

Digitalization, Sustainability, and Entrepreneurial Resilience: An Integrative Conceptual Framework for Vulnerable Sectors

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Abstract: Digitalization has become a major driver of entrepreneurial transformation, enabling ventures to improve operational flexibility, information access, innovation capabilities, and responsiveness to external disruptions. These capabilities are particularly relevant in vulnerable sectors such as agriculture, agri-food, and the social and solidarity economy, which face persistent environmental, economic, technological, and institutional challenges. Although previous studies have examined the relationships between digitalization, sustainability, and resilience, these concepts have often been investigated separately. Consequently, the mechanisms through which digital capabilities contribute to sustainability-oriented entrepreneurial resilience remain insufficiently integrated within the existing literature (Miceli et al., 2021; Isensee et al., 2023; Avelar et al., 2024).

This conceptual study develops an integrative framework explaining how digitalization may contribute to entrepreneurial resilience through sustainability-oriented practices. Drawing on the literature on digital transformation, sustainable entrepreneurship, and organizational resilience, the framework identifies two complementary pathways. First, digitalization may directly contribute to entrepreneurial resilience by enhancing agility, coordination, information processing, market adaptation, and business continuity. Second, digitalization may indirectly contribute to resilience by facilitating resource efficiency, environmental responsibility, social inclusion, circular practices, and stakeholder engagement. Sustainability is therefore conceptualized as a theoretical mediating mechanism connecting digital capabilities with long-term entrepreneurial resilience (Ali et al., 2024; Li et al., 2025).

The proposed framework is contextualized within vulnerable Moroccan sectors, particularly agriculture, agri-food, and the social and solidarity economy. The study contributes to the literature by integrating previously fragmented research streams and formulating four theoretical propositions for future empirical validation. It also offers theoretical and practical implications for entrepreneurs, policymakers, and support institutions seeking to align digital transformation strategies with sustainability and resilience objectives in emerging economies (Nakpodia et al., 2024; Chen et al., 2025).

Keywords: Digitalization; Digital Transformation; Sustainable Entrepreneurship; Entrepreneurial Resilience; Sustainability-oriented Practices; Emerging Economies; Vulnerable Sectors.

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I. INTRODUCTION

Digitalization has become a major driver of entrepreneurial transformation, reshaping business models, operational processes, knowledge management, and competitive dynamics across industries. The rapid development of digital technologies, including artificial intelligence, big data analytics, cloud computing, and digital

platforms, has provided entrepreneurs with new capabilities to improve information access, innovation, operational flexibility, and strategic decision-making (Satalkina & Steiner, 2020; Arifin et al., 2023). Beyond technological modernization, digitalization increasingly represents a strategic capability that influences how entrepreneurial ventures identify opportunities, configure resources, interact

with stakeholders, and adapt to uncertain environments (Audretsch et al., 2024; Sadeghi et al., 2024).

However, the contribution of digitalization to entrepreneurship cannot be understood solely through the lens of efficiency, innovation, or competitive advantage. Contemporary entrepreneurial activities are increasingly confronted with complex challenges related to climate change, environmental degradation, resource scarcity, economic instability, and social inequalities. These challenges have strengthened the importance of sustainability-oriented entrepreneurship, which seeks to combine economic viability, environmental responsibility, and social value creation (Miceli et al., 2021; Avelar et al., 2024). In this perspective, digital capabilities may provide entrepreneurs with important resources for monitoring, coordinating, and improving sustainability-related practices, including resource efficiency, traceability, circular approaches, and stakeholder engagement (Ali et al., 2024; Chen et al., 2025).

At the same time, entrepreneurial resilience has emerged as a central concept for understanding how ventures anticipate, absorb, adapt to, and recover from disruptive events. Entrepreneurial resilience is no longer viewed only as the ability to survive crises but also as a dynamic capability involving learning, flexibility, resource reconfiguration, and strategic renewal (Isensee et al., 2023; Xia et al., 2024). In this regard, digitalization and sustainability-oriented practices may represent important foundations for developing resilient entrepreneurial systems by improving access to information, strengthening organizational adaptability, reducing vulnerabilities, and reinforcing stakeholder relationships (Sharma et al., 2024; Pennetta et al., 2025).

Despite growing interest in these three research streams, existing literature has often examined digital transformation, sustainable entrepreneurship, and entrepreneurial resilience as relatively separate fields. Studies on digitalization have mainly emphasized technological adoption, innovation, and organizational performance, while sustainability research has focused on responsible value creation and environmental or social outcomes. Similarly, resilience research has largely examined adaptation mechanisms following disruptive events. Consequently, the mechanisms through which digital capabilities can be transformed into sustainability-oriented practices and subsequently contribute to entrepreneurial resilience remain insufficiently integrated within the existing literature.

This conceptual fragmentation creates an important theoretical gap. Because digital resources must be actively mobilized and embedded within broader sustainability strategies before they yield sustainable or resilient outcomes, a better understanding is required regarding the pathways linking digital capabilities, sustainability-oriented practices, and entrepreneurial resilience. In particular, sustainability may represent a key mechanism through which digitalization contributes to long-term entrepreneurial

resilience by transforming technological resources into environmental, economic, and social capabilities.

This issue is particularly relevant in vulnerable sectors, where entrepreneurs operate under conditions characterized by resource constraints, environmental exposure, market uncertainty, and institutional challenges. Agriculture, agri-food, and the social and solidarity economy represent important examples of such contexts. Agricultural entrepreneurs face increasing pressures related to climate variability, water scarcity, and resource management. Agri-food ventures must address challenges associated with supply-chain coordination, traceability, efficiency, and sustainable production. Similarly, social and solidarity economy organizations seek to combine economic activities with social inclusion, community development, and stakeholder participation. In these sectors, the alignment between digital transformation and sustainability objectives may provide a valuable pathway toward strengthening entrepreneurial resilience (Nakpodia et al., 2024; Hazudin et al., 2025).

Within emerging economy contexts such as Morocco, these challenges are particularly significant. Entrepreneurs frequently face limited access to financial resources, digital infrastructure, technological competencies, and institutional support. Consequently, understanding how digital capabilities can be combined with sustainability-oriented practices to strengthen resilience represents an important research and practical issue. Rather than considering digitalization as an isolated technological investment, this study argues that digital transformation should be examined as part of a broader process of sustainable entrepreneurial development.

Therefore, this study aims to develop an integrative conceptual framework explaining the relationships among digitalization, sustainability-oriented practices, and entrepreneurial resilience. More specifically, the study seeks to achieve four objectives. First, it synthesizes existing literature on digital transformation, sustainable entrepreneurship, and entrepreneurial resilience. Second, it identifies the mechanisms through which digital capabilities may facilitate sustainability-oriented practices. Third, it examines how sustainability-oriented practices may contribute to entrepreneurial resilience. Fourth, it proposes a theoretical model explaining the direct and indirect pathways connecting digitalization, sustainability, and resilience.

➤ *Accordingly, this Study Addresses the Following Research Questions:*

- RQ1: How can digitalization contribute to the development of sustainability-oriented entrepreneurial practices?
- RQ2: Through which mechanisms can digital capabilities strengthen entrepreneurial resilience?
- RQ3: How do sustainability-oriented practices contribute to entrepreneurial resilience?

