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Digital Technologies as Catalysts of Entrepreneurial Innovation: A CASP-Appraised Systematic Review of 2020–2025 Evidence

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Abstract

This study systematically reviews the role of digital technologies as catalysts for entrepreneurial innovation across diverse industrial and geographical contexts. The PRISMA framework guided the identification, screening, and appraisal of 120 peer-reviewed articles published between 2020 and 2025, using the Critical Appraisal Skills Programme (CASP). The 94 studies were assessed as strong or moderate, forming the evidence base for synthesis. The findings reveal six interrelated themes: (1) digital platforms and ecosystems, (2) data, artificial intelligence, and algorithms, (3) business models and value creation, (4) policy, regulation, and institutional frameworks, (5) adoption and diffusion, and (6) social impact and sustainability. Strongly appraised studies highlighted the transformative role of digital infrastructures in reshaping entrepreneurial opportunities, while moderately appraised studies pointed to methodological and contextual limitations that temper generalizability. However, geographic concentration in advanced economies, methodological reliance on cross-sectional designs, and fragmented conceptual frameworks constrain the evidence base. Future research should address these gaps through longitudinal, cross-contextual, and interdisciplinary approaches that incorporate ethical, sustainability, and inclusivity dimensions.

Keywords: digital entrepreneurship; innovation; digital platforms; entrepreneurial ecosystems

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INTRODUCTION

Building on the digital acceleration of the past decade, the discourse on the associative role of technology, entrepreneurship, and innovation has shifted from mere "tool adoption" to a more systemic understanding of the capabilities, networks, and institutions that enable the creation and diffusion of new value. The literature demonstrates that technology is not only an enabler that lowers transaction costs, but also a shaper of the competitive landscape through digital platforms, ecosystem architectures, and entirely new business logics. Within this framework, the definition of "technology entrepreneurship" itself is increasingly contested, as contemporary practices include the orchestration of digital assets, platform complements, and resource-pooling mechanisms (e.g., crowdfunding) that mediate the process of opportunity discovery and execution (Abubakre et al., 2021). Recent conceptual perspectives emphasize the need to broaden the lens beyond "tool acquisition" to measure platform capabilities, ecosystem configuration, and the cross-level effects of digital transformation on innovation outcomes and entrepreneurial performance (Abubakre et al., 2022).

Specifically, for small and medium-sized enterprises (SMEs), digital technology acts as an accelerator of business model innovation, capability reconfiguration, and the acceleration of the innovation cycle (AFAWUBO & NOGLO, 2022). Data-driven studies across various sectors show that SME participation in digital platforms is positively correlated with business model innovation and increased organizational agility; even cross-platform synergies have been shown to increase innovation speed when actors act as complementors within a larger ecosystem (Alaassar et al., 2020; AlAstal, 2023). Furthermore, platform capabilities, now measurable with valid instruments, influence innovation performance through resource orchestration and reconfigurability, while adoption factors such as top management support, digital culture, and trading partner pressure continue to determine the depth of transformation. This synthesis underscores that the impact of technology on SME innovation is uneven; it is mediated by the organization's ability to absorb, combine, and mobilize digital resources within an interdependent ecosystem context (Al-Maadeed & Yesuf, 2025; Alhadihaq et al., 2024).

At the ecosystem level, the literature has shifted from the “cluster” metaphor to the concept of digital entrepreneurial ecosystems (DEEs), which emphasize the role of platforms, standards, complementors, and governance in generating innovation opportunities and selecting. Recent systematic and narrative reviews map the components, trends, and latent themes of DEEs, including the previously overlooked “online” dimension of entrepreneurial ecosystems and the integration of the sharing economy as a source of new opportunities (Amuda & Alabdulrahman, 2024; Antonopoulou & Begkos, 2020; Arroyabe et al., 2024). This wave of research was followed by attention to “transformative innovation ecosystems” that combine desirability, viability, and social impact, as well as by city or regional case studies that highlight how actor and policy configurations generate knowledge-intensive dynamics over time (Arshad et al., 2025). Thus, technology not only transforms how entrepreneurs operate but also rewires relationships between actors (universities, corporations, startups, governments, communities) that collectively shape collective capacity for innovation (Baccarne et al., 2020; Baiyere et al., 2020; Bejjani et al., 2023; Belousova et al., 2023).

On the process and outcome side, empirical evidence shows that digital transformation drives efficiency, resilience, and sustainability, while opening new, more inclusive financing channels. For SMEs and micro-enterprises, post-pandemic digital strategies are closely linked to a

shift from survival to growth through a combination of digital strategy orientation, information technology investment, and process redesign; integrating digital transformation with the circular economy strengthens the impact of sustainable product or service innovation (Arshad et al., 2025; Cahyadi & Magda, 2021; Cearra et al., 2021). In emerging markets, crowdfunding platforms and digital marketplaces expand access to capital and markets, while SME coping practices on transaction platforms highlight the need for dynamic capabilities to navigate regulatory, rating, and information asymmetries (Arroyabe et al., 2024; Chaniago, 2023; Chebo & Dhliwayo, 2024). Overall, this trajectory of findings confirms that technology is changing not only costs and speed, but also the value logics and incentive structures that underpin sustainability-oriented entrepreneurship.

At the same time, recent literature highlights the heterogeneity of implementation contexts and tensions. In the healthcare industry, for example, technology-based entrepreneurship faces complex challenges of regulation, clinical validation, and social value; while in other regulated sectors, the maturity of innovation ecosystems is influenced by national cultures and governance mechanisms that mediate knowledge flows (Cosa, 2024; Crysdian, 2022). Even as digital transformation promises improvements in employee performance and well-being, recent research highlights the tensions and paradoxes that need to be managed, from the burden of organizational change to short-term versus long-term trade-offs to ensure that innovation truly creates sustainable value. An emerging research agenda is how to optimize ecosystem policies and practices so that entrepreneurs' digital capabilities can interact productively with social institutions and norms (Cuntz & Peuckert, 2023).

Conceptually, several recent reviews and special issues synthesize decades of research and call for a remapping of terminology and research priorities. Two points stand out. First, the contemporary field of “digital entrepreneurship” is fragmented across disciplines; multi-level integration is needed that encompasses micro (individual or organizational capabilities), medium (platform or complementary relationships), and macro (policy or ecosystem) mechanisms so that empirical evidence can be linked to cumulative theory. Second, research is beginning to move away from the social vs. technology dichotomy toward a "socio-tech entrepreneurship" framework that examines the co-evolution of digital artifacts, social values, and business models.

Building on the above critics, this article, "*Technology as a Catalyst for Entrepreneurial Innovation: A Systematic Literature Review*," positions the study to bridge two needs: (1) summarizing recent empirical findings on how technology shapes entrepreneurial processes, outcomes, and governance across various industrial and national contexts; and (2) constructing a conceptual framework that links digital capabilities, including platform capabilities, resource orchestration, and transformation strategies, with ecosystem and policy dynamics.

