretical literature, the following propositions articulate the expected relationships among the key constructs. They are written in narrative form to maintain academic continuity and avoid bullet structures.

The first proposition posits that SMEs operating within technologically advanced digital ecosystems are more likely to enhance their competitiveness, as access to robust digital infrastructures enables them to integrate innovative tools, streamline operations, and participate more effectively in digital value chains. This relationship reflects the premise that digital infrastructures reduce entry barriers and expand firms' strategic options by providing scalable and interoperable technological resources.

The second proposition suggests that SME competitiveness is strengthened when firms develop strong digital capabilities that allow them to assimilate, deploy, and adapt digital technologies in response to evolving market conditions. These capabilities enable firms to innovate, reconfigure their resources, and create value through digital means, thus serving as a critical mechanism linking digital ecosystem participation to performance.

The third proposition asserts that the governance structure of digital platforms significantly influences the value that SMEs derive from ecosystem participation. Transparent, inclusive, and fair governance mechanisms promote trust, reduce dependency risks, and foster collaborative innovation, while weak governance may hinder SMEs' ability to appropriate value and maintain autonomy within the ecosystem.

The fourth proposition indicates that institutional enablers moderate the impact of digital ecosystems on SME competitiveness. In environments with strong regulatory frameworks, stable digital infrastructures, and supportive public policies, SMEs are better positioned to leverage digital platforms and capabilities. Conversely, institutional weaknesses may constrain the benefits of ecosystem participation and exacerbate existing disparities.

Together, these propositions provide a structured theoretical foundation that clarifies how digital ecosystems influence SME competitiveness and highlight the conditions under which these effects are most pronounced. They also offer a pathway for future empirical investigation, particularly in emerging economies where institutional dynamics play a critical role in shaping digital transformation outcomes.

4. Research Design and Methodology

This study adopts a conceptual, theory-building research design intended to develop an integrated framework explaining how digital ecosystems influence the competitiveness of small and medium-sized enterprises (SMEs). Conceptual research is particularly appropriate when research questions seek to understand underlying mechanisms, synthesize fragmented literature, and propose theoretical explanations without relying on primary empirical data (Jaakkola, 2020; MacInnis, 2011). Because the three research questions guiding this study—namely how digital ecosystems generate value for SMEs, how ecosystem-level mechanisms shape SME competitiveness, and how policymakers can strengthen ecosystem conditions—are explanatory and integrative in nature, a conceptual methodology provides the most suitable approach for addressing them.

The methodological foundation of this research draws on systematic interpretive synthesis, an approach that enables scholars to integrate insights across multiple theoretical traditions, reconcile conceptual inconsistencies, and generate novel theoretical contributions (Gilson & Goldberg, 2015; Tranfield, Denyer, & Smart, 2003). This study therefore undertook a structured review of peer-reviewed literature published between 2010 and 2024 in the fields of digital innovation, platform ecosystems, entrepreneurship, SME competitiveness, and institutional theory. Databases including Scopus, Web of Science, and ScienceDirect were consulted to ensure the inclusion of high-quality, verifiable academic sources.

The selection of sources was guided by two criteria. First, priority was given to studies that explicitly examined the mechanisms of digital transformation, platform-mediated interactions, and ecosystem governance. Second, the review emphasized research addressing SMEs, particularly in contexts where resource constraints, capability gaps, and institutional environments influence digital adoption. This ensured that the synthesis remained aligned with the focus of RQ1, RQ2, and RQ3.

The analytic process followed three iterative stages. The first stage involved identifying core concepts recurring across the literature, such as digital capabilities, platform governance, interoperability, institutional support, and value co-creation. This stage provided the foundation for answering RQ1, which concerns how digital ecosystems create value for SMEs through technological and capability-related mechanisms. The second stage examined how platform structures, governance rules, and data policies affect SME participation and competitive outcomes. Insights from this stage informed RQ2, by highlighting ecosystem-level dynamics that shape the benefits SMEs can extract from digital participation. The third stage synthesized institutional and policy discussions in the literature, focusing on the conditions under which digital ecosystems flourish or fail in emerging economies. This stage directly supported RQ3, addressing how policymakers and managers can strengthen digital ecosystem conditions to improve SME performance.

Following these stages, the constructs were integrated into a multidimensional conceptual framework. The relationships between the constructs were then articulated through theoretical propositions derived from logical reasoning and supported by empirical and conceptual evidence found in the literature. While the study does not provide empirical testing of these propositions, it adheres to established standards of conceptual rigor by ensuring internal coherence, logical consistency, and clear theoretical contribution (Whetten, 1989; Weick, 1989). The resulting framework offers a structured foundation for future empirical research capable of validating and further refining the proposed relationships.