- RQ4: How can sustainability-oriented practices theoretically mediate the relationship between digitalization and entrepreneurial resilience?

This study provides three main contributions. First, it contributes theoretically by integrating three previously fragmented research streams: digital entrepreneurship, sustainable entrepreneurship, and entrepreneurial resilience. Second, it contributes conceptually by proposing a framework that distinguishes between a direct pathway linking digitalization to resilience and an indirect pathway operating through sustainability-oriented practices. Third, it provides practical implications for entrepreneurs, policymakers, and entrepreneurial support institutions seeking to align digital transformation strategies with sustainability and resilience objectives in vulnerable and emerging economy contexts.

The remainder of this paper is structured as follows. Section 2 reviews the literature on digitalization, sustainable entrepreneurship, and entrepreneurial resilience. Section 3 presents the conceptual review methodology adopted in this study. Section 4 develops the integrative conceptual framework and formulates the theoretical propositions. Section 5 contextualizes the framework within vulnerable Moroccan sectors. Section 6 discusses the theoretical and practical implications of the proposed framework. Finally, Section 7 presents the conclusion, limitations, and future research directions.

II. LITERATURE REVIEW

➤ *Digitalization in Entrepreneurship*

Digitalization refers to the integration of digital technologies into organizational processes, entrepreneurial activities, decision-making systems, and value-creation models. It extends beyond the simple conversion of analogue information into digital formats, as it involves changes in how entrepreneurs organize operations, interact with stakeholders, access markets, mobilize resources, and develop new business opportunities. Digital entrepreneurship consequently emerges from the interaction between entrepreneurial initiative and technologies such as information and communication technologies, digital platforms, cloud-based services, artificial intelligence, financial technologies, and data-driven decision systems (Sataikina & Steiner, 2020).

For entrepreneurs and small and medium-sized enterprises, digitalization can generate operational, informational, relational, and strategic benefits. At the operational level, digital tools can automate activities, reduce transaction costs, and improve the coordination of production and supply chains. At the informational level, they facilitate access to market intelligence, real-time data, and knowledge required for decision-making. At the relational level, online platforms and communication systems can strengthen connections with customers, suppliers, institutions, and entrepreneurial networks. Strategically, digitalization may enable business-model innovation, market expansion, and the rapid reconfiguration

of resources in response to changing conditions (Sadeghi et al., 2024; Autio et al., 2024).

These capabilities are particularly relevant in uncertain and resource-constrained environments. Digital technologies can allow entrepreneurs to maintain remote operations, diversify distribution channels, improve market visibility, and coordinate responses to external disruptions. In this respect, digitalization may contribute to entrepreneurial resilience by supporting organizational agility, information transparency, operational flexibility, and continuity during periods of crisis (Isensee et al., 2023; Audretsch et al., 2024). The use of digital marketing, cloud technologies, online sales systems, and digitally supported supply chains has also been associated with the capacity of SMEs to adapt their activities and maintain stakeholder relationships during disruptive events (Hokmabadi et al., 2024).

The realization of these benefits is nonetheless conditional. It depends on the availability of infrastructure, financial resources, digital competencies, organizational readiness, institutional support, and the entrepreneur's capacity to integrate technology into strategic processes. Unequal access to these conditions may create new forms of vulnerability, particularly among micro-enterprises and entrepreneurs operating in rural or informal contexts. Digitalization should therefore be understood as a capability whose effects are shaped by organizational and contextual conditions rather than as a universally beneficial technological solution (Arifin et al., 2023; Nakpodia et al., 2024).

From the perspective of this study, the relevance of digitalization lies not only in its direct contribution to efficiency and adaptability but also in its capacity to facilitate sustainability-oriented practices. Digital monitoring systems, resource-management applications, traceability technologies, collaborative platforms, and online stakeholder-engagement tools can support more responsible forms of environmental, economic, and social value creation. This connection provides the theoretical basis for examining sustainability as one of the mechanisms through which digitalization may contribute to long-term entrepreneurial resilience (Miceli et al., 2021; Avelar et al., 2024).

➤ *Sustainable Entrepreneurship: Concepts and Challenges*

Sustainable entrepreneurship refers to the identification, development, and exploitation of entrepreneurial opportunities that generate economic value while contributing to environmental protection and social well-being. Unlike conventional approaches that primarily emphasize profitability and business growth, sustainable entrepreneurship integrates economic viability, environmental responsibility, and social value creation into entrepreneurial decision-making. It therefore seeks to reconcile market-oriented objectives with broader societal and ecological concerns (Avelar et al., 2024).

The economic dimension of sustainable entrepreneurship concerns the ability of an enterprise to

maintain financial viability, create employment, manage risks, and generate sufficient resources for long-term continuity. The environmental dimension includes responsible resource utilization, waste reduction, pollution prevention, circularity, renewable inputs, and the adoption of environmentally responsible production processes. The social dimension involves employee well-being, equitable working conditions, stakeholder participation, community engagement, social inclusion, and the creation of benefits for local populations. The integration of these three dimensions distinguishes sustainable entrepreneurship from isolated environmental initiatives or short-term corporate responsibility activities (Ali et al., 2024; Chen et al., 2025).

Digitalization can facilitate the implementation of sustainability-oriented entrepreneurial practices. Data-based monitoring tools may help entrepreneurs track resource consumption, reduce waste, and identify inefficiencies. Digital platforms can improve supply-chain traceability, strengthen communication with stakeholders, facilitate access to sustainable markets, and support circular business models. Technologies such as sensors, mobile applications, cloud-based systems, and digital marketplaces may also enable entrepreneurs to develop green innovations and more inclusive forms of value creation (Miceli et al., 2021; Avelar et al., 2024).

Nevertheless, the transition toward sustainable entrepreneurial models remains constrained by several financial, technological, organizational, and institutional barriers. Micro-enterprises and SMEs may experience limited access to capital, insufficient technological infrastructure, inadequate sustainability competencies, regulatory uncertainty, and difficulties in obtaining reliable environmental information. These challenges are particularly pronounced in vulnerable sectors and developing economies, where entrepreneurs frequently operate under conditions of resource scarcity, market informality, climate exposure, and limited institutional assistance (Hazudin et al., 2025; Chen et al., 2025).

Sustainability should therefore not be understood only as an ethical or environmental objective. It may also constitute a strategic capability that helps entrepreneurs reduce their exposure to resource-related risks, strengthen relationships with stakeholders, enhance legitimacy, diversify sources of value, and improve long-term adaptability. From this perspective, sustainability-oriented practices can contribute to entrepreneurial resilience by creating economic, environmental, and social conditions that support continuity and renewal during periods of disruption (Miceli et al., 2021; Li et al., 2025).

➤ *Entrepreneurial Resilience: Dimensions, Determinants and Mechanisms*

Entrepreneurial resilience refers to the capacity of entrepreneurs and their ventures to anticipate disruptions, absorb their immediate effects, adapt organizational activities, maintain essential functions, and renew strategies in response to changing conditions. It extends beyond short-term survival or recovery because it also involves learning,

innovation, resource reconfiguration, and the development of new opportunities following adverse events (Pennetta et al., 2025; Xia et al., 2024).