LITERATURE REVIEW

Digital technologies have fundamentally transformed innovation and entrepreneurial activity. In this context, digital entrepreneurship is broadly defined as the pursuit of new business opportunities through digital technologies. Innovation is any activity that adds value to a product or service, and digital innovation refers specifically to technological advancements (such as cloud services, mobile apps, or artificial intelligence) that create new value or markets. For entrepreneurs, digital tools such as platforms, social media, and e-commerce offer unprecedented reach and

efficiency, but also introduce new challenges. This review synthesizes current research on how digital technologies drive entrepreneurial innovation, highlighting key themes, theoretical perspectives, and empirical findings.

Conceptual Foundations of Digital Entrepreneurship

Digital entrepreneurship lies at the intersection of technology and business model innovation. Entrepreneurs create value using ICT, social media, mobile, or other digital platforms, leveraging digital affordances such as connectivity, data analytics, or platform APIs to disrupt traditional industries. Resource-based and knowledge-based views now consider digital capabilities like software, data, and networks as key firm assets, while entrepreneurship theories examine how opportunity recognition is enabled by digital information flows.

Digital innovation's impact on the economy is evident. ICT-driven innovation enhances productivity, competitiveness, and market growth, with Internet adoption lowering operational costs, improving customer engagement, and expanding market access. Such benefits show that digitalization developed entrepreneurial expansion into new domains, creating a positive feedback loop between innovation and business creation. However, the field remains conceptually fragmented. Much of the research lacks strong theoretical foundations, often focusing on isolated technologies rather than systematic theory. There is little consensus on how digital entrepreneurship differs from traditional ventures, and questions remain about how digital tools reshape opportunity discovery and firm performance. These gaps underscore the need for integrated models combining entrepreneurial ecosystem theory, platform theory, and institutional perspectives.

Digital Entrepreneurial Ecosystems and Platforms

An emerging theme is the digital entrepreneurial ecosystem, which defined furtherly as the socio-technical networks that enable digital ventures. Traditional ecosystem studies emphasized regional clusters, but digital infrastructure has redefined ecosystems that transcend geography and rely heavily on platforms. Digital platforms such as Amazon, Google, and blockchain networks provide boundary resources like APIs, data, and payment systems that allow startups to launch rapidly with limited capital. These platforms lower barriers to entry, make it easier to raise capital through mechanisms such as crowdfunding, and spread risk across multiple stakeholders. They provide small businesses and micro-entrepreneurs access to global markets without major infrastructure investment. Yet platforms also create vulnerabilities. Algorithm changes, regulatory shifts, or policy updates by dominant platforms can disrupt or even eliminate dependent business models. Entrepreneurs may invest heavily in a platform ecosystem only to face appropriation of their innovation by the platform itself. Thus, while platforms ease entry and growth, they also concentrate power among gatekeepers and alter value distribution. Entrepreneurs must navigate these dynamics strategically, often diversifying across multiple platforms or building alliances to reduce risk.

Digital Innovation Outcomes and Entrepreneurial Growth

Research consistently finds that digital technologies enhance innovation outcomes and entrepreneurial performance. Firms adopting ICT experience cost reductions, faster product development cycles, improved customer engagement, and greater market reach. Data-driven insights and connectivity allow entrepreneurs to personalize offerings and adapt more quickly to market needs. Digital platforms also facilitate resource recombination, enabling novel business models such

as subscription services, on-demand services, and sharing economy ventures. Business model innovation has become one of the most significant outputs of digital entrepreneurship.

Beyond firm performance, digital innovation contributes to broader societal goals. Sustainable entrepreneurship, enabled by digital tools, addresses social and environmental challenges. Digital technologies support inclusive stakeholder engagement, circular economy models, and environmentally responsible practices. In this sense, digital entrepreneurship is not only about profit but also about aligning with social and ecological value creation. However, outcomes remain contingent on context. National policies, regulatory environments, and regional support structures strongly influence whether digital adoption translates into an innovation. In some contexts, digital technologies provide measurable growth and productivity gains, while in others, weak infrastructure and institutional barriers limit their impact.

Human-Organizational Factors and Challenges and Critical Perspectives

Entrepreneurial orientation, which is the tendency to be innovative, proactive, and risk-taking; is essential in leveraging digital opportunities. Entrepreneurs with strong orientation are more likely to adopt new technologies and gain competitive advantage. Organizations need new competencies, such as digital literacy, agile management, and absorptive capacity, to make the most of digital tools.

In small and medium-sized enterprises, resilience strategies help balance the risks of adopting digital technologies. Education and training also critical in cultivating digital entrepreneurs. Programs that build digital literacy and management skills can accelerate adoption and improve innovation capacity. Challenges persist, however, including skill gaps, managerial resistance, and unsustainable strategies that prioritize rapid growth without proper governance. Theoretical frameworks must also adapt because traditional models do not always capture the nuances of digital entrepreneurship.

As the time goes by, digital entrepreneurship faces challenges such as resource constraints, regulatory barriers, and obsolescence risk. Obtaining funding for technology-intensive ventures is often difficult, while regulatory uncertainty around data, privacy, and platform policies creates additional costs. For smaller firms, high costs of adoption and integration. Obsolescence is another risk, as dependence on specific technologies or platforms can become a liability when those technologies are replaced or policy changes occur. Entrepreneurs must therefore build agility and dynamic capabilities to reconfigure resources as digital trends evolve. The field also suffers from theoretical immaturity. Many studies remain fragmented, focusing narrowly on specific tools or cases. There is a lack of systematic frameworks to explain the dynamics of digital entrepreneurship, and inconsistencies across findings highlight the need for integration and comparative approaches.