Through this methodological approach, the study meets its objective of synthesizing fragmented knowledge into a coherent theoretical account of how digital ecosystems shape SME competitiveness. In doing so, it provides the conceptual groundwork necessary for advancing theory and guiding policymakers and business practitioners seeking to leverage digital ecosystems for economic development.

5. Discussion and Implications

This section interprets the conceptual framework and explains how the mechanisms identified throughout the paper respond to the study's three research questions. The analysis clarifies how digital ecosystems generate value for SMEs (RQ1), how ecosystem-level structures and institutional arrangements influence SME

competitiveness (RQ2), and how policymakers and managers can strengthen the conditions necessary for innovation, performance, and resilience (RQ3). By bringing these dimensions together, the discussion highlights the central role of digital ecosystems as socio-technical environments that shape SME outcomes through technological, organizational, and institutional interactions.

The first research question (RQ1) asks how digital ecosystems create value for SMEs through digital capability development and technological integration. The findings of the conceptual synthesis reveal that digital ecosystems expand SMEs' productive possibilities by providing access to shared technological infrastructures, modular digital tools, and platform interfaces that facilitate resource integration and innovation. Prior studies consistently show that SMEs operating within digital ecosystems benefit from enhanced digital capabilities, faster technology adoption, and reduced barriers to innovation (Adner, 2017; Yoo et al., 2010; Bharadwaj et al., 2013). These benefits arise because ecosystems expose SMEs to flows of data, knowledge, and complementary services that they could not develop internally due to resource constraints. The framework demonstrates that capability development is not an isolated firm-level process; it occurs through repeated interactions with ecosystem actors, platform architectures, and digitally mediated routines. Ecosystems thus serve as amplifiers of SME learning, accelerating digital maturity and enabling firms to integrate advanced technologies—such as cloud services, analytics, and APIs—into their business models at significantly lower cost and complexity. In this sense, value creation for SMEs is fundamentally relational and embedded in the collaborative logic of digital ecosystems.

The second research question (RQ2) concerns the ecosystem-level mechanisms—particularly platform governance, data-sharing structures, and institutional support—that shape SME competitiveness. The conceptual analysis shows that these mechanisms determine the distribution of opportunities within digital ecosystems and strongly influence SMEs' autonomy, strategic flexibility, and innovation potential. Platform governance emerges as a central determinant: rules regarding data access, pricing, interoperability, algorithmic visibility, and dispute resolution directly affect how SMEs participate and compete within the ecosystem (Cennamo, 2021; Foerderer et al., 2018). When platform governance is transparent, inclusive, and oriented toward openness, SMEs are more likely to capture value through higher visibility, innovation opportunities, and collaborative arrangements. Conversely, governance structures designed around exclusivity or dominance can limit SMEs' capacity to scale or differentiate.

Institutional conditions further shape SME competitiveness by moderating how effectively firms can engage with ecosystems. Strong institutions provide digital infrastructure, stable regulatory frameworks, reliable data governance systems, and financial support mechanisms that reduce uncertainty and encourage SME

participation. Weak institutional environments, on the other hand, amplify transaction costs, increase dependency on dominant platforms, and restrict SMEs' ability to appropriate value from digital engagement (Hinings et al., 2018; OECD, 2021). The framework therefore shows that the competitive outcomes of SMEs are not solely determined by their internal capabilities but by the broader ecosystem and institutional architecture that enables—or inhibits—them.

The third research question (RQ3) asks how policymakers and managers can strengthen digital ecosystem conditions to accelerate SME innovation, performance, and resilience. The conceptual framework identifies several leverage points for both groups. Policymakers influence SME competitiveness by shaping the institutional foundations that sustain digital ecosystems. This includes investing in broadband and cloud infrastructure, establishing national frameworks for data protection and cybersecurity, promoting competition in digital markets, and designing SME-centered digital transformation programs. Effective public policy reduces uncertainty, lowers entry barriers, and encourages SMEs to engage with digital platforms and complementary service providers. Such interventions are particularly critical in contexts where market failures, infrastructure deficiencies, or regulatory fragmentation limit SMEs' capacity to participate in digital ecosystems.

Managers, in turn, strengthen SME resilience by cultivating internal readiness for digital engagement. This involves developing digital skills, adopting scalable digital tools, and aligning business models with ecosystem dynamics. Managers must assess platform governance arrangements strategically, selecting ecosystems that align with their long-term objectives and minimize dependency risks. They must also develop dynamic capabilities—such as agility, learning capacity, and innovation orientation—that allow SMEs to adapt to evolving technological trajectories and market conditions. The framework emphasizes that managerial decisions regarding ecosystem participation are not merely operational choices, but strategic levers that determine long-term competitiveness.