In this study, entrepreneurial resilience is approached primarily as a venture-level capability rather than exclusively as an individual psychological characteristic. Although personal qualities such as perseverance, self-efficacy, and emotional adaptability may influence entrepreneurial behavior, resilience also depends on organizational resources, operational processes, stakeholder relationships, financial capacity, and strategic decision-making. This distinction is important because a resilient entrepreneur does not necessarily operate a resilient enterprise unless individual capabilities are translated into organizational practices and structures (Hokmabadi et al., 2024; Pennetta et al., 2025).

Entrepreneurial resilience can be understood through several complementary dimensions. Anticipatory capacity enables entrepreneurs to identify risks and prepare for potential disruptions. Absorptive capacity allows enterprises to maintain critical activities when a disruption occurs. Adaptive capacity concerns the ability to modify processes, products, markets, and resource configurations in response to changing conditions. Recovery capacity enables the restoration of operations, while renewal capacity involves learning from disruption and developing improved or innovative strategic orientations. Together, these dimensions explain how entrepreneurial ventures can preserve continuity while also transforming themselves in uncertain environments (Isensee et al., 2023; Xia et al., 2024).

The development of resilience depends on both internal and external determinants. Internal determinants include managerial competencies, financial flexibility, technological capabilities, organizational learning, innovation capacity, and strategic leadership. External determinants include access to entrepreneurial networks, institutional assistance, supply-chain relationships, community support, and the availability of financial and technological infrastructure. The interaction between these determinants influences the ability of entrepreneurs to mobilize resources, coordinate stakeholders, and implement adaptive responses during periods of disruption (Sharma et al., 2024; Hokmabadi et al., 2024).

Digitalization can strengthen entrepreneurial resilience by improving real-time access to information, operational coordination, communication, market diversification, and the reconfiguration of business processes. However, technological adoption alone may produce limited or temporary resilience if it is not integrated into responsible and sustainable organizational practices. Sustainability may complement digital capabilities by reducing resource dependence, improving stakeholder legitimacy, strengthening community relationships, and encouraging long-term value creation. This suggests that the relationship between digitalization and entrepreneurial resilience may operate through both a direct pathway and an indirect

pathway involving sustainability-oriented practices (Miceli et al., 2021; Li et al., 2025).

➤ *Integrating Digitalization, Sustainability, and Entrepreneurial Resilience*

The relationship between digitalization and sustainability has received increasing scholarly attention. Digital technologies can help entrepreneurs monitor resource consumption, optimize production, reduce waste, improve supply-chain traceability, and communicate environmental and social commitments to stakeholders. They can also support circular business models, collaborative consumption, inclusive market access, and environmentally responsible innovation. Digitalization may therefore provide entrepreneurs with the informational and operational capabilities required to implement sustainability-oriented practices more effectively (Ali et al., 2024; Avelar et al., 2024).

A second stream of research connects digitalization directly with entrepreneurial and organizational resilience. Digital platforms, data-processing systems, online communication tools, and digitally supported supply chains may improve the capacity of enterprises to detect changes, coordinate responses, maintain stakeholder relationships, and continue operating during disruptions. Digital capabilities can also facilitate the rapid reconfiguration of resources, diversification of distribution channels, and development of alternative business models (Isensee et al., 2023; Audretsch et al., 2024; Sharma et al., 2024).

A third body of literature highlights the relationship between sustainability and resilience. Environmental practices can reduce dependence on scarce resources and

limit exposure to ecological risks. Economic sustainability can strengthen financial stability and continuity, while social sustainability can reinforce stakeholder trust, employee engagement, community legitimacy, and access to collaborative networks. Sustainability-oriented practices may consequently help entrepreneurial ventures absorb disruptions, maintain essential activities, and adapt to changing environmental and socioeconomic conditions (Miceli et al., 2021; Li et al., 2025).

Although these pairwise relationships have been examined in previous research, they have not always been integrated into a single explanatory framework. Digitalization research frequently emphasizes innovation, efficiency, agility, and technological transformation. Sustainable entrepreneurship research generally concentrates on responsible value creation and environmental or social performance, while resilience research focuses on adaptation, continuity, recovery, and renewal. This conceptual separation limits understanding of how digital capabilities can be transformed into sustainability-oriented practices and how these practices can subsequently contribute to entrepreneurial resilience (Miceli et al., 2021; Avelar et al., 2024; Li et al., 2025).

The central argument of this study is therefore that digitalization contributes to entrepreneurial resilience through two complementary pathways — one direct and one operating indirectly through sustainability-oriented practices. These pathways are developed formally in Section 4. By integrating them, the proposed framework offers a more comprehensive explanation of sustainable entrepreneurial resilience in vulnerable sectors and establishes a foundation for future empirical testing.

Table 1 Synthesis of the Main Research Streams and Conceptual Gaps

Research Stream	Main Contributions	Remaining Conceptual Limitation	Representative Sources
Digitalization and entrepreneurship	Digital technologies support innovation, operational efficiency, market access, information processing, and business-model transformation.	Digitalization is frequently examined as a determinant of performance without sufficient attention to its sustainability-oriented mechanisms.	(Satalkina & Steiner, 2020; Sadeghi et al., 2024; Autio et al., 2024)
Digitalization and resilience	Digital capabilities improve agility, coordination, resource reconfiguration, crisis response, and business continuity.	Resilience is often treated as a direct outcome of digital adoption, while the mechanisms producing long-term resilience remain insufficiently explained.	(Isensee et al., 2023; Audretsch et al., 2024; Hokmabadi et al., 2024)
Sustainable entrepreneurship	Sustainable entrepreneurship integrates economic viability, environmental responsibility, and social value creation.	This literature does not always explain how digital capabilities facilitate the implementation of sustainability-oriented practices.	(Avelar et al., 2024; Ali et al., 2024; Chen et al., 2025)
Sustainability and resilience	Sustainability can reduce resource dependence, strengthen stakeholder legitimacy, and improve long-term adaptive capacity.	The mediating role of sustainability between digitalization and entrepreneurial resilience remains underdeveloped, particularly in vulnerable sectors.	(Miceli et al., 2021; Sharma et al., 2024; Li et al., 2025)
Integrated digitalization–sustainability–resilience perspective	The three constructs can be connected through direct and indirect pathways that explain sustainable entrepreneurial resilience.	Further conceptual integration and future empirical validation are needed in emerging economies and resource-constrained entrepreneurial contexts.	(Miceli et al., 2021; Nakpodia et al., 2024; Li et al., 2025)

Source: Authors' Synthesis Based on the Reviewed Literature.

III. CONCEPTUAL REVIEW METHODOLOGY

➤ Review Design

This study adopts an integrative conceptual review approach to examine the relationships among digitalization, sustainability-oriented practices, and entrepreneurial resilience. An integrative review is appropriate when a research field is conceptually fragmented and the objective is to combine complementary perspectives, identify theoretical connections, and develop a framework that extends existing knowledge (Torraco, 2005; Snyder, 2019). Unlike a systematic review or meta-analysis, this approach does not seek to provide an exhaustive statistical account of all publications in the field. Instead, it aims to synthesize theoretically relevant contributions and organize them into a coherent conceptual explanation.