Literature Review Conceptual Matrix

Table 1. Conceptual Matrix of Variables, Dimensions, and Indicators

Variable (Construct)	Aspects / Dimensions	Indicative Measures / Indicators
Digital Technology Infrastructure	Connectivity, Access, Platform Availability	Internet penetration rate, broadband subscriptions per capita; platform usage metrics (e.g. number of active users on e-

		commerce/social platforms)
Digital Literacy / Skills	Technical proficiency, ICT training	% of population with ICT skills certification; entrepreneur ICT competence score; number of STEM graduates
Entrepreneurial Orientation (EO)	Innovativeness, Proactiveness, Risk-taking	Survey EO scales (e.g. Lumpkin-Dess EO questionnaire); share of firms launching new products/services; proportion of sales from new offerings
Innovation Capability	R&D intensity, Absorptive capacity, Business model innovation	R&D expenditure (% of sales or GDP); patent counts; presence of dedicated innovation teams; number of new digital business models implemented
Firm Performance	Growth, Productivity, Market Expansion	Revenue growth rate; return on assets (ROA); export/new market entry statistics; employment growth in digital ventures
Ecosystem Support	Finance, Policy, Networks, Culture	Venture capital investment per GDP; ease-of-doing-business or innovation index score; number of startup incubators/accelerators; regulatory quality index
Social/Environmental Impact	Sustainability orientation, social value	Number of social enterprises using digital tech; SDG-aligned business count; ESG (environmental, social governance) scores; community impact metrics
Platform Engagement	Boundary resources, Network externalities	Number of APIs/SDKs available; level of developer community activity; platform connectivity index; crowdfunding participation rate
Business Model Innovation	Platform-based models, Subscription, Sharing economy	Percentage of firms using subscription or platform-based models; incidence of peer-to-peer or on-demand service models; digital service revenue share
Regulatory and Institutional Context	E-readiness, Government support, Legal framework	Global e-Readiness Index; digital regulation index; public R&D funding for tech; availability of digital infrastructure subsidies

Theoretical Perspectives

The study of digital technology, innovation, and entrepreneurship needs a strong theoretical backbone that can keep up with the pace of change in today's fast-moving socio-technical systems.

While traditional entrepreneurship theories still matter, the theories often fall short when it comes to explaining the unique ways digital technologies create, transform, or even limit entrepreneurial opportunities. That's why more recent research has extended well-known perspectives like the Resource-Based View (RBV) and Dynamic Capabilities Theory into digital contexts.

The RBV emphasizes the value of resources that are rare, hard to imitate, and difficult to replace as a foundation for competitive advantage. In the digital world, these resources now include data, algorithms, digital infrastructure, and platform access. But unlike physical resources, digital assets can usually be copied or shared much more easily. As a result, the real advantage often lies in how entrepreneurs continuously configure and reconfigure these assets. This is where Dynamic Capabilities Theory becomes especially useful. Entrepreneurs and firms that can sense emerging digital opportunities, seize them quickly, and keep adapting to their resource base are the ones most likely to thrive in constantly shifting digital environments (Dana et al., 2024; Danilin, 2020).

Another valuable lens is Entrepreneurial Ecosystem Theory, which is increasingly being adapted to account for digital technologies (Díaz-Pelaez et al., 2025). Traditional views of ecosystems emphasized local networks and geographical proximity. But today, digital infrastructures allow ecosystems to stretch across borders, creating global, virtual, and platform-centered spaces. These digital ecosystems enable knowledge sharing, capital flows, and collaborative innovation, but they also introduce new dependencies particularly on powerful platform owners and intermediaries (Amuda & Alabdulrahman, 2024; Do et al., 2022). This dual nature of opportunity and risk is central to understanding entrepreneurship in digital networks.

Institutional Theory adds yet another important perspective. Regulations on data privacy, digital taxation, and platform governance can make or break entrepreneurial models. Cultural attitudes toward risk, technology, and innovation also shape how entrepreneurs embrace digital tools. Institutional contexts explain why digital entrepreneurship flourishes in some places but lags in others, even when the technology itself is widely available (Esposito et al., 2022; Flick et al., 2020). The theory also highlights how entrepreneurs must actively build legitimacy and trust in markets where uncertainty and information gaps run high (Ganotakis et al., 2021).

Platform Theory has become central as well, especially given the rise of platform-based entrepreneurship. Platforms connect multiple sides of a market and create powerful network effects that entrepreneurs can leverage. With boundary resources like APIs, toolkits, and shared data, platforms lower entry barriers and speed up innovation. At the same time, they introduce risks of dependency, lock-in, and power imbalances. (Gerhart & Feng, 2021) Entrepreneurs must make tough choices about whether to build on existing platforms, compete with them, or diversify across several ecosystems.

Innovation Diffusion Theory offers another angle, focusing on how entrepreneurs adopt and spread digital technologies. Adoption depends on factors such as relative advantage, compatibility, and complexity. In digital contexts, these dynamics are heightened: for instance, AI-powered tools may offer huge advantages, but their complexity often discourages smaller firms. The theory also sheds light on the widening gap between digital "early adopters" and laggards, raising concerns about inequality in who benefits from digital entrepreneurship (Ghosh et al., 2022; Gifford et al., 2021).

Finally, newer perspectives on sustainability and social entrepreneurship are increasingly relevant in digital spaces. Theories like the Triple Bottom Line and Stakeholder Theory are being applied to examine how digital entrepreneurs balance profit with social and environmental goals

(Gusenbauer & Haddaway, 2020). Initiatives such as platforms for the circular economy or inclusive entrepreneurship show that digital innovation can be about more than just financial gain, but also drive more sustainable, fair, and inclusive futures (Gyamerah et al., 2024; Haouel & Nemeslaki, 2024).

METHODS

Research Design

This study adopted a *systematic literature review* (SLR) approach to synthesize existing scholarly evidence on the role of digital technologies in fostering entrepreneurship and innovation. A systematic review was chosen because it allows for a structured, transparent, and replicable method of identifying, evaluating, and synthesizing the available body of knowledge, in contrast to narrative reviews which may be more subjective. The methodology was guided by the principles outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, which provides explicit guidance on documentation, inclusion and exclusion criteria, and evidence synthesis.

Search Strategy

A search strategy was employed to capture relevant publications across major academic databases known for peer-reviewed and high-impact outputs in business, management, and technology research. A structured search was conducted across ScienceDirect, Taylor & Francis Online, and Wiley Online Library. These publisher platforms were selected a priori because they provide searchable collections of peer-reviewed journals relevant to business, management, entrepreneurship, innovation, and digital transformation. The selection criteria included disciplinary relevance, breadth of journal coverage, Boolean search functionality, accessibility, and reproducibility. This selection was informed by recommendations that information sources for evidence synthesis should be evaluated according to their coverage and search-and-retrieval performance (Gusenbauer & Haddaway, 2020), while the reporting of information sources and search procedures followed the PRISMA-S guidelines (Rethlefsen et al., 2021). Nevertheless, other relevant publisher platforms, including SpringerLink, Emerald Insight, and SAGE Journals, were not included in the original search. Therefore, the possibility of source-coverage bias is acknowledged as a limitation of this review. The search was conducted in July–August 2025. Boolean operators and truncations were used to refine the scope of the search. The following search string was applied with adjustments as required by database-specific syntax.