Integrating the responses to RQ1, RQ2, and RQ3, the discussion demonstrates that digital ecosystems function as multi-layered environments in which technological opportunities, governance structures, and institutional conditions converge to shape SME performance. The conceptual model contributes to theory by connecting these mechanisms in a unified framework, clarifying how value creation emerges from the interaction between firm-level capabilities and ecosystem-level structures. It also extends existing knowledge by highlighting the relational nature of digital capability development and the centrality of governance and institutions in determining ecosystem outcomes.

Finally, the implications for practice are equally significant. SMEs must adopt proactive ecosystem strategies, policymakers must design supportive digital frameworks, and platform operators must recognize their role as orchestrators of inclusive and competitive digital environments. Together, these implications underscore the transformative potential of digital ecosystems when supported by coherent governance, robust institutional capacities, and strategic managerial engagement.

6. Conclusion

This paper developed a conceptual framework that explains how digital ecosystems shape the competitiveness of small and medium-sized enterprises by integrating mechanisms of value creation, technological integration, platform governance, and institutional support. Responding to the three research questions guiding this study, the analysis demonstrates that SMEs derive significant competitive advantages from embedding themselves in digital ecosystems, primarily through the development of digital capabilities and access to technological complementarities. Digital ecosystems serve as amplifiers of learning and innovation, enabling SMEs to adopt advanced digital tools, participate in data-driven processes, and benefit from collective knowledge flows that remain beyond the reach of firms operating in isolation.

The study further shows that the competitiveness of SMEs is strongly conditioned by the structure and governance of the ecosystems in which they participate. Platform rules, data policies, interoperability standards, and resource access arrangements influence the distribution of opportunities and risks within digital environments. Transparent and inclusive governance models enhance SME participation and innovation, while restrictive or asymmetric arrangements may constrain value capture and increase dependency risks. Institutional frameworks—such as regulatory clarity, digital infrastructure, and national policies—also play a decisive role in enabling or limiting SME engagement with digital ecosystems. These findings directly address RQ2 by demonstrating that ecosystem-level mechanisms shape competitive outcomes as much as firm-level capabilities do.

The final research question (RQ3) concerns the practical actions that policymakers and managers can take to strengthen digital ecosystem conditions. The conceptual model highlights the importance of coordinated interventions that simultaneously enhance technological readiness, foster capability development, and reinforce institutional foundations. Policymakers can support SMEs by investing in digital public goods, ensuring fair platform competition, and establishing clear data governance standards. Managers, in turn, must cultivate digital preparedness, adopt flexible and scalable tools, and align their strategic decisions with ecosystem dynamics.

Together, these actions contribute to the emergence of more resilient and innovative SME sectors capable of leveraging digital ecosystems for long-term growth.

Overall, the study contributes to the literature by integrating previously fragmented perspectives on digital capabilities, platform governance, and institutional environments into a unified conceptual framework. This synthesis clarifies how value creation in digital ecosystems arises from multi-level interactions rather than from isolated firm actions, thereby offering a more holistic understanding of SME competitiveness in digitally mediated markets. The framework also provides a foundation for future empirical research, which may test the proposed relationships using quantitative, qualitative, or mixed-method approaches. Such research would deepen understanding of how the mechanisms identified in this paper operate across different industries, platforms, and institutional contexts.

By articulating the core technological, organizational, and institutional elements of digital ecosystems, this paper offers both theoretical insights and practical guidance for actors seeking to enhance SME competitiveness in an increasingly digital economy. The conclusion reinforces the central message of the study: SMEs do not compete alone, but within ecosystems whose governance, infrastructure, and collaborative dynamics fundamentally shape their capacity to innovate, scale, and thrive.

7. List of references:

Adner, R. (2017). Ecosystem as structure: An actionable construct for strategy. *Journal of Management*, 43(1), 39–58. <https://doi.org/10.1177/0149206316678451>

Agostini, L., & Filippini, R. (2019). Organizational and Managerial Challenges in the Path toward Industry 4.0. *European Journal of Innovation Management*, 22, 406-421

<https://doi.org/10.1108/EJIM-02-2018-0030>

Autio, E., Nambisan, S., Thomas, L. D. W., & Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 72–95.

<https://doi.org/10.1002/sej.1266>

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37(2), 471–482. <https://doi.org/10.25300/MISQ/2013/37:2.3>

Bourhlal, Amine & Alhaderi, Kaoutar. (2025). Digital Transformation and SME Performance: A Systematic Literature Review. 10.1007/978-3-031-99997-0_31

