From Digital Literacy to Innovation 5.0: The Strategic Role of Agility in Enhancing Entrepreneurial Success

Introduction

The Middle East is undergoing a profound digital and entrepreneurial transformation, driven by national strategies aimed at economic diversification, innovation, and technological empowerment. Countries across the region, from Saudi Arabia's Vision 2030 and the UAE's Digital Economy Strategy to Egypt's Digital Transformation Framework, actively promote entrepreneurship as a cornerstone of post-oil, knowledge-based economies. In this context, digital literacy, the capacity to effectively use, evaluate, and adapt digital technologies for business creation and growth, has become a fundamental entrepreneurial asset (Shatila et al., 2025). Simultaneously, the rise of Innovation 5.0, which integrates advanced technologies with human-centric and sustainability-focused values, has redefined what constitutes meaningful innovation in the region's rapidly changing economies. Innovation 5.0 emphasizes efficiency, productivity, ethical responsibility, inclusiveness, and environmental consciousness (Nigam & Shatila, 2024). An agenda that resonates with the Middle East's urgent socioeconomic challenges, including youth unemployment, gender inequality, and ecological vulnerability. While these achievements have been made, the region still sees differences in turning digital and innovation solutions into successful businesses (Khodor et al., 2024). Other studies have studied how the direct effects of innovative ideas impact education, but they sometimes miss the fact that the reality of these effects depends on context and changes over time. A crucial point is agility, which is the ability to feel out, reply to, and take advantage of new chances that appear when things are unpredictable (Shatila et al., 2024). The region's political instability, fast technological changes, and the lack of strong single institutions create a very uncertain situation where how well companies adapt could tilt events in their favor or against them. Researchers have not focused much on how agility influences the effects of being digitally literate and having critical innovation abilities on an entrepreneur's performance, leaving a big hole in our understanding of the area (Shatila et al., 2024).

This study looks at the dynamic capability's framework and the new literature on digital entrepreneurship to close this gap. Digital literacy is necessary, helping entrepreneurs deal with digital tools and use data to make choices. As a unique philosophy, Innovation 5.0 links digital transformation to better well-being and strong communities. Still, to fully use their skills, entrepreneurs must be able to change their strategies quickly as circumstances develop. The paper combines two main influences, entrepreneurial self-efficacy and digital entrepreneurial orientation, to help explain why people start businesses. How these elements affect agility is key to understanding why specific organizations are successful when resources are limited and changes come fast in the Middle East. For this reason, the study aims to examine the influence of digital literacy and the Innovation 5.0 trends on Middle Eastern entrepreneurs, see if agility is a factor, and learn about the effects of entrepreneurial self-efficacy and digital entrepreneurial orientation within this situation. For these purposes, the study explores the following issue: (1) What consequences does digital literacy and Innovation 5.0 have on entrepreneurial success in the Middle East? Is agility able to influence the impact of these capabilities on an organization's success, and if it does, by how much? Do entrepreneurial self-efficacy and digital entrepreneurial orientation, such as cognitive and strategic traits, reinforce agility to impact entrepreneurial results? The analysis brings several contributions to the topic. It proposes a common framework

that combines technological knowledge, interest in innovation, and flexibility in behaviors with how well entrepreneurs do in growing economies. The research shows that agility helps explain how entrepreneurial capabilities influence various Middle Eastern contexts. The researchers use SEM to study how interactions affect the outcomes of their research using data gathered from a broad range of entrepreneurs in different Middle Eastern countries to ensure its regional applicability. The study gives practical ideas to those supporting regional entrepreneurial development. The research demonstrates how digital literacy, Innovation 5.0, and being agile can help entrepreneurs achieve greater success in a digital marketplace.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature and hypotheses development. Section 3 details the research methodology, including sample selection, measurement constructs, and analytical techniques. Section 4 reports the empirical findings. Section 5 discusses the theoretical and practical implications of the results. Finally, Section 6 concludes the paper and outlines directions for future research.

Theoretical Framework

Understanding how digital literacy, digital entrepreneurial orientation, entrepreneurial self-efficacy, agility, and Innovation 5.0 shape entrepreneurial success requires a theoretical foundation that explains both organizational adaptation and individual cognition. This study draws on two complementary frameworks: Dynamic Capabilities Theory (DCT) and Social Cognitive Theory (SCT). Each theory offers a different but mutually reinforcing perspective on how entrepreneurs interpret opportunities, deploy digital resources, and respond to environmental uncertainty.

Dynamic Capabilities Theory (DCT)

Dynamic Capabilities Theory explains how firms and entrepreneurs achieve competitive advantage in volatile, technology-driven environments by developing the ability to sense, seize, and reconfigure resources (Teece, 2007; 2014; 2018). These capabilities form the structural backbone of the present study's conceptual model. Sensing capabilities involve identifying and interpreting opportunities in the marketplace. In this study, digital literacy functions as a core sensing capability because it enables entrepreneurs to scan digital environments, understand technological trends, evaluate information quality, and detect emerging innovation possibilities. Innovation 5.0 also contains a sensing dimension by helping entrepreneurs identify socio-technical and sustainability-oriented opportunities that arise from human-centric and ethical innovation needs. Seizing capabilities refer to the strategic commitment to act upon sensed opportunities. DEO represents this seizing capability, as it captures an entrepreneur's proactive, innovative, and risk-taking posture toward digital opportunities. Innovation 5.0 also contributes to seizing by guiding the development of solutions that align technology with social welfare, personalization, and sustainability. Reconfiguring capabilities allow organizations to realign processes, modify business models, and reorganize resources in response to changing conditions. Agility embodies this reconfiguring dimension. Without agility, entrepreneurs may recognize opportunities and commit to innovations but struggle to adapt when market demands, technologies, or institutional constraints shift. In this model, agility determines whether digital literacy, DEO, and Innovation 5.0 translate into meaningful and sustained entrepreneurial success. Finally, within the DCT microfoundations perspective, ESE is understood as a behavioral and cognitive mechanism that underpins the entrepreneur's ability to deploy dynamic capabilities. ESE influences how

individuals interpret environmental signals, make judgments, and mobilize resources, thus serving as a human microfoundation of sensing and seizing.

Social Cognitive Theory (SCT)

While DCT focuses on strategic and organizational adaptation, Social Cognitive Theory provides a complementary explanation for the cognitive and behavioral processes that shape entrepreneurial action. SCT posits that human behavior arises from the reciprocal interaction among personal beliefs, environmental influences, and actions (Bandura, 1986; 1997). Within this framework, ESE is central, as it affects opportunity recognition, risk evaluation, creative problem-solving, and persistence in the face of obstacles. ESE motivates entrepreneurs to pursue digital opportunities, engage in innovation, and persist during setbacks. However, SCT also acknowledges that high levels of self-efficacy can sometimes lead to biased judgments or overconfidence, especially in contexts marked by technological volatility and institutional uncertainty. This underscores the importance of agility as an adaptive mechanism that can shape how self-efficacy is expressed in behavior. Agility enables entrepreneurs to translate confidence into flexible decision-making, iterative learning, and context-sensitive adjustments, thereby ensuring that ESE leads to effective—not rigid—entrepreneurial action. SCT also informs how entrepreneurs adopt and implement digital technologies. Digital literacy shapes cognitive processing, ESE affects behavioral intention, and environmental conditions determine whether digital capabilities are successfully transformed into performance outcomes. The interaction of these elements supports the claim that entrepreneurial success results from both cognitive readiness and adaptive capability.

Integrating DCT and SCT

Together, DCT and SCT create a comprehensive foundation for understanding digital and human-centric entrepreneurship. DCT clarifies the structural capabilities required to sense, seize, and reconfigure digital opportunities, while SCT explains the cognitive mechanisms that motivate entrepreneurial action and influence how digital capabilities are interpreted and used. In the present model, digital literacy enhances sensing, DEO drives seizing, Innovation 5.0 integrates social and technological value creation, ESE motivates the entrepreneur's engagement with these capabilities, and agility determines the effectiveness of reconfiguration under environmental uncertainty. This integrated perspective is particularly relevant for emerging economies in the MENA region, where entrepreneurs confront rapid digital transformation, institutional instability, and societal demands for sustainability and resilience. The combined theoretical approach thus provides a robust foundation for the hypotheses that follow.

Hypotheses Development

The Influence of Foundational Entrepreneurial Capabilities on Venture Success

Digital literacy has become a foundational entrepreneurial capability in technology-driven economies, yet its influence on entrepreneurial performance extends far beyond basic technical proficiency. Scholars increasingly conceptualize digital literacy as a multidimensional cognitive and strategic competence that enhances entrepreneurs' ability to evaluate information quality, recognize digital opportunities, and integrate technology into decision-making processes. Empirical research consistently shows that digital literacy strengthens entrepreneurial intention, opportunity recognition, and venture formation (Suryani & Chaniago, 2023; Zeynalov &

Doğantan, 2025), and that technology-competent entrepreneurs often outperform their peers in financial and marketing outcomes (Zhang et al., 2023). However, the literature also highlights important boundary conditions: digital literacy alone is not sufficient for entrepreneurial success in emerging markets. Its effect becomes meaningful only when complemented by digital enterprise capabilities, institutional support mechanisms, or absorptive capacity (Mohamad et al., 2025). These contradictory findings underscore that digital literacy operates primarily as a sensing capability within Dynamic Capabilities Theory, equipping entrepreneurs with the cognitive readiness to identify opportunities, interpret technological trends, and navigate digital ecosystems, but requiring additional strategic or institutional enablers to translate those insights into performance. In the Middle Eastern context where digital transformation is accelerating but institutional structures remain uneven digitally literate entrepreneurs are better positioned to exploit emerging opportunities, adapt to technological shifts, and make informed strategic decisions. Therefore, digital literacy is expected to contribute positively to entrepreneurial success. This led to the development of the following hypothesis:

H1a: Digital Literacy has a positive and significant effect on Entrepreneurial Success.

DEO reflects a venture's strategic posture toward proactively leveraging digital technologies to innovate, take risks, and pursue new opportunities, and it has emerged as a central determinant of entrepreneurial performance in digitally intensive environments. As a seizing capability within Dynamic Capabilities Theory, DEO enables entrepreneurs to convert sensed opportunities into concrete strategic actions by integrating digital tools, experimenting with business models, and accelerating technology adoption. Prior studies show that DEO enhances firms' absorptive capacity, facilitates digital innovation, and improves overall business performance (Jang & Lee, 2025; Nigam & Shatila, 2024). Additionally, DEO drives technology-oriented strategic choices such as AI adoption, platform development, and digital transformation processes, often through its influence on innovativeness and organizational learning (Duong et al., 2024; Salih et al., 2024). Yet, evidence from emerging economies reveals that DEO's benefits are not uniform: its effects depend on factors such as internal technological readiness, workforce capabilities, and sector-specific conditions (Petermann & Zacher, 2022; Najib et al., 2020). These contextual variations suggest that DEO contributes to entrepreneurial success primarily when firms possess the agility, absorptive capacity, or innovation infrastructure necessary to support digital experimentation. In the Middle East, where national strategies are heavily geared toward digital transformation and entrepreneurship, DEO provides entrepreneurs with a competitive advantage by enabling them to engage in proactive digital strategizing, adapt to fast-changing technological environments, and capture emerging opportunities. Therefore, DEO is expected to positively influence entrepreneurial success. This led to the development of the following hypothesis:

H1b: Digital Entrepreneurial Orientation has a positive and significant effect on Entrepreneurial Success.

ESE has long been recognized as a central psychological determinant of entrepreneurial behavior and venture performance, yet evidence increasingly shows that its effects are neither uniform nor unconditional. Grounded in Social Cognitive Theory (Bandura, 1986), ESE shapes individuals' confidence in their ability to pursue opportunities, solve problems, and persist under uncertainty, which in turn enhances entrepreneurial outcomes. Empirical studies demonstrate that higher ESE is associated with stronger performance, greater commitment, and improved opportunity

exploitation (Miao et al., 2017; Srimulyani & Hermanto, 2021). At the same time, cross-contextual research reveals substantial variation in the strength of this relationship. In some cases, ESE amplifies the impact of personality traits on entrepreneurial outcomes (Diputra et al., 2021), while in others its effects are moderated by environmental turbulence, market conditions, or the availability of resources (McGee & Peterson, 2019; Suryani & Chaniago, 2023). These contradictions suggest that ESE alone is insufficient; its impact is shaped by contextual contingencies such as institutional support, digital infrastructure, or the capacity to adapt to external shocks. In uncertain environments—typical of many Middle Eastern markets—ESE provides motivational confidence but requires complementary dynamic capabilities to be converted into tangible performance. Nevertheless, ESE remains a critical antecedent of entrepreneurial success because it underpins the cognitive readiness and behavioral persistence necessary for navigating risk and pursuing growth-oriented strategies. Accordingly, it is expected that individuals with higher ESE will achieve stronger entrepreneurial outcomes. This led to the development of the following hypothesis:

H1c: Entrepreneurial Self-Efficacy has a positive and significant effect on Entrepreneurial Success.

Antecedents of Innovation 5.0 in Emerging Market Entrepreneurship

The evolution toward Industry 5.0 has transformed the meaning and strategic value of digital literacy, shifting it from basic tool usage to an advanced capability involving data interpretation, engagement with AI systems, ethical digital judgment, and collaborative digital work. In contemporary innovation ecosystems, digital literacy serves as a foundational sensing capability that enables individuals and organizations to identify technological trends, experiment with emerging tools, and participate in human-centric innovation processes. Empirical evidence suggests that SMEs led by digitally literate individuals are more capable of integrating the core principles of Innovation 5.0 such as personalization, sustainability, and ethical AI into their products and processes, thereby enhancing their capacity for human-centered innovation. Shatila et al. (2025), for example, demonstrate that organizational digital literacy facilitates the adoption of sustainable, socially oriented, and personalized innovation approaches, reflecting the broader socio-technical orientation of Industry 5.0. Yet the literature also highlights clear boundary conditions. Several cross-national studies show that digital literacy alone does not guarantee meaningful innovation outcomes; its impact is significantly weakened when digital infrastructure is limited, cultural readiness is low, or collaborative structures are underdeveloped (Mohamad et al., 2025). These contradictions underscore that digital literacy is necessary but not sufficient: it enables participation in Innovation 5.0 but must operate within organizational cultures, leadership systems, and institutional environments that support ethical, inclusive, and technology-enabled innovation. Accordingly, digital literacy is expected to play a positive role in shaping Innovation 5.0 initiatives. This led to the development of the following hypothesis:

H2a: Digital Literacy has a positive and significant effect on Innovation 5.0.

DEO reflects a venture's strategic posture toward proactive opportunity pursuit, experimentation with digital technologies, and willingness to take risks in digitally dynamic environments. Within the Innovation 5.0 paradigm—where technological sophistication must be combined with human-centric, ethical, and collaborative innovation—DEO plays a crucial role in enabling firms to

integrate digital and traditional innovation logics. Recent evidence shows that DEO facilitates co-creative, participatory forms of innovation by enhancing ventures' capacity to experiment with AI-driven customization, real-time user engagement, and collaborative design (Zhang & Li, 2025). These practices align closely with Industry 5.0's emphasis on personalization and human–machine collaboration. However, contrasting studies in emerging markets highlight that DEO's positive effects are contingent on internal readiness and absorptive capacity. Overemphasis on digital experimentation can overwhelm firms lacking robust technological infrastructure, skilled personnel, or established routines (Alghamdi & Rehman, 2024). Moreover, organizational factors such as digital trust, psychological safety, and cross-sector openness strongly shape whether DEO leads to socially embedded and inclusive innovation or merely fragmented technological initiatives (Hoffman & Bell, 2023; Jang & Lee, 2025). These findings underscore that while DEO aligns conceptually with Innovation 5.0 principles, its actual contribution depends on firms' ability to uphold ethical digital governance, foster inclusive design practices, and leverage technology collaboratively. Therefore, DEO is expected to enhance Innovation 5.0 by enabling ventures to pursue technologically enabled, human-oriented innovation activities. This led to the development of the following hypothesis:

H2b: Digital Entrepreneurial Orientation positively and significantly affects Innovation 5.0.

ESE influences entrepreneurs' confidence in navigating uncertainty, experimenting with emerging technologies, and engaging in creative problem-solving—behaviors closely aligned with the values of Innovation 5.0. Evidence from human–AI collaborative contexts shows that entrepreneurs with higher ESE are more willing to trust ethical AI systems, engage in co-design processes, and pursue technologically mediated innovation (Lin & Rahman, 2023). These behavioral dispositions support Innovation 5.0's emphasis on human–technology collaboration, reflective judgment, and responsible innovation (Ferreira-Neto et al., 2023). However, the literature also highlights important complexities. ESE can generate both positive and negative outcomes depending on contextual and interpersonal dynamics: excessive confidence may impede collaborative creativity, reduce group cohesion, or hinder participatory decision-making—key requirements in inclusive, human-centric innovation systems (Lin & Rahman, 2023). Studies further show that ESE enables resilience and strengthens innovation only when supported by enabling conditions such as psychological safety, team-based experimentation, and inclusive leadership (Osman & Bekele, 2025; Fawad Sharif et al., 2024). These boundary conditions reveal that ESE is not a standalone driver of Innovation 5.0; rather, it functions effectively when embedded within innovation cultures that value empathy, shared decision-making, and ethical human–machine interactions. Accordingly, in contexts where reflective thinking and collaborative learning are encouraged particularly relevant in emerging economies undergoing digital transformation ESE supports entrepreneurs in adopting and shaping Innovation 5.0 practices. This led to the development of the following hypothesis:

H2c: Entrepreneurial Self-Efficacy has a positive and significant effect on Innovation 5.0

The Contribution of Innovation 5.0 to Entrepreneurial Success

Innovation 5.0 represents a significant evolution from earlier innovation paradigms by integrating the human-centric, ethical, and sustainability-oriented principles of Society 5.0 with the technological sophistication and collaborative intelligence of Industry 5.0. Rather than viewing

innovation as a solely efficiency-driven or technology-driven process, Innovation 5.0 reframes entrepreneurial value creation around social welfare, environmental responsibility, resilience, and stakeholder well-being (Fawad Sharif et al., 2024). This aligns with contemporary expectations that businesses must not only innovate technologically but also contribute to societal progress. Empirical evidence supports this shift: Ferreira-Neto et al. (2025) demonstrate that entrepreneurs who adopt Innovation 5.0 practices—particularly in sustainability-oriented and digitally transforming sectors—achieve stronger performance and strategic positioning. Similarly, European SMEs integrating Innovation 5.0 demonstrate enhanced adaptability, resilience, and access to funding for sustainability-driven initiatives, translating into improved growth trajectories and scale-up potential (Kolić et al., 2024). Evidence from Lebanon also reinforces the transformative potential of Innovation 5.0; firms that combine AI-driven solutions with social value creation exhibit stronger differentiation, improved reputational capital, and higher customer trust (Shatila et al., 2025). These findings sharply contrast with earlier Innovation 4.0 research, which showed limited long-term benefits when digital upgrades were implemented without attention to socio-ecological considerations (Al-Omoush et al., 2020). The literature thus suggests that Innovation 5.0 offers a more sustainable and competitive pathway for entrepreneurs by aligning operational efficiency with societal impact. However, the effectiveness of Innovation 5.0 depends on complementary organizational and individual factors, such as purpose-driven leadership, digital