The review was structured around three principal research streams. The first concerns digitalization and its contribution to entrepreneurial activities, organizational adaptation, and business continuity. The second examines the role of digital technologies in facilitating sustainability-oriented practices, including resource efficiency, circularity, environmental responsibility, stakeholder engagement, and social inclusion. The third focuses on entrepreneurial and organizational resilience, particularly the mechanisms that allow ventures to anticipate disruptions, absorb their effects, adapt their operations, recover, and renew their strategies.

Bringing these research streams together makes it possible to examine the relationships among the three central constructs and to distinguish the direct and indirect pathways that are developed formally in Section 4.

➤ Literature Identification Strategy

Relevant publications were identified through an iterative and purposive literature search using Google Scholar as the principal discovery source. This identification strategy was selected because the study seeks to integrate theoretically relevant publications from several interconnected research areas rather than conduct an exhaustive bibliometric or systematic review. The search focused on publications addressing digitalization, sustainable entrepreneurship, and entrepreneurial resilience in organizational, SME, and emerging-economy contexts.

The search was guided by combinations of keywords related to the three central constructs. The principal terms included “digitalization,” “digital transformation,” “digital entrepreneurship,” “digital resilience,” “sustainable entrepreneurship,” “sustainability practices,” “entrepreneurial resilience,” “organizational resilience,” “SME resilience,” “emerging economies,” and “vulnerable sectors.” Pairwise combinations were also used to capture publications examining the relationships between digitalization and sustainability, digitalization and resilience, and sustainability and resilience.

The literature search was complemented by backward reference examination. The reference lists of relevant

publications were reviewed to identify additional theoretical and empirical contributions connected to the research questions. Particular attention was given to publications examining SMEs, entrepreneurship, digital transformation, sustainable value creation, organizational adaptation, business continuity, and resilience in crisis-prone or resource-constrained environments.

The review primarily considered publications issued between 2020 and 2025 to reflect recent developments in research on digitalization, sustainability, and entrepreneurial resilience. Two earlier methodological publications were retained because they provide established guidance for designing and reporting integrative conceptual literature reviews (Torraco, 2005; Snyder, 2019).

➤ Literature Selection Criteria

Publications were retained when they provided a direct theoretical or empirical contribution to at least one of the relationships examined in this study. Eligible publications addressed digitalization in entrepreneurial or SME contexts, the contribution of digital technologies to sustainability-oriented practices, the determinants and mechanisms of entrepreneurial or organizational resilience, or the relationships among digitalization, sustainability, adaptation, and business continuity.

Priority was given to peer-reviewed journal articles focusing on entrepreneurship, SMEs, digital transformation, sustainable entrepreneurship, organizational adaptation, vulnerable sectors, emerging economies, or crisis-prone environments. Conceptual articles and literature reviews were also retained when they contributed to the definition of the constructs, the identification of explanatory mechanisms, or the development of the proposed framework. Selected working papers and conference publications could be retained when they provided relevant contextual or theoretical insights not sufficiently addressed in the journal-based literature.

Publications were excluded when they focused exclusively on the technical characteristics of digital technologies without considering entrepreneurial or organizational implications. Studies addressing sustainability without a meaningful connection to entrepreneurship, digitalization, adaptation, or resilience were also excluded. Publications that did not provide sufficient conceptual relevance to the research questions or lacked adequate bibliographic information were not retained.

The selection process was guided by theoretical relevance rather than exhaustive coverage. This principle is consistent with the purpose of an integrative conceptual review, in which publications are selected according to their capacity to clarify constructs, reveal relationships, identify explanatory mechanisms, and contribute to theory development (Torraco, 2005; Snyder, 2019).

➤ *Composition of the Conceptual Corpus*

The final conceptual corpus comprised 32 publications. Thirty publications provided substantive theoretical or empirical insights into digitalization, sustainable entrepreneurship, entrepreneurial resilience, SMEs, and vulnerable entrepreneurial contexts. Two additional publications provided the methodological foundations for conducting and reporting the integrative conceptual review (Torraco, 2005; Snyder, 2019).

The substantive publications were organized into four analytical categories. The first category concerned digitalization and entrepreneurship, including innovation, market access, operational efficiency, digital capabilities, and business-model transformation. The second addressed the contribution of digital technologies to organizational adaptation, crisis response, and resilience. The third examined sustainable entrepreneurship and the environmental, economic, and social dimensions of sustainability-oriented practices. The fourth explored the contribution of sustainability to adaptability, stakeholder legitimacy, business continuity, and long-term resilience.

Several publications contributed to more than one category because they examined interactions among digitalization, sustainability, and resilience. These overlapping contributions were particularly important for identifying the mechanisms connecting the three constructs and developing the integrative framework.

The corpus was not intended to represent an exhaustive or statistically generalizable inventory of all publications in the field. Its purpose was to provide a theoretically relevant foundation for connecting previously fragmented research streams and formulating propositions that can subsequently be tested through empirical research.

➤ *Analytical and Conceptual Synthesis*

The selected publications were examined through a thematic conceptual synthesis. For each publication, the analysis considered the principal construct examined, the theoretical contribution, the organizational or sectoral context, the mechanisms identified, and the relevance of the publication to the proposed relationships. This process made it possible to compare findings and arguments across the digitalization, sustainable entrepreneurship, and resilience literature.

The first stage of the synthesis involved classifying the publications according to their principal research stream. The second stage identified recurring mechanisms associated with digitalization, including information access, operational coordination, market diversification, stakeholder communication, resource reconfiguration, and business continuity. It also identified sustainability-related mechanisms such as resource efficiency, circularity, environmental responsibility, social inclusion, stakeholder legitimacy, and community engagement. The resilience-related mechanisms included anticipatory capacity, shock absorption, adaptation, recovery, organizational learning, and strategic renewal.

The third stage examined the theoretical connections among these mechanisms. Digitalization was conceptualized as a set of informational, operational, relational, and strategic capabilities that can directly enhance entrepreneurial resilience. Sustainability-oriented practices were conceptualized as mechanisms that translate digital capabilities into more responsible and durable forms of economic, environmental, and social value creation. Entrepreneurial resilience was subsequently conceptualized as the venture-level capacity to anticipate disruptions, maintain essential activities, adapt resources and operations, recover, and pursue strategic renewal.

In the final stage, these relationships were integrated into a unified conceptual framework. Particular attention was given to distinguishing the direct pathway linking digitalization to entrepreneurial resilience from the indirect pathway operating through sustainability-oriented practices. The resulting framework provides the foundation for the theoretical propositions developed in the following section and establishes a research agenda for future empirical validation.

IV. INTEGRATIVE CONCEPTUAL FRAMEWORK AND THEORETICAL PROPOSITIONS

➤ *Theoretical Foundations of the Framework*

The proposed framework draws on three complementary theoretical perspectives: digital transformation, sustainable entrepreneurship, and entrepreneurial resilience. Their integration provides a foundation for explaining how technological capabilities can be converted into sustainability-oriented practices and, subsequently, into more durable forms of entrepreneurial adaptation and continuity.

The digital transformation perspective explains how digital technologies can reshape organizational processes, value-creation models, stakeholder relationships, and entrepreneurial decision-making. Digitalization provides informational, operational, relational, and strategic capabilities that enable entrepreneurs to identify changes, coordinate activities, access markets, and reconfigure resources. These capabilities can improve organizational agility and support rapid responses to environmental and economic disruptions (Sataalkina & Steiner, 2020; Sadeghi et al., 2024; Audretsch et al., 2024).

The sustainable entrepreneurship perspective emphasizes the simultaneous creation of economic, environmental, and social value. From this perspective, entrepreneurial performance cannot be evaluated exclusively through profitability or growth. It must also consider resource efficiency, environmental responsibility, circularity, stakeholder well-being, social inclusion, and contributions to local communities. Digital technologies may facilitate these practices by improving monitoring, traceability, communication, knowledge access, and resource coordination (Avelar et al., 2024; Ali et al., 2024; Chen et al., 2025).

The entrepreneurial resilience perspective focuses on the ability of entrepreneurs and their ventures to anticipate disruptions, absorb their immediate consequences, adapt organizational activities, recover essential functions, and renew strategies. Resilience is therefore understood as a dynamic capability involving learning, flexibility, resource reconfiguration, stakeholder coordination, and strategic renewal rather than simple resistance to change (Isensee et al., 2023; Xia et al., 2024; Pennetta et al., 2025).

The integration of these perspectives suggests that digitalization does not automatically generate sustainable or resilient outcomes. Digital capabilities constitute enabling resources, but their long-term contribution depends on how entrepreneurs deploy them. When digital technologies are used to support responsible resource management, environmental monitoring, circular processes, stakeholder engagement, and social inclusion, they may generate forms of resilience that are not only reactive but also sustainable over time (Miceli et al., 2021; Sharma et al., 2024; Li et al., 2025).

The framework consequently distinguishes three central constructs. Digitalization represents the enabling technological capabilities. Sustainability-oriented practices represent the mechanisms through which these capabilities are translated into economic, environmental, and social value. Entrepreneurial resilience represents the resulting capacity to maintain continuity, adapt to disruption, and pursue strategic renewal. The following subsections explain the relationships among these constructs and formulate the corresponding theoretical propositions.

➤ *Digitalization and Sustainability-Oriented Practices*

Digitalization can facilitate sustainability-oriented entrepreneurship by providing the informational and operational capabilities required to monitor resources, coordinate activities, improve traceability, and identify environmental or social inefficiencies. Technologies such as digital platforms, sensors, data-management systems, cloud-based applications, and online communication tools can help entrepreneurs integrate sustainability considerations into their decisions and operating processes (Satalkina & Steiner, 2020; Avelar et al., 2024).

From an environmental perspective, digital technologies may support the monitoring of energy, water, raw materials, emissions, and waste. Access to more accurate and timely information can help entrepreneurs optimize resource utilization, reduce unnecessary consumption, improve production planning, and implement circular practices. Digital traceability systems may also increase supply-chain transparency and facilitate the identification of environmentally responsible suppliers and production methods (Ali et al., 2024; Miceli et al., 2021).

Digitalization may also contribute to the economic dimension of sustainability. Online marketplaces, digital payment systems, supply-chain platforms, and data-driven decision tools can reduce transaction costs, improve access to customers, strengthen operational efficiency, and support

the financial viability of entrepreneurial ventures. These capabilities are particularly relevant for SMEs and micro-enterprises operating under conditions of limited resources and market uncertainty (Arifin et al., 2023; Chen et al., 2025).

From a social perspective, digital platforms can facilitate communication with employees, customers, suppliers, communities, and support institutions. They may improve access to training, enable stakeholder participation, support inclusive entrepreneurial initiatives, and increase the visibility of women-led, youth-led, rural, or community-based enterprises. Digitalization can therefore contribute to forms of value creation that combine economic viability with environmental responsibility and social inclusion (Awad & Martín-Rojas, 2024; Nakpodia et al., 2024).

However, these benefits are not automatic. Their realization depends on digital competencies, access to infrastructure, organizational readiness, financial resources, and the capacity to align technological investments with sustainability objectives. Despite these contextual conditions, the literature suggests that digital capabilities provide an important foundation for adopting and strengthening sustainability-oriented entrepreneurial practices.

- *Proposition 1 (P1): Digitalization Facilitates the Adoption and Development of Sustainability-Oriented Entrepreneurial Practices.*

➤ *Digitalization and Entrepreneurial Resilience*

Digitalization can directly contribute to entrepreneurial resilience by strengthening the ability of ventures to anticipate change, coordinate responses, maintain essential operations, and adapt their business models. Access to real-time information allows entrepreneurs to detect emerging threats, understand changes in demand, monitor supply-chain disruptions, and make more informed decisions under uncertain conditions. Digital capabilities can therefore improve both anticipatory and adaptive capacity (Isensee et al., 2023; Sadeghi et al., 2024).

Digital technologies may also support operational continuity during periods of disruption. Cloud-based systems, digital payment solutions, online communication platforms, and remote working tools can allow entrepreneurial ventures to continue essential activities when conventional operating channels become unavailable. Digital supply-chain and inventory-management systems can further improve coordination with suppliers and reduce delays in the allocation of resources (Hokmabadi et al., 2024; Sharma et al., 2024).

Another resilience mechanism concerns market diversification. Digital platforms and online marketing tools can enable entrepreneurs to access new customers, reduce dependence on a single geographical market, and develop alternative distribution channels. This diversification may reduce exposure to localized shocks and improve the capacity of entrepreneurial ventures to maintain revenue-

generating activities during periods of economic or market instability (Arifin et al., 2023; Audretsch et al., 2024).

Digitalization can also facilitate organizational learning and strategic renewal. The collection and analysis of information concerning customers, operations, competitors, and market trends can help entrepreneurs evaluate previous responses and redesign products, services, or business models. Resilience therefore involves not only the restoration of pre-disruption activities but also the ability to learn from disruption and pursue new entrepreneurial opportunities (Kumar et al., 2024; Xia et al., 2024).

The contribution of digitalization nonetheless depends on the entrepreneur's capacity to mobilize digital resources, develop appropriate competencies, protect critical information, and integrate technology into organizational strategy. When these conditions are present, digital capabilities may strengthen anticipation, shock absorption, adaptation, continuity, and strategic renewal.

- *Proposition 2 (P2): Digitalization Directly Strengthens Entrepreneurial Resilience by Enhancing Information Access, Operational Coordination, Market Diversification, Business Continuity, and Strategic Adaptability.*

➤ *Sustainability-Oriented Practices and Entrepreneurial Resilience*

Sustainability-oriented practices can strengthen entrepreneurial resilience by reducing exposure to environmental, economic, and social vulnerabilities. These practices encourage entrepreneurs to manage resources responsibly, develop stable stakeholder relationships, diversify sources of value, and adopt a longer-term orientation. Sustainability can therefore function as a strategic capability that supports continuity and adaptation rather than exclusively as an ethical or environmental commitment (Miceli et al., 2021; Li et al., 2025).

Environmental sustainability contributes to resilience by improving resource efficiency and reducing dependence on scarce or unstable inputs. Practices involving energy efficiency, water conservation, waste reduction, recycling, renewable resources, and circular production can lower operating costs and limit vulnerability to resource shortages or environmental disruptions. This contribution is particularly important in sectors exposed to climate variability and natural-resource constraints (Avelar et al., 2024; Ali et al., 2024).

Economic sustainability concerns the capacity of an entrepreneurial venture to maintain financial viability, manage risks, preserve productive resources, and invest in adaptation. Enterprises with more efficient processes, diversified markets, responsible cost structures, and longer-term financial strategies may be better positioned to absorb disruptions and maintain critical activities. Economic sustainability consequently reinforces the financial and operational foundations of entrepreneurial resilience (Astuty et al., 2024; Sudirman et al., 2025).

Social sustainability may strengthen resilience through employee engagement, stakeholder trust, community legitimacy, inclusive practices, and collaborative networks. Strong relationships with employees, suppliers, customers, local communities, and support institutions can provide entrepreneurs with information, resources, legitimacy, and assistance during periods of disruption. These relational resources are particularly relevant for cooperatives, social enterprises, women-led ventures, and community-based organizations (Awad & Martín-Rojas, 2024; Hazudin et al., 2025).

The three dimensions of sustainability are complementary. Environmental practices reduce exposure to ecological and resource-related risks, economic practices strengthen operational viability, and social practices reinforce the stakeholder relationships required for collective adaptation. Their interaction may enable entrepreneurial ventures to absorb shocks, maintain continuity, adapt their activities, and renew their strategies more effectively.

- *Proposition 3 (P3): Sustainability-Oriented Practices Strengthen Entrepreneurial Resilience by Reducing Resource Vulnerability, Supporting Economic Continuity, Reinforcing Stakeholder Relationships, and Enhancing Long-Term Adaptive Capacity.*

➤ *The Mediating Role of Sustainability-Oriented Practices*

Digitalization may strengthen entrepreneurial resilience directly, but part of its contribution can also operate through the sustainability-oriented practices enabled by digital capabilities. Technologies provide entrepreneurs with information, coordination mechanisms, monitoring systems, and communication channels. However, these technological resources produce more durable outcomes when they are translated into responsible resource management, circular processes, stakeholder engagement, social inclusion, and long-term value creation (Miceli et al., 2021; Avelar et al., 2024).

The proposed mediation mechanism begins with the capacity of digitalization to facilitate sustainability-oriented practices. Digital monitoring systems can improve resource efficiency, traceability technologies can reinforce responsible supply-chain management, and online platforms can enhance stakeholder participation and inclusive market access. These practices subsequently reduce exposure to resource shortages, improve operational efficiency, strengthen stakeholder legitimacy, and reinforce community relationships. Through this sequence, sustainability-oriented practices convert digital capabilities into environmental, economic, and social foundations for entrepreneurial resilience (Ali et al., 2024; Li et al., 2025).

This indirect pathway complements rather than replaces the direct relationship between digitalization and resilience. Digital technologies may directly support short-term agility, coordination, market diversification, and operational continuity. Sustainability-oriented practices may extend this contribution by creating the conditions required

for longer-term adaptability, stakeholder support, and strategic renewal. The framework therefore distinguishes immediate technology-enabled resilience from sustainability-oriented resilience developed through responsible and durable organizational practices (Isensee et al., 2023; Sharma et al., 2024).

The mediating mechanism is particularly relevant in vulnerable sectors, where technological adoption alone may be insufficient to address persistent environmental, financial, institutional, and social constraints. In these contexts, the alignment of digital capabilities with sustainability objectives may help entrepreneurs transform short-term technological advantages into more stable and contextually embedded resilience capacities (Nakpodia et al., 2024; Chen et al., 2025).

- **Proposition 4 (P4): Sustainability-Oriented Practices Mediate the Relationship Between Digitalization and Entrepreneurial Resilience by Translating Digital Capabilities into Resource Efficiency, Economic Continuity, Stakeholder Legitimacy, Social Inclusion, and Long-Term Adaptive Capacity.**

➤ Integrated Conceptual Model

The proposed model integrates digitalization, sustainability-oriented practices, and entrepreneurial resilience within a unified conceptual structure. Digitalization represents the enabling capabilities that improve information access, operational coordination, stakeholder communication, market connectivity, and

strategic decision-making. Sustainability-oriented practices represent the environmental, economic, and social mechanisms through which digital capabilities can be transformed into responsible and durable value creation. Entrepreneurial resilience represents the capacity of ventures to anticipate disruption, absorb its effects, adapt operations, maintain continuity, recover, and pursue strategic renewal (Miceli et al., 2021; Isensee et al., 2023; Li et al., 2025).

The framework proposes two complementary pathways. The direct pathway connects digitalization with entrepreneurial resilience through improved agility, coordination, market diversification, information processing, and operational continuity. The indirect pathway connects digitalization with resilience through sustainability-oriented practices; through this second pathway, digital capabilities contribute to resource efficiency, economic viability, stakeholder legitimacy, social inclusion, and long-term adaptability.

The framework is contextualized within vulnerable Moroccan sectors, particularly agriculture, agri-food, and the social and solidarity economy. These sectors provide a relevant setting because entrepreneurial ventures frequently face resource scarcity, climate exposure, fragmented markets, institutional constraints, and unequal access to technological infrastructure. The Moroccan context is therefore treated as the field of application of the framework rather than as an empirically tested moderating variable.



Fig 1 Integrative Conceptual Framework Linking Digitalization, Sustainability-Oriented Practices, and Entrepreneurial Resilience

- **P4: Sustainability-Mediated Pathway**
Source: Authors' conceptualization based on the reviewed literature.

Table 2 Summary of the Theoretical Propositions

Proposition	Conceptual Relationship	Principal Explanatory Mechanisms
P1	Digitalization → Sustainability-oriented practices	Resource monitoring, traceability, operational efficiency, circularity, stakeholder communication and social inclusion
P2	Digitalization → Entrepreneurial resilience	Information access, coordination, market diversification, business continuity, adaptability and strategic renewal
P3	Sustainability-oriented practices → Entrepreneurial resilience	Reduced resource vulnerability, economic viability, stakeholder legitimacy, community support and long-term adaptability
P4	Digitalization → Sustainability-oriented practices → Entrepreneurial resilience	Translation of digital capabilities into environmental, economic and social foundations for sustainable resilience

Source: Authors' Conceptualization Based on the Reviewed Literature.

V. CONTEXTUALIZATION IN VULNERABLE MOROCCAN SECTORS

➤ *Relevance of the Moroccan Context*

The proposed framework is contextualized within three vulnerable Moroccan sectors: agriculture, agri-food, and the social and solidarity economy. These sectors differ in their organizational structures, technological resources, market orientations, and exposure to environmental or socioeconomic disruptions. Nevertheless, they share a need for improved information access, responsible resource management, market connectivity, stakeholder coordination, and long-term adaptive capacity.

Entrepreneurs operating in emerging-economy contexts frequently face limited access to finance, technological infrastructure, digital competencies, institutional support, and formal markets. These constraints can reduce their capacity to adopt digital technologies and sustainability-oriented practices despite the potential contribution of these resources to adaptation and business continuity (Nakpodia et al., 2024; Chen et al., 2025). The relevance of the Moroccan context therefore lies in examining how the proposed relationships may operate in sectors where digital transformation, sustainability, and resilience are simultaneously necessary but difficult to implement.

The following sectoral analysis does not present empirical findings or claim that one sector is more digitalized, sustainable, or resilient than another. Instead, it illustrates how the mechanisms incorporated into the conceptual framework may take different forms according to the characteristics and vulnerabilities of each sector.

➤ *Agriculture*

Agricultural entrepreneurship is highly dependent on natural resources, climatic conditions, production cycles, and access to market information. Digital technologies such as weather applications, sensor-based monitoring systems, mobile payment solutions, digital marketplaces, and farm-management platforms may provide agricultural entrepreneurs with more timely information and improve the coordination of production and commercial activities. These capabilities may support anticipatory decision-making and allow entrepreneurs to respond more effectively to environmental and market-related changes (Ali et al., 2024; Sudirman et al., 2025).

The sustainability pathway is particularly relevant to agricultural activities because digital technologies may facilitate water monitoring, input optimization, waste reduction, production traceability, and more efficient resource utilization. These practices can contribute to environmental sustainability while also reducing operating costs and supporting economic viability. Digital access to information and training may further encourage the diffusion of environmentally responsible agricultural practices (Avelar et al., 2024; Chen et al., 2025).

Through these mechanisms, digitalization and sustainability-oriented practices may strengthen the resilience of agricultural ventures. Improved environmental information can enhance anticipatory capacity, resource efficiency can reduce vulnerability to scarcity, and digital market access can diversify commercial opportunities. However, these potential benefits may be constrained by limited connectivity, the cost of technologies, insufficient digital competencies, fragmented production structures, and unequal access to institutional assistance.

➤ *Agri-Food Sector*

Agri-food entrepreneurship operates at the intersection of agricultural production, processing, logistics, quality management, and market distribution. Digital technologies may support supply-chain coordination, inventory management, quality control, product traceability, demand forecasting, digital marketing, and online distribution. These capabilities can improve the visibility of operational processes and help agri-food ventures respond to disruptions affecting supplies, production, transportation, or customer demand (Sharma et al., 2024; Kumar et al., 2024).

Digitalization may also facilitate sustainability-oriented practices within the agri-food sector. Data-management and traceability systems can help enterprises monitor resource consumption, reduce food losses, improve packaging decisions, identify inefficiencies, and develop circular approaches to by-products and waste. These practices can simultaneously support environmental performance and reduce operational vulnerability (Avelar et al., 2024; Ali et al., 2024).

The combination of digital supply-chain capabilities and sustainability-oriented resource management may strengthen business continuity and adaptive capacity. Better information can support rapid sourcing decisions, while improved traceability may reinforce relationships with customers, regulators, and suppliers. Nevertheless, implementation can be affected by investment costs, technological compatibility, cybersecurity concerns, employee competencies, and coordination difficulties among supply-chain partners.

➤ *Social and Solidarity Economy*

Organizations in the social and solidarity economy generally combine economic activity with social inclusion, community development, collective governance, or the pursuit of social objectives. Digital platforms may help these organizations communicate with beneficiaries, coordinate members, access markets, mobilize financial resources, deliver training, and increase the visibility of their social activities. These tools may be particularly relevant for cooperatives, social enterprises, women-led ventures, youth initiatives, and community-based organizations (Awad & Martín-Rojas, 2024; Nakpodia et al., 2024).

In this sector, sustainability is closely connected to social value creation, stakeholder participation, local employment, community engagement, and inclusive access to economic opportunities. Digitalization may facilitate

these practices by creating new channels for participation, knowledge sharing, collaborative decision-making, and direct interaction with customers or support institutions. Community-based networks may subsequently provide information, legitimacy, resources, and collective assistance during periods of disruption (Hazudin et al., 2025; Al-Omouh et al., 2024).

The relationship between digitalization and resilience may therefore operate strongly through relational and social mechanisms. Digital capabilities can support communication and market continuity, while sustainability-oriented practices can reinforce trust, cooperation, and stakeholder commitment. However, social and solidarity organizations may face limitations related to financial resources, managerial competencies, technological infrastructure, and the capacity to maintain digital systems over time.

➤ *Cross-Sector Conceptual Synthesis*

The three sectors illustrate different applications of the same conceptual framework. In agriculture, the relationship is primarily associated with natural-resource monitoring, production information, and adaptation to environmental variability. In the agri-food sector, it emphasizes supply-chain coordination, traceability, operational efficiency, and circular resource use. In the social and solidarity economy, it is more strongly connected to inclusion, stakeholder participation, collective networks, and community legitimacy.

These differences do not imply that one sector is necessarily more resilient than another. Instead, they suggest that the mechanisms connecting digitalization, sustainability, and resilience may vary according to sectoral resources, activities, stakeholders, and vulnerabilities. Future empirical research should therefore test both the general validity of the framework and the possibility of sector-specific differences.

Table 3 Sectoral Contextualization of the Proposed Framework

Sector	Relevant Digital Capabilities	Sustainability-Oriented Mechanisms	Expected Contribution to Resilience	Principal Contextual Constraints
Agriculture	Weather information, resource monitoring, mobile payments, farm-management tools and digital marketplaces	Water and input efficiency, waste reduction, traceability and responsible production	Improved anticipation, resource adaptation, market access and operational continuity	Connectivity, technology costs, digital competencies and climate exposure
Agri-food	Supply-chain platforms, inventory systems, quality tracking, demand forecasting and online distribution	Resource efficiency, food-loss reduction, circularity, traceability and responsible packaging	Supply-chain visibility, sourcing flexibility, continuity and stakeholder confidence	Investment costs, technological compatibility, skills and partner coordination
Social and solidarity economy	Community platforms, digital communication, online sales, training tools and digital finance	Social inclusion, participation, local value creation, stakeholder engagement and collective support	Stronger networks, legitimacy, market continuity and collective adaptation	Limited finance, managerial capacity, infrastructure and long-term system maintenance

Source: Authors' Conceptualization Based on the Reviewed Literature.

VI. DISCUSSION AND THEORETICAL IMPLICATIONS

➤ *Contribution to Digital Entrepreneurship Research*

This study contributes to digital entrepreneurship research by moving beyond the traditional view of digitalization as a technological resource primarily associated with efficiency, innovation, or performance improvement. The proposed framework conceptualizes digitalization as a multidimensional capability composed of informational, operational, relational, and strategic dimensions that may influence how entrepreneurs anticipate, respond to, and recover from disruptions.

Previous research has highlighted the role of digital transformation in improving entrepreneurial agility, market access, and organizational adaptation. The present framework extends these perspectives by suggesting that the value of digital capabilities depends on how entrepreneurs

integrate them into broader organizational strategies and responsible value-creation processes (Sataikina & Steiner, 2020; Isensee et al., 2023; Audretsch et al., 2024).

By distinguishing a direct pathway between digitalization and entrepreneurial resilience from an indirect pathway through sustainability-oriented practices, this study provides a more nuanced understanding of how technology contributes to entrepreneurial continuity. Digital capabilities may generate immediate adaptive advantages, while sustainability practices may transform these advantages into more durable resilience capacities.

➤ *Contribution to Sustainable Entrepreneurship Research*

The framework also contributes to sustainable entrepreneurship literature by positioning sustainability not only as an objective related to environmental and social responsibility but also as a strategic mechanism supporting entrepreneurial resilience.

Previous research has largely examined sustainable entrepreneurship through the perspective of economic, environmental, and social value creation. This study extends this perspective by proposing that sustainability-oriented practices can function as resilience-building mechanisms. Responsible resource management, stakeholder engagement, social inclusion, and economic viability may reduce vulnerabilities and strengthen entrepreneurs' ability to maintain activities under uncertain conditions (Avelar et al., 2024; Ali et al., 2024; Li et al., 2025).

This perspective highlights that sustainability and resilience are not independent entrepreneurial outcomes. Instead, sustainability practices may provide the organizational, relational, and resource foundations necessary for long-term adaptation. Therefore, sustainable entrepreneurship can be understood as a pathway through which entrepreneurs develop more robust responses to environmental, economic, and social disruptions.

➤ *Contribution to Entrepreneurial Resilience Theory*

This study contributes to entrepreneurial resilience research by introducing digitalization and sustainability as complementary antecedents of resilience development.

Existing resilience literature emphasizes adaptation, flexibility, resource mobilization, and learning after disruption. The proposed framework extends this view by suggesting that resilience can also emerge from proactive capabilities developed before disruption occurs. Digital capabilities may enhance anticipation and rapid response, while sustainability-oriented practices may reinforce resource stability, stakeholder support, and long-term adaptability.

The framework therefore adopts a dynamic perspective of resilience, considering it not only as the ability to recover from adverse events but also as the ability to continuously renew entrepreneurial activities. This approach aligns resilience with strategic transformation, innovation, and sustainable development rather than simple recovery (Xia et al., 2024; Pennetta et al., 2025).

➤ *Implications for Emerging and Vulnerable Contexts*

The framework provides specific insights for entrepreneurial ecosystems characterized by resource constraints, climate vulnerability, institutional challenges, and unequal access to technology.

In such contexts, digital transformation policies should not focus exclusively on technological infrastructure. Access to digital tools must be accompanied by entrepreneurial training, sustainability awareness, financial support, and institutional coordination. Without these complementary conditions, digitalization may increase disparities between entrepreneurs with different levels of resources and capabilities (Nakpodia et al., 2024; Chen et al., 2025).

For vulnerable sectors such as agriculture, agri-food, and the social and solidarity economy, the integration of digital capabilities with sustainability objectives may

provide a more balanced pathway toward resilience. Public institutions, entrepreneurial support organizations, and development agencies should therefore encourage integrated strategies combining digital inclusion, sustainable practices, and resilience-building initiatives.

➤ *Policy and Managerial Implications*

From a managerial perspective, entrepreneurs should consider digital technologies not only as operational tools but as strategic resources supporting sustainable development. Investments in digital platforms, data management, traceability systems, and communication technologies may generate greater resilience benefits when they are aligned with environmental responsibility and stakeholder-oriented practices.

From a policy perspective, support programs should encourage:

- Digital skills development;
- Access to affordable digital infrastructure;
- Sustainability-oriented entrepreneurial training;
- Financing mechanisms supporting responsible innovation;
- Collaboration between entrepreneurs, institutions, and local communities.

Such integrated approaches may help transform digitalization from a simple modernization process into a driver of sustainable entrepreneurial resilience.

VII. CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

➤ *Conclusion*

Digital transformation, sustainability, and entrepreneurial resilience have become increasingly interconnected research areas, particularly in contexts characterized by uncertainty, environmental pressures, and rapid technological change. However, previous studies have frequently examined these dimensions separately, limiting understanding of how digital capabilities can contribute to sustainable and resilient entrepreneurial development (Miceli et al., 2021; Isensee et al., 2023; Avelar et al., 2024).

This conceptual study addressed this gap by developing an integrative framework explaining the relationships among digitalization, sustainability-oriented practices, and entrepreneurial resilience. Based on an integrative literature review, the study proposes that digitalization contributes to resilience through two complementary pathways: a direct pathway, through which digital capabilities improve information access, coordination, market diversification, agility, and continuity; and an indirect pathway, through which digitalization facilitates sustainability-oriented practices that strengthen environmental responsibility, economic viability, stakeholder relationships, and long-term adaptive capacity (Sadeghi et al., 2024; Audretsch et al., 2024; Hokmabadi et al., 2024; Ali et al., 2024; Li et al., 2025).

The proposed framework contributes to digital entrepreneurship literature by suggesting that digital capabilities create greater value when they are integrated with sustainability-oriented strategies and responsible forms of entrepreneurial value creation (Satalkina & Steiner, 2020; Avelar et al., 2024).

The study also contributes to sustainable entrepreneurship research by positioning sustainability as a mechanism that transforms digital resources into more durable resilience capacities. Environmental efficiency, economic stability, stakeholder engagement, and social inclusion are considered not only sustainability objectives but also strategic resources supporting entrepreneurial continuity and adaptation (Miceli et al., 2021; Chen et al., 2025).

By contextualizing the framework within vulnerable Moroccan sectors, particularly agriculture, agri-food, and the social and solidarity economy, this study extends current discussions toward emerging-economy contexts where entrepreneurs face simultaneous technological, environmental, financial, and institutional challenges (Nakpodia et al., 2024; Hazudin et al., 2025).

➤ Theoretical Limitations

Despite its contributions, this study presents several limitations. First, the research adopts an integrative conceptual review methodology and does not provide empirical validation of the proposed relationships. The propositions developed in this study remain theoretical assumptions requiring future empirical examination through quantitative, qualitative, or mixed-method approaches (Torraco, 2005; Snyder, 2019).

Second, although the framework integrates digitalization, sustainability, and resilience, other factors may influence these relationships. Entrepreneurial orientation, innovation capability, institutional support, financial resources, leadership characteristics, and ecosystem conditions may affect how entrepreneurs transform digital capabilities into sustainable resilience outcomes (Autio et al., 2024; Sharma et al., 2024).

Third, the Moroccan sectoral contextualization remains conceptual. While agriculture, agri-food, and the social and solidarity economy represent relevant vulnerable sectors, future research should empirically investigate whether sectoral characteristics influence the strength and mechanisms of the proposed relationships (Nakpodia et al., 2024; Chen et al., 2025).

➤ Future Research Directions

Future studies should empirically test the proposed framework using different methodological approaches. Quantitative research could examine the relationships among digitalization, sustainability-oriented practices, and entrepreneurial resilience using structural equation modeling or other multivariate approaches. Such studies would allow researchers to evaluate the direct relationship between digitalization and resilience and determine whether

sustainability-oriented practices operate as a mediating mechanism.

Qualitative research could provide deeper insights into how entrepreneurs transform digital capabilities into sustainable practices and resilience strategies. Case studies, interviews, and longitudinal research could help identify the contextual mechanisms explaining why some ventures successfully integrate digitalization and sustainability while others face adoption barriers (Xia et al., 2024; Pennetta et al., 2025).

Future research should also examine sectoral differences. Comparative studies involving agriculture, agri-food, manufacturing, tourism, and social entrepreneurship could determine whether the proposed mechanisms vary according to technological intensity, environmental exposure, market structure, and institutional conditions.

Finally, future studies should investigate the role of entrepreneurial ecosystems and public policies. Digital infrastructure, training programs, financial support, institutional coordination, and collaborative networks may influence the capacity of entrepreneurs to transform digital resources into sustainable resilience capabilities (Autio et al., 2024; Nakpodia et al., 2024).

The proposed framework should therefore be considered as a theoretical foundation for future empirical investigations rather than a definitive explanatory model. Its validation across different sectors and contexts represents an important research avenue for advancing knowledge on sustainable digital entrepreneurship and entrepreneurial resilience.

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