- Cenamor, J., Parida, V., & Wincent, J. (2019). How entrepreneurial SMEs compete through digital platforms: The roles of digital platform capability, network capability and ambidexterity. *Journal of Business Research*, 100, 196–206. <https://doi.org/10.1016/j.jbusres.2019.03.035>
- Cennamo, C. (2021). Competing in digital markets: A platform-based perspective. *Academy of Management Perspectives*, 35(2), 265–291. <https://doi.org/10.5465/amp.2018.0057>
- Chang, X., Fu, K., & Conteh, M. (2025). How Digitalization Impacts the High-Quality Development of the Manufacturing Industry: Evidence from China. *Sustainability*, 17(12), 5586. <https://doi.org/10.3390/su17125586>
- Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly*, 36(4), 1165–1188
- Constantinides, P., Henfridsson, O., & Parker, G. G. (2018). Introduction—Platforms and infrastructures in the digital age. *Information Systems Research*, 29(2), 381–400. <https://doi.org/10.1287/isre.2018.0794>
- Foerderer, J., Kude, T., Schuetz, S. W., & Heinzl, A. (2018). Knowledge boundaries in enterprise software platform development: Antecedents and consequences for platform governance. *Information Systems Research*, 29(2), 278–299
- Gawer, A., & Cusumano, M. A. (2014). Industry platforms and ecosystem innovation. *Journal of Product Innovation Management*, 31(3), 417–433. <https://doi.org/10.1111/jpim.12105>
- Gilson, L. L., & Goldberg, C. B. (2015). Editor commentary: So, what is a conceptual paper? *Group & Organization Management*, 40(2), 127–130. <https://doi.org/10.1177/1059601115576425>
- Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital Innovation and Transformation: An Institutional Perspective. *Information and Organization*, 28, 52–61. <https://doi.org/10.1016/j.infoandorg.2018.02.004>
- Jaakkola, E. (2020). Designing conceptual articles: Four approaches. *AMS Review*, 10(1), 18–26. <https://doi.org/10.1007/s13162-020-00161-0>
- Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, 39(8), 2255–2276. <https://doi.org/10.1002/smj.2904>

- Li, L., Su, F., Zhang, W., & Mao, J. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, 28(6), 1129–1157. <https://doi.org/10.1111/isj.12153>
- López-Nicolás, C., & Meroño-Cerdán, Á. L. (2011). Strategic knowledge management, innovation and performance. *International Journal of Information Management*, 31(6), 502–509. <https://doi.org/10.1016/j.ijinfomgt.2011.02.003>
- MacInnis, D. J. (2011). A framework for conceptual contributions in marketing. *Journal of Marketing*, 75(4), 136–154. <https://doi.org/10.1509/jmkg.75.4.136>
- Marzanna K. Witek-Hajduk, Magda Górka Grginović, and Bartosz Targański. (2025). Digital Internationalisation of Firms, Strategies, Challenges and Legal Aspects. Routledge Open Business and Economics. DOI: 10.4324/9781003617396
- McIntyre, D. P., & Srinivasan, A. (2017). Networks, platforms, and strategy: Emerging views and next steps. *Strategic Management Journal*, 38(1), 141–160. <https://doi.org/10.1002/smj.2596>
- Mittal, S., Khan, M. A., Romero, D., & Wuest, T. (2018). A Critical Review of Smart Manufacturing & Industry 4.0 Maturity Models: Implications for Small and Medium-Sized Enterprises (SMEs). *Journal of Manufacturing Systems*, 49, 194-214. <https://doi.org/10.1016/j.jmsy.2018.10.005>
- Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research in a digital world. *MIS Quarterly*, 41(1), 223–238. <https://doi.org/10.25300/misq/2017/41:1.03>
- Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship. *Research Policy*, 48(8), 103773. <https://doi.org/10.1016/j.respol.2019.03.018>
- OECD. (2021). The digital transformation of SMEs. OECD Publishing. <https://doi.org/10.1787/bdb9256a-en>
- Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). Platform Revolution: How Networked Markets Are Transforming the Economy and How to Make Them Work for You. WW Norton & Company
- Teece, D. J., Peteraf, M. A., & Leih, S. (2016). Dynamic capabilities and organizational agility. *California Management Review*, 58(4), 13–35. <https://doi.org/10.1525/cmr.2016.58.4.13>

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, 14(3), 207–222. <https://doi.org/10.1111/1467-8551.00375>

UNCTAD. (2022). *Digital Economy Report 2022: Value creation and capture—Implications for developing countries*. United Nations Publications

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, 28(2), 118–144. <https://doi.org/10.1016/j.jsis.2019.01.003>

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation. *Long Range Planning*, 52(3), 326–349. <https://doi.org/10.1016/j.lrp.2018.12.001>

Weick, K. E. (1989). Theory construction as disciplined imagination. *Academy of Management Review*, 14(4), 516–531. <https://doi.org/10.5465/amr.1989.4308376>

Williamson, P. J., & De Meyer, A. (2012). Ecosystem advantage: How to successfully harness the power of partners. *California Management Review*, 55(1), 24–46. <https://doi.org/10.1525/cmr.2012.55.1.24>

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary: The new organizing logic of digital innovation. *Information Systems Research*, 21(4), 724–735. <https://doi.org/10.1287/isre.1100.0322>