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Business Innovation Ecosystems for SMEs in the Digital and Sustainable Economy

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Abstract

This article examines how business innovation ecosystems help SMEs innovate while pursuing digital transformation and sustainability goals, and which ecosystem mechanisms most influence SME performance. The study's role is to consolidate fragmented findings into a coherent account of how platforms, networks, and institutions shape SME innovation pathways. A systematic literature review of peer reviewed studies published from 2020 to 2024 was conducted to synthesize evidence on ecosystem structures, governance conditions, and capability development. The synthesized results indicate that SMEs gain the greatest benefits when ecosystem participation is coupled with internal capability building and business model innovation, and when governance arrangements clarify roles, interfaces, and value capture. The article discusses the literature through four analytic lenses: ecosystem governance, capability reconfiguration and dynamic capabilities, sustainability oriented open innovation, and orchestration practices that coordinate partners and align incentives. Overall, ecosystems can amplify SME innovation, but outcomes remain contingent on governance quality, interoperability, and robust sustainability measurement.

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1. Introduction

Small and medium-sized enterprises (SMEs) are navigating a "twin transition" in which competitiveness increasingly depends on both digitalization and measurable sustainability outcomes. Yet SMEs rarely innovate in isolation: they depend on interdependent partners, technologies, and institutions that shape access to knowledge, markets, and complementary assets. Innovation ecosystem theory helps explain these interdependencies by emphasizing evolving constellations of actors, activities, and artifacts, including both collaboration and competition, that influence innovative performance (Granstrand & Holgersson, 2020). For SMEs, this ecosystem lens is especially useful because their resource constraints amplify the value of external complementarities, intermediaries, and shared infrastructures.

In the digital economy, platforms have become a central organizing architecture of business innovation ecosystems, enabling SMEs to recombine resources and scale innovation through data, modular complements, and network effects. Empirical work shows that adopting digital platforms can support SME business model innovation by enabling capability reconfiguration, meaning how firms adapt, upgrade, or substitute routines and resources to create and capture value (Xie et al., 2022). At the ecosystem level, digital entrepreneurship research further highlights how digital technologies and collective intelligence broaden participation in venture creation and innovation, shifting attention from firm-level choices toward community dynamics, infrastructures, and governance mechanisms (Elia et al., 2020). These developments suggest that digital innovation outcomes for SMEs are

increasingly contingent on ecosystem orchestration, interoperability, and the distribution of digital capabilities across partners.

At the same time, the sustainable economy is raising the bar beyond growth and efficiency, pushing SMEs to align innovation with triple-bottom-line priorities and societal expectations. Reviews of sustainable digital transformation emphasize that SMEs face persistent barriers such as limited resources, unclear roadmaps, and uneven measurement approaches when attempting to integrate sustainability into digital change programs (Melo et al., 2023; Mick et al., 2024). Complementary evidence indicates that digital capabilities can materially strengthen entrepreneurial performance in SMEs, reinforcing the importance of capability-building as part of ecosystem participation rather than solely an internal investment decision (Kim & Jin, 2024). From an open innovation perspective, sustainability-oriented outcomes also depend on SMEs' inbound knowledge flows and network positions, implying that ecosystem embeddedness can be a pathway to sustainability performance improvements (Kurniawati et al., 2022).

Despite rapid growth in scholarship connecting digital transformation, sustainability, and ecosystems, the literature remains dispersed across adjacent domains and often lacks integrated explanations of how ecosystem configurations enable SMEs to achieve both digital and sustainable value creation. Bibliometric evidence points to expanding interest in ecosystem-inspired approaches to digital transformation for sustainable innovation, but also indicates conceptual fragmentation and uneven operationalization of "ecosystem" constructs (Liao et al., 2024). Therefore, this article employs a systematic literature review (SLR) of peer-

reviewed studies published from 2020 to 2024 to synthesize how business innovation ecosystems support SME innovation in the digital and sustainable economy, map dominant mechanisms such as platforms, open innovation, and capability reconfiguration, and identify research gaps that can guide theory development and actionable ecosystem strategies.

2. Literature Review

The recent SME literature increasingly frames innovation as an ecosystem phenomenon where value creation depends on interdependencies among firms, platform owners, complements providers, intermediaries, and institutions. Building on innovation ecosystem theory, this stream emphasizes that SMEs benefit from complementarities and shared infrastructures, but also face coordination challenges related to governance, role clarity, and capability gaps (Granstrand & Holgersson, 2020). Platform-centric views deepen this logic by treating digital platforms as architectures that structure participation, define interfaces for complementors, and shape how resources are recombined for innovation. A multidisciplinary systematic literature review by Costabile (2024) consolidates prior work on digital platform ecosystem governance and synthesizes governance building blocks that shape how platform owners coordinate complementors and users, underscoring the practical importance of structured governance for ecosystem functioning.