1. “digital technology” OR “information technology” OR “emerging technology” OR “ICT”

AND

2. “entrepreneur” OR “new venture” OR “start-up” OR “entrepreneurial activity”

AND

3. “innovation” OR “business innovation” OR “technological innovation”

The time frame was limited to 2020 – 2025 to ensure that only the most recent and relevant literature reflecting current technological landscapes was included. Only articles published in English were considered, and search filters were applied to restrict results to peer-reviewed journal articles.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were established a priori to ensure transparency and replicability. Inclusion criteria:

1. Studies published between 2020 and 2025.
2. Empirical or conceptual research articles published in peer-reviewed journals.
3. Articles explicitly examining the intersection of digital technologies, entrepreneurship, and innovation.
4. Studies focusing on any geographical region or industry sector, as long as entrepreneurship and innovation were central outcomes.
5. Both qualitative and quantitative studies.

Exclusion criteria:

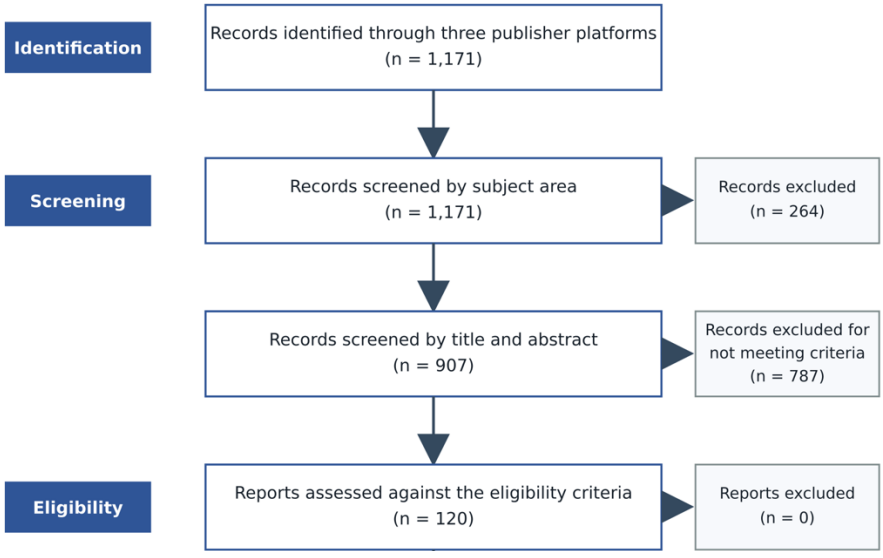
1. Articles published before 2020.
2. Grey literature, conference proceedings, book chapters, dissertations, or editorials.
3. Studies focusing solely on technology adoption without reference to entrepreneurship or innovation outcomes.
4. Duplicate publications across databases.
5. Non-English publications.

Screening and Selection Process

The screening process was carried out in three stages:

1. Initial identification: A total of 1,171 records were retrieved from the three databases after applying the search strategy.
2. Subject area screening: Two reviewers independently screened all the subject area to exclude clearly irrelevant studies. At this stage, 264 records were excluded.
3. Criteria review: The remaining 907 articles were assessed for eligibility against the inclusion and exclusion criteria. Following this step, 120 articles left.
4. Tittle-abstract review: At this stage, only 118 articles were retained for in-depth synthesis.

A PRISMA flow diagram was constructed to illustrate the search and screening process, ensuring transparency in the selection of final studies.



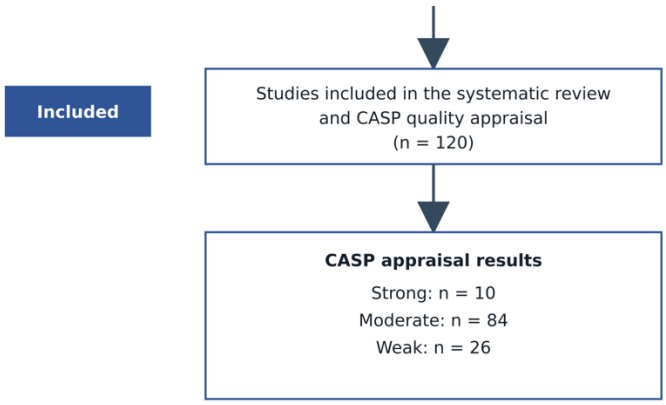


Figure 1. PRISMA flow diagram of the identification, screening, eligibility assessment, and inclusion of studies

To ensure consistency, a structured data extraction form was developed. For each article, the following information was recorded.

1. Bibliographic information (author, year, journal, country of study).
2. Research purpose and context.
3. Theoretical frameworks applied.
4. Research methodology (qualitative, quantitative, mixed-method).
5. Key variables investigated (type of digital technology, innovation outcomes, entrepreneurial outcomes).
6. Major findings and contributions.
7. Identified gaps or limitations.

The extracted data were coded using a thematic coding framework. Codes were initially generated inductively from the data and later organized deductively according to three central themes: (1) digital technologies as enablers of entrepreneurship, (2) digital technologies as drivers of innovation, and (3) integration of entrepreneurship and innovation in digital contexts.

Quality Assessment

To evaluate methodological rigor and reduce bias, a quality appraisal was conducted for all included studies. Empirical articles were assessed using criteria adapted from the Critical Appraisal Skills Programme (CASP), focusing on clarity of research objectives, appropriateness of methodology, transparency of data collection and analysis, and validity of conclusions. Conceptual papers were assessed based on theoretical contribution, coherence of arguments, and originality. Only studies meeting a minimum threshold of quality were retained.

Data Synthesis

The synthesis process followed a thematic synthesis approach. After data extraction, findings from individual studies were compared, contrasted, and organized into overarching themes. The goal was not only to summarize existing knowledge but also to identify patterns, contradictions, and knowledge gaps. This approach allowed the review to highlight both consensus and contestation within the literature, while also pointing to avenues for future research. The analysis produced three levels of synthesis:

1. Descriptive synthesis of study characteristics and contexts.

2. Analytical synthesis that grouped findings under thematic clusters.
Interpretative synthesis that generated new insights into how digital technologies are reshaping entrepreneurial and innovation dynamics.

RESULT

From the 120 screened references as seen in Figure 2, 94 were appraised as 'Strong' or 'Moderate' based on CASP criteria. These articles collectively represent the most informative subset for synthesizing evidence about digital technology, innovation, and entrepreneurship. The overall results of the CASP appraisal process reveal that most of the reviewed studies were assessed as having a moderate level of methodological rigor. As shown in the figure, a total of 84 studies fell into the moderate category, indicating that while they provided valuable insights, certain methodological limitations were present that warrant cautious interpretation. In contrast, only 10 studies were classified as strong, reflecting high methodological quality with minimal risk of bias. On the other end of the spectrum, 26 studies were appraised as weak, suggesting considerable limitations that may undermine the reliability of their findings.

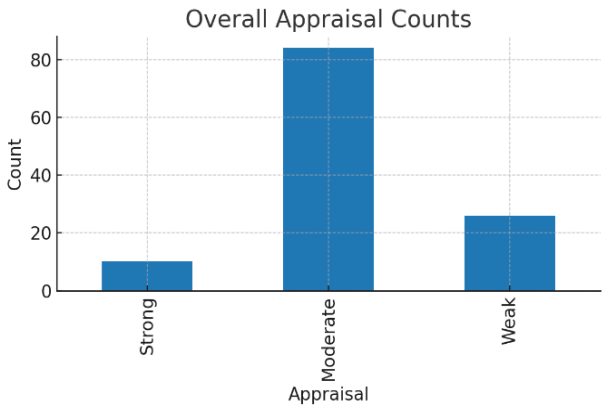


Figure 2. Distribution of overall CASP appraisal ratings across the reviewed studies

Thematic Analysis

The thematic synthesis produced six dominant and interrelated analytical themes, as documented in the coding audit trail presented in Table 2. These themes were not predetermined or based solely on the authors' interpretation. Instead, they emerged through line-by-line coding of the extracted findings, comparison and consolidation of recurrent codes, development of descriptive categories, and iterative refinement into higher-order analytical themes. The themes were retained because they appeared across multiple studies, were conceptually distinct, and directly addressed the research questions. The six themes comprised Digital Platforms and Ecosystems; Data, AI, and Algorithms; Business Models and Value Creation; Policy, Regulation, and Institutional Conditions; Adoption and Diffusion; and Social Impact and Sustainability.

Table 2. Audit Trail from Initial Codes to Final Analytical Themes

Initial codes	Descriptive category	Final analytical theme	Representative supporting studies

Digital platforms, APIs, platform governance, complementors, network effects	Platform infrastructure and ecosystem coordination	Digital Platforms and Ecosystems	Jiang et al. (2023); Wu et al. (2022); Xie et al. (2022)
Artificial intelligence, data analytics, algorithms, data governance, predictive systems	Data-driven entrepreneurial capabilities	Data, AI, and Algorithms	Masenya (2023); Segarra-Blasco et al. (2025)
Subscription models, sharing economy, value capture, service innovation, business model reconfiguration	Digitally enabled value creation	Business Models and Value Creation	Zhang et al. (2022); Xie et al. (2022); Wang and Chen (2024)
Regulation, institutional support, innovation policy, data privacy, governance	Institutional and regulatory environment	Policy, Regulation, and Institutional Conditions	Gifford et al. (2021); Kumar et al. (2021); Tkachenko et al. (2022)
Digital skills, leadership, organizational readiness, technology acceptance, diffusion barriers	Technology adoption and organizational readiness	Adoption and Diffusion	Modgil et al. (2022); Chaniago (2023); Nayak et al. (2025)
Inclusion, women-owned businesses, circular economy, environmental value, social innovation	Inclusive and sustainable entrepreneurship	Social Impact and Sustainability	Do et al. (2022); Kaihatu et al. (2024); Mets and Vettik-Leemet (2024); Neudert et al. (2024)

Digital Platforms & Ecosystems. This theme highlights the central role of digital infrastructure in enabling and structuring entrepreneurial ventures. A growing body of research emphasizes that platforms are not neutral intermediaries but active architects of innovation ecosystems. Studies explore how platform governance models affect participation, innovation incentives, and power distribution among actors. The design and availability of Application Programming Interfaces (APIs) are shown to be critical enablers of third-party innovation, allowing startups and SMEs to integrate, extend, and co-create value within larger digital infrastructures. Furthermore, the economics of multisided markets reveal how platforms balance competing demands from users, developers, and advertisers, often shaping entrepreneurial strategies around network effects and ecosystem lock-in. These insights underscore that entrepreneurship in the digital era is increasingly ecosystem-dependent, where success hinges not only on product quality but on the ability to navigate, contribute to, and benefit from platform-mediated environments.

Closely linked is the theme of Data, AI & Algorithms, which examines how data-driven technologies are redefining entrepreneurial capabilities and competitive advantage. Machine learning models and predictive analytics are increasingly used by startups to personalize offerings, optimize operations, and identify emerging market opportunities. However, the literature also cautions against technological optimism, revealing disparities in access to quality data and

algorithmic tools that can reproduce or even amplify inequalities. Issues of data governance such as ownership, consent, and bias in training datasets are shown to have direct implications for innovation legitimacy and scalability. Moreover, algorithmic management on gig and sharing platforms introduces new forms of control and precarity, raising ethical concerns about autonomy and fairness in digitally mediated work.

Business Models & Value Creation. The theme reflects a fundamental rethinking of how value is conceived, captured, and delivered in digital entrepreneurship. Traditional linear models are being replaced by dynamic, networked, and often platform-based approaches. Monetization strategies are increasingly tied to data flows, user engagement, and ecosystem participation rather than one-time transactions. For startups, innovation is no longer limited to product development but extends to business model experimentation, often supported by agile methodologies and rapid feedback loops.

Parallel to these technological and strategic shifts, the theme of Policy, Regulation & Institutional scope underscores the critical role of formal institutions in shaping the boundaries and opportunities for digital entrepreneurship. Regulatory frameworks around data privacy (e.g., GDPR), digital taxation, platform accountability, and antitrust enforcement are shown to significantly influence entrepreneurial entry, scalability, and risk-taking. In highly regulated sectors such as fintech, health tech, and mobility, startups must navigate complex compliance landscapes that can either stifle innovation or, when well-designed, provide trust and legitimacy. Moreover, platform governance emerges as a hybrid regulatory space where power, transparency, and fairness are continuously negotiated. This body of work calls for greater policy entrepreneurship: the proactive engagement of entrepreneurs, regulators, and civil society in co-designing rules that foster innovation while protecting public interest.

The fifth theme, Adoption & Diffusion, focuses on the organizational and behavioral dimensions of technology integration. Despite the availability of advanced tools, many firms (mostly SMEs) struggle with low adoption rates due to barriers such as lack of digital skills, financial constraints, and cultural resistance. Studies identify key drivers of technology uptake, including leadership commitment, employee training, and peer influence within industry networks. Diffusion patterns vary significantly across sectors and regions, with late adopters often facing a growing digital divide that limits their competitive potential.

Lastly, the theme of Social Impact & Sustainability reflects a growing tendency related to digital entrepreneurship. Scholars increasingly examine how digital innovations can contribute to inclusive growth, environmental sustainability, and societal well-being. Research on inclusive platforms explores how digital marketplaces can empower marginalized entrepreneurs, particularly in developing economies, by lowering entry barriers and expanding market access. At the same time, concerns about labor exploitation and digital inequality persist, calling for more equitable platform designs. Circular economy models (as the focus of sustainability) supported by digital tracking, sharing platforms, and product-as-a-service innovations are gaining traction among eco-conscious startups.