Within digital transformation research, a recurring explanation is that SME outcomes depend less on technology acquisition alone and more on capability building and reconfiguration. Studies link digital platform participation to business

model innovation via capability reconfiguration, which supports adaptation in routines, resources, and partner relationships (Xie et al., 2022). At the firm level, dynamic capabilities are frequently used to explain how SMEs sense opportunities, learn, and reorganize to create customer value in digital contexts. Evidence from Made in Italy SMEs suggests that sensing and learning capabilities are central triggers for digital transformation, enabling new channels and redesigned value creation processes (Matarazzo et al., 2021). This capability lens aligns with broader work showing that digital capabilities can strengthen entrepreneurial performance, which reinforces the argument that ecosystems matter because they distribute knowledge, tools, and partners that enable capability development (Elia et al., 2020; Kim & Jin, 2024).

In parallel, sustainable digital transformation research argues that SMEs face persistent barriers in aligning digital initiatives with environmental and social goals, including limited resources, unclear roadmaps, and inconsistent measurement approaches (Melo et al., 2023; Mick et al., 2024). Sustainability-oriented open innovation provides one mechanism for addressing these constraints by emphasizing external knowledge sourcing, collaboration, and network positioning as pathways to improved sustainability performance (Kurniawati et al., 2022). However, the ecosystem literature also cautions that collaboration alone is insufficient without orchestration capabilities that coordinate partners and align incentives. A qualitative meta-analysis identifies orchestration practices that support ecosystem functioning, including strategic design, relational work, resource integration, technological leveraging, and innovation practices (Shen et al., 2024).

Taken together, these findings suggest that SME innovation in the digital and sustainable economy is shaped by the interplay among platform structures, firm-level capabilities, and orchestration and governance conditions across the ecosystem, while current evidence remains fragmented across adjacent domains (Liao et al., 2024).

3. Methods

This study applies a systematic literature review (SLR) to synthesize peer reviewed research on business innovation ecosystems for SMEs in the digital and sustainable economy. The review protocol defined the research scope, keywords, inclusion and exclusion criteria, and screening procedures before article selection. Searches were conducted in major scholarly databases (for example Scopus, Web of Science, and Google Scholar) using combinations of terms related to SMEs, innovation ecosystems, digital transformation, platforms, sustainability, circular economy, and sustainable innovation. The search was limited to publications from 2020 to 2024 and written in English. Only journal articles and full conference papers that were peer reviewed and directly examined SMEs within ecosystem, platform, or multi actor innovation settings were considered.

All retrieved records were exported and de duplicated, then screened in two stages: title and abstract screening followed by full text eligibility assessment. Studies were excluded if they were not peer reviewed, focused solely on large firms, treated ecosystems only as a metaphor without empirical or conceptual grounding, or did not link ecosystem dynamics to digital and or sustainability related innovation

outcomes. Quality appraisal was performed using a structured checklist assessing methodological transparency, construct clarity, data adequacy, and relevance to the review questions. Key data were extracted into a standardized table capturing publication details, context, ecosystem type and actors, digital mechanisms, sustainability mechanisms, outcomes, and reported enablers or barriers. Evidence was synthesized through narrative and thematic analysis by grouping findings into recurring themes such as platform governance, capability building and reconfiguration, orchestration practices, and sustainability oriented open innovation, and by comparing patterns across sectors and study designs.

4. Results and Discussion

Across the reviewed studies, a consistent result is that SMEs' innovation performance is strongly conditioned by their ecosystem position and the quality of ecosystem governance. Rather than treating ecosystems as a broad metaphor, the literature repeatedly links concrete governance choices to SME outcomes, including who sets standards and interfaces, how access is granted, and how value capture is structured among platform owners and complementors. In particular, platform ecosystem governance research indicates that governance mechanisms shape participation incentives and coordination costs, which is especially consequential for SMEs with limited slack resources (Costabile, 2024). This aligns with the broader view that innovation ecosystems function through evolving configurations of actors and complementarities, where the distribution of roles and the alignment of incentives can accelerate or constrain innovation (Granstrand & Holgersson, 2020).

A second pattern is that digitalization delivers stronger innovation benefits when it supports business model change through capability reconfiguration, not merely through tool adoption. Evidence shows that SMEs embedded in digital platform ecosystems can recombine resources and partnerships more effectively, improving business model innovation via capability reconfiguration processes that adjust routines, resources, and partner linkages (Xie et al., 2022). This finding is reinforced by dynamic capabilities research showing that sensing and learning capabilities often trigger digital transformation, enabling SMEs to redesign value creation and engage new channels, which then feeds back into ecosystem participation because digital interfaces and data flows become integral to collaboration (Matarazzo et al., 2021). At the ecosystem level, research on digital entrepreneurship ecosystems further indicates that collective intelligence and digital infrastructures broaden participation and reshape the innovation process, which helps explain why ecosystem architectures can matter as much as firm-level decisions (Elia et al., 2020).

A third result is that sustainability and digital transformation are increasingly treated as interdependent, but SMEs struggle with implementation roadmaps and measurement consistency. Reviews of sustainable digital transformation point to recurring barriers such as resource constraints, unclear pathways, and uneven performance measurement, which complicate the move from isolated green initiatives to integrated digital-sustainability strategies (Melo et al., 2023; Mick et al., 2024). In response, framework-based contributions emphasize staged approaches that connect objectives, stakeholder engagement, sustainability dimensions, and

execution to make sustainable digital transformation more actionable for SMEs (Martínez-Peláez et al., 2024). The discussion across these studies suggests that when sustainability is integrated early into digital initiatives, it can reduce later rework and improve coherence across operations, reporting, and partner expectations.

A fourth theme concerns mechanisms that translate ecosystem participation into sustainability-oriented outcomes. Sustainability-oriented open innovation is repeatedly identified as a pathway through which SMEs can access external knowledge, partners, and legitimacy needed to improve sustainability performance (Kurniawati et al., 2022). However, the results also show that open collaboration does not automatically yield impact without orchestration practices that coordinate partners, integrate resources, and align incentives. A qualitative meta-analysis synthesizes orchestration practices such as strategic design, relational work, and resource integration, suggesting these practices are central for sustaining innovation flows and preventing coordination failures (Shen et al., 2024). This indicates that SMEs benefit when ecosystems provide not only access to partners, but also clear coordination and governance structures that lower transaction costs and reduce uncertainty.

From a performance perspective, the evidence base increasingly supports a mediated relationship between digital transformation and sustainable outcomes. Empirical findings indicate that digital capabilities and digitalization strategies can enhance sustainable business performance, with business model innovation acting as a key mechanism and digital leadership strengthening the effect (Chen et al., 2024). When interpreted alongside SME-focused evidence on digital capabilities and

entrepreneurial performance, a coherent implication is that ecosystems can serve as capability amplifiers by distributing tools, knowledge, and market access, but SMEs still need internal capability development and leadership to convert ecosystem access into sustained outcomes (Kim & Jin, 2024).

Overall, the reviewed literature suggests a converging explanation: SME innovation in the digital and sustainable economy depends on the interaction between platform structures, governance and orchestration conditions, and SME capabilities. At the same time, bibliometric and conceptual analyses indicate fragmentation in ecosystem definitions and inconsistent operationalization of ecosystem constructs, which limits comparability across studies and weakens cumulative theory building (Liao et al., 2024). Future research can strengthen the evidence by clarifying ecosystem boundaries and actor roles, using comparable outcome measures for digital and sustainability performance, and testing how specific governance and orchestration mechanisms influence SME capability development and value capture across different ecosystem types.

5. Conclusion

Overall, the reviewed evidence converges on a clear message: SMEs advance innovation in the digital and sustainable economy most effectively when they treat ecosystems not as background context, but as a strategic arena where governance, complementarities, and capability development jointly shape outcomes. The most credible studies do not imply that platform participation or collaboration automatically improves performance. Instead, they show that benefits materialize

when SMEs can translate ecosystem access into internal learning, business model change, and measurable sustainability progress, while ecosystem governance lowers coordination frictions and clarifies roles and value capture.

At the same time, this body of research has limitations that should temper the strength of conclusions. First, many studies rely on cross-sectional designs and perceptual measures, which limits causal inference and may inflate positive associations between digitalization, ecosystem engagement, and performance. Second, conceptual inconsistency remains a core weakness. "Ecosystem", "platform ecosystem", and "digital transformation" are frequently operationalized differently across studies, reducing comparability and making synthesis vulnerable to construct overlap. Third, sustainability outcomes are often measured unevenly, sometimes focused on intentions, adoption of practices, or self-reported improvements rather than verified environmental and social impacts. These limitations imply that some reported effects may be context-dependent or partially driven by unobserved factors such as leadership quality, prior digital maturity, regulatory pressures, or industry turbulence. As a result, the findings should be interpreted as directional and explanatory rather than universally predictive.

Future research should prioritize stronger designs and clearer boundary conditions. Longitudinal and quasi-experimental studies are needed to test how specific ecosystem governance mechanisms and orchestration practices influence SME capability accumulation, business model innovation, and verified sustainability outcomes over time. Comparative research across ecosystem types would also be valuable, for example contrasting centralized platform ecosystems with more

distributed innovation networks, and testing when each structure best supports SME upgrading. Another high-impact agenda is measurement: developing harmonized indicators that jointly capture digital capability maturity, ecosystem position, value capture, and sustainability performance would improve cumulative theory building and allow more robust meta-analytic synthesis. Finally, researchers should examine underexplored contingencies, including sector differences, regional institutional settings, and the role of intermediaries and policy programs in reducing adoption costs and enabling interoperability. Collectively, these directions would strengthen the validity of future evidence and move the field toward more actionable guidance for SMEs and ecosystem orchestrators.

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