Related to study designs & methods, common methodological approaches include Trials/RCTs, Cohort/Longitudinal, Qualitative, Survey/Cross-sectional, and Review/Meta-analysis (detected via automated keyword matching). Moreover, the sample shows relatively strong reporting on several CASP items, such as Q2, Q9, and Q10 (see Figure 3).

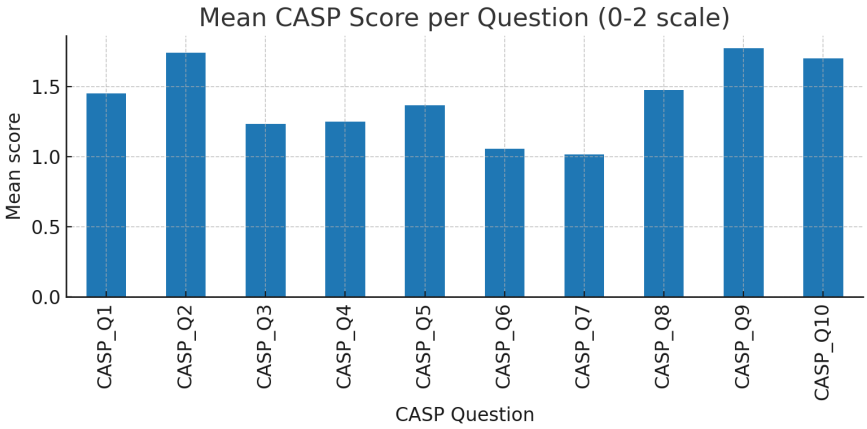


Figure 3. Mean score for each CASP questions

Areas with weaker reporting (more 'Cannot tell' or 'No') include reflexivity (Q6), ethical statements (Q7), and some sampling details (Q4). These gaps often relate to reflexivity, explicit ethical statements, and detailed sampling descriptions in abstracts.

Table 3. Distribution of CASP responses (n = 120)

Question	Frequency			Percentage		
	Confirmed	Equivocal	Rejected	Confirmed	Equivocal	Rejected
CASP_Q1 (Clear aims?)	54	66	0	45	55	0
CASP_Q2 (Appropriate methodology?)	89	31	0	74.2	25.8	0
CASP_Q3 (Research design appropriate?)	28	92	0	23.3	76.7	0
CASP_Q4 (Recruitment / sampling strategy?)	30	90	0	25	75	0
CASP_Q5 (Data collection rigorous?)	44	76	0	36.7	63.3	0
CASP_Q6 (Bias / reflexivity considered?)	7	113	0	5.8	94.2	0
CASP_Q7 (Ethical issues addressed?)	2	118	0	1.7	98.3	0
CASP_Q8 (Data analysis rigorous?)	57	63	0	47.5	52.5	0
CASP_Q9 (Clear statement of findings?)	93	27	0	77.5	22.5	0

CASP_Q10 (Value / contribution?)	84	36	0	70	30	0

What should be learned?

Digital platforms and related boundary resources (APIs, toolkits) are central enablers of entrepreneurial activity, so practitioners should prioritize platform interoperability and deliberate partnership strategies to capture complementary value (Hajli et al., 2025; Haslanger et al., 2023). Organizations that invest in data capabilities including analytics pipelines and algorithmic literacy are better positioned to generate actionable insights and scale digital business models, suggesting firms should build internal analytics capacity or strategic ties to analytics providers (Hermawan et al., 2021; Hermes et al., 2020). SMEs and female-owned enterprises can particularly leverage digital platforms to access markets and resources, but practical support (training, integration tools, financing) is needed to translate access into sustainable growth (Haslanger et al., 2023; Honglei et al., 2025). Policymakers should therefore adopt balanced regulation that protects privacy and competition while maintaining space for innovation (for example, rules on data governance and platform fairness), and couple regulation with capacity-building programs for smaller firms (Jemine et al., 2024; Jiang et al., 2023). Finally, public policy that encourages open data practices and interoperability standards can reduce entry barriers and support more equitable participation in digital ecosystems (Johansson & Karlsson, 2022; Kaihatu et al., 2024).

Gaps

There is a clear need for more longitudinal research that traces how firms' digital capabilities and platform relationships evolve over time, enabling causal insights into capability development and sustained competitive advantage (Koe et al., 2021). Comparative studies across institutional contexts (different regulatory regimes, cultural settings, and platform governance models) are needed to understand when and why similar technologies produce divergent entrepreneurial outcomes (Jemine et al., 2024; Koski & Järvensivu, 2010). Intervention and experimental designs (policy pilots, field trials of platform governance changes, or randomized support programs for SMEs) remain scarce and would help test what policy or managerial actions alter entrepreneurial performance (Kumar et al., 2021; Lamine et al., 2023). Methodological reporting gaps especially around sampling procedures, reflexivity, and ethical approvals were widespread in abstracts; future empirical work should improve transparency by clearly documenting sampling, study limitations, and any ethical review (Haslanger et al., 2023; Leitão et al., 2024; Liu et al., 2025). Finally, research that examines the social and sustainability implications of digital business models (for inclusion, labor, and environmental impacts) is necessary to move beyond narrow economic performance metrics (Honglei et al., 2025; Lotz et al., 2024).

DISCUSSION

Synthesis of Key Findings

The overall synthesis of the included studies highlights that the majority demonstrated moderate quality, while a smaller proportion were assessed as strong, and a notable minority were deemed weak. This distribution indicates that while the evidence base is generally reliable, there are variations in methodological rigor and reporting transparency. Studies with moderate appraisal

often provided valuable insights into emerging themes such as the role of digital innovation in organizational transformation (Mady et al., 2025), talent management in smart city ecosystems (Hermes et al., 2020), and entrepreneurial orientation in education (Mahmood & Arslan, 2020). However, limitations in sampling strategies, incomplete data reporting, and restricted contextual generalizability were common, leading to their moderate ranking. Strong studies, although fewer in number, tended to present clearer methodological approaches, robust theoretical grounding, and higher reproducibility of findings, as exemplified by research on institutional upgrading and global value chains (Johansson & Karlsson, 2022). Conversely, weakly appraised studies often suffered from insufficient methodological description or lack of alignment between research aims and findings, which reduces their utility in shaping broader theoretical or policy discussions. Taken together, the evidence points to a moderately robust knowledge base that provides meaningful insights but requires cautious interpretation, especially when extrapolating across diverse contexts.

Strongly appraised studies, although fewer in number, provided clearer evidence of how technology and entrepreneurship intersect in structurally embedded contexts. For instance, research on institutional upgrading within global value chains demonstrates how digital transformations not only enable process innovations but also reshape governance structures and international competitiveness (Johansson & Karlsson, 2022). These studies typically employed more rigorous designs (most reference combine case-based methods with longitudinal or comparative approaches) that allowed them to draw deeper causal inferences. Such work strengthens the argument that entrepreneurship in the digital era cannot be studied in isolation but must be situated within broader socio-technical systems. In contrast, weaker studies often exhibited a descriptive orientation without sufficient methodological grounding. For example, some offered promising insights into niche areas such as specific technological applications or local entrepreneurial practices but failed to adequately link empirical findings with theoretical frameworks, limiting their contribution to cumulative knowledge building (Hajli et al., 2025).

Another critical finding that emerges from the synthesis is the diversity of technological domains addressed within the entrepreneurship literature. While some studies focused heavily on digital platforms and online ecosystems as catalysts for entrepreneurial behavior (Mady et al., 2025), others highlighted enabling technologies in manufacturing and logistics that support innovation-led competitiveness (Leitão et al., 2024). A significant subset of research also explored the intersections of digital transformation with organizational culture, learning processes, and talent management, particularly in relation to smart cities and sustainability transitions (Hermes et al., 2020; Kaihatu et al., 2024). This breadth of technological focus enriches the field, suggesting that entrepreneurship in the contemporary era is highly multi-dimensional, shaped by digital affordances, policy contexts, and institutional arrangements. Yet this thematic diversity also poses challenges for synthesis, as the lack of standardized theoretical models and methodological comparability across studies contributes to heterogeneity in findings.

Finally, the synthesis reveals a recurrent emphasis on the contextual embeddedness of technological entrepreneurship. Studies conducted in emerging economies frequently highlighted the barriers posed by institutional voids, resource constraints, and regulatory uncertainty, while those in developed contexts emphasized opportunity creation, ecosystem orchestration, and global value chain upgrading (Hermawan et al., 2021; Jemine et al., 2024; Johansson & Karlsson, 2022). This divergence illustrates that while digital technologies are broadly recognized as enablers of innovation, their actual impact is mediated by context-specific institutional and cultural conditions.

Consequently, the predominance of moderately appraised studies suggests that while valuable insights exist, the field still requires stronger methodological designs that can bridge contexts and offer more generalizable conclusions. This highlights a future research agenda focused on comparative, cross-contextual analyses that are both methodologically robust and theoretically grounded.

Theoretical and Conceptual Implications

The reviewed literature collectively advances theoretical understandings of how digital technologies reshape entrepreneurship and innovation, yet it also reveals several conceptual blind spots that require critical attention. A first major implication concerns the role of technology as both a structural enabler and a dynamic mediator of entrepreneurial activity. Several studies have demonstrated that digital tools are not merely neutral instruments but rather transformative infrastructures that reconfigure entrepreneurial logics, network formation, and value creation mechanisms (Manríquez et al., 2022; Marchesani et al., 2023; Marso-Navarro & Berné-Manero, 2023). This recognition expands the dominant resource-based and capability-driven views of entrepreneurship by emphasizing the socio-technical embeddedness of innovation processes. Rather than viewing entrepreneurs as isolated actors who mobilize resources, these findings suggest that technological infrastructures themselves co-create entrepreneurial opportunities, reinforcing the need for theories that integrate institutional, technological, and behavioral perspectives.

A second conceptual implication is the growing recognition of ecosystem perspectives in theorizing digital entrepreneurship. Multiple studies emphasized that innovation and entrepreneurship flourish not through individual ventures alone but through networks, clusters, and ecosystems of actors interacting around digital platforms and infrastructures (Martini et al., 2023; Masenya, 2023; Mashavira, 2020). The ecosystem lens aligns with systems-of-innovation theories while pushing beyond traditional firm-centric views, illustrating how universities, policymakers, and industry players converge to create enabling environments. The presence of digital technologies accelerates ecosystem dynamics by lowering entry barriers, enhancing information flows, and facilitating co-creation between diverse stakeholders. Yet, despite the strong emphasis on ecosystems, several studies noted a lack of clear conceptualization regarding power asymmetries and governance mechanisms within these networks (Hermawan et al., 2021; Masele & Rwehikiza, 2024; Mets & Vettik-Leemet, 2024; Modgil et al., 2022). This reveals an urgent need to refine ecosystem theories by integrating insights from institutional economics and governance studies to better capture the uneven distribution of resources and influence in digital entrepreneurial contexts.

The findings also carry implications for theories of innovation management and organizational learning. Several contributions pointed to the ways digital transformation compels firms to adopt adaptive learning strategies, experiment with open innovation models, and embrace ambidexterity in balancing exploitation and exploration (Haslanger et al., 2023; Leitão et al., 2024; Nayak et al., 2025; Neudert et al., 2024; Nieto Cubero et al., 2021). Such insights highlight the limitations of linear innovation models, instead underscoring the iterative, networked, and uncertain character of digital-age entrepreneurship. Conceptually, this pushes scholarship toward embracing dynamic capabilities theory as a more suitable lens for understanding how entrepreneurs and firms navigate rapid technological shifts. At the same time, however, contradictions emerged: while some studies emphasized agility and fluidity, others pointed to institutional rigidities, legacy

systems, and path dependencies that constrained entrepreneurial innovation (Noor & et al., 2023; Ployhart, 2021; Pérez-Fernández et al., 2020). These tensions suggest that future theoretical work must grapple with paradoxes of stability versus change and continuity versus disruption in entrepreneurial ecosystems shaped by technology.

Another key implication arises for theories of institutional embeddedness and global value chains. Research demonstrated how digital technologies influence institutional upgrading, cross-border collaboration, and participation in global innovation systems (Koski & Järvensivu, 2010; Lamine et al., 2023; Poluan et al., 2024). From a conceptual standpoint, this extends institutional theory by highlighting the role of digital infrastructures in reshaping not only local entrepreneurial practices but also international competitiveness and governance architectures. However, divergences were observed in the way these processes unfold in different contexts: studies in advanced economies often framed digital entrepreneurship as opportunity-driven, whereas those in emerging markets highlighted persistent institutional voids and structural barriers (Kumar et al., 2021; Mets & Vettik-Leemet, 2024; Přívara et al., 2025; Rana et al., 2022). This comparative insight suggests that theoretical frameworks must account for contextual heterogeneity and avoid universalistic assumptions about the impacts of technology on entrepreneurship.

Lastly, the literature suggests conceptual implications for sustainability and societal transformation theories. A few studies connected digital entrepreneurship with sustainability transitions, circular economy practices, and inclusive innovation (Koe et al., 2021; Rethlefsen et al., 2021; SECUNDO et al., 2021). Such work expands entrepreneurial theory beyond its traditional focus on economic performance toward integrating social and environmental value creation. By embedding entrepreneurship within grand societal challenges, these contributions resonate with transition management and socio-technical transition theories. Yet the conceptual frameworks applied remain fragmented, with some studies privileging economic logics and others leaning toward normative visions of sustainability.

Practical and Policy Implications

The synthesis of the reviewed literature reveals several actionable insights that carry important implications for practice and policy in the fields of entrepreneurship, innovation, and digital transformation. At the practical level, the findings underscore the pivotal role of digital technologies in reshaping entrepreneurial processes, reducing entry barriers, and opening new market niches. Entrepreneurs are increasingly required to not only adopt digital tools but also to embed them into their business models as sources of agility and competitive advantage. Studies highlight how artificial intelligence, data analytics, and digital platforms enable firms to reach customers more effectively, streamline internal operations, and accelerate product development (Jemine et al., 2024; Jiang et al., 2023; Mady et al., 2025; Marchesani et al., 2023; Nieto Cubero et al., 2021). For practitioners, this means that technological literacy and continuous upskilling are no longer optional but rather integral to survival and growth. At the same time, entrepreneurs must remain mindful of technological path dependencies and integration challenges, as evidenced by cases where legacy systems hindered digital adoption (Marso-Navarro & Berné-Manero, 2023; Martini et al., 2023). From a policy perspective, the evidence underscores the need for governments to act as facilitators of digital entrepreneurial ecosystems. Multiple studies point to the importance of supportive policy frameworks that include financial incentives, incubators, infrastructure development, and legal reforms to accommodate new forms of digital business (Masele &

Rwehikiza, 2024; Masenya, 2023; Mashavira, 2020; Segarra-Blasco et al., 2025).

Emerging literature further reinforces that digital technologies reshape entrepreneurial practice and policy environments in profound ways. For instance, studies highlight that entrepreneurial firms leveraging digital innovation gain agility in responding to market turbulence and resource constraints (Setini et al., 2020; Setini et al., 2021). This underscores the need for policies that nurture experimentation and provide adaptive support mechanisms, ensuring that smaller firms are not disadvantaged in digital transformation. Similarly, work on digital capabilities demonstrates their direct contribution to enhanced business performance, particularly when firms integrate data-driven processes and platform strategies into their core models (Setini et al., 2020; Silagadze et al., 2024). Policymakers must therefore design targeted programs that not only provide funding but also cultivate the absorptive capacities of entrepreneurs, enabling them to effectively use and scale digital solutions. Furthermore, research shows that indigenous values and local practices can be harmonized with digital business models, creating inclusive entrepreneurial pathways that are both economically viable and socially embedded (Rana et al., 2022; Swanson, 2024). For practitioners, this highlights the importance of adapting digital strategies to local cultural logics rather than relying solely on standardized global templates. For policymakers, it suggests that support systems should emphasize localized incubation, capacity-building, and co-creation, especially in rural and underrepresented regions.

The literature also stresses the necessity of aligning entrepreneurial ecosystems with evolving technological trajectories. Studies reveal that highly supportive ecosystems (characterized by access to networks, mentorship, and digital infrastructure) significantly increase the likelihood of successful high-growth ventures (Tiwari et al., 2023; Tkachenko et al., 2022; Toan et al., 2021). Entrepreneurs should proactively engage with these ecosystems to leverage shared resources, while governments must create enabling conditions through cluster policies, collaborative platforms, and sustained investment in ecosystem governance. Weak ecosystems, conversely, risk leaving entrepreneurs isolated and unable to sustain innovation in the long term, particularly in resource-constrained economies (Troisi et al., 2023; Tsukanova et al., 2025).

Limitations of Evidence Base and Future Research Directions

Despite the growing body of scholarship on digital entrepreneurship and innovation, several limitations within the current evidence base temper the strength of conclusions and point toward promising future research directions. A recurrent limitation concerns the geographic concentration of studies. Much of the recent work remains centered on advanced economies, such as Europe, North America, and East Asia, where digital infrastructure and institutional frameworks are more developed (Van Meeteren et al., 2022; Vekic et al., 2020; Wang & Chen, 2024). This creates a skewed understanding of entrepreneurial dynamics, potentially neglecting unique challenges in emerging markets, such as infrastructural deficits, informal economies, or institutional voids. Future research should therefore extend empirical investigations to underexplored contexts in Africa, Latin America, and rural Asia to capture the heterogeneity of digital entrepreneurial realities.

Another limitation lies in the dominant reliance on cross-sectional and survey-based methodologies, which constrain insights into causality and the long-term impacts of digital transformation on entrepreneurship (Weimar et al., 2025; Windapo et al., 2020; Wu et al., 2022). Many studies assess short-term correlations between technology adoption and entrepreneurial outcomes, but rarely account for dynamic processes of scaling, adaptation, or failure. This points to

the need for more longitudinal and mixed-method approaches, combining quantitative tracking with ethnographic or case-based inquiry. Such designs could illuminate how entrepreneurs sustain innovation over time and under evolving technological and institutional pressures.

The evidence base also reveals thematic gaps. While topics such as platformization, AI-enabled business models, and ecosystem integration are increasingly studied (Neudert et al., 2024; Xie et al., 2022; Yao & Li, 2023), less attention has been devoted to ethical, environmental, and inclusivity dimensions of digital entrepreneurship. Questions around algorithmic bias, digital exclusion, and the sustainability trade-offs of rapid digitalization remain insufficiently addressed (Lotz et al., 2024; Yunanto et al., 2021). Future research must therefore broaden its scope beyond efficiency and growth outcomes, embedding perspectives from digital ethics, gender studies, and sustainability science.

Then, further weakness concerns fragmented conceptual frameworks. Although some contributions integrate ecosystem theory, institutional perspectives, and business model innovation, there is still limited theoretical convergence across the literature (Zaheer et al., 2019), this fragmentation complicates efforts to build cumulative knowledge and hinders comparative generalization. Scholars should work toward more integrative models that capture the interplay between technological affordances, institutional conditions, and entrepreneurial agency. In doing so, the field could progress toward a more robust and interdisciplinary theory of digital entrepreneurship.

CONCLUSION

This systematic literature review bridges two critical needs in the study of digital entrepreneurship and innovation. First, this study consolidates recent empirical findings on how digital technologies shape entrepreneurial processes, outcomes, and governance across a variety of industrial sectors and national contexts. The review demonstrates that technologies such as platforms, artificial intelligence, and advanced data systems not only expand market opportunities and innovation pathways but also restructure the mechanisms of entrepreneurial governance within ecosystems. Second, this study advances the field conceptually by constructing an integrative framework that links digital capabilities with broader ecosystem and policy. This perspective emphasizes that entrepreneurship in the digital era is not only a matter of firm-level adaptation but also a systemic phenomenon shaped by networked interactions, institutional frameworks, and regulatory regimes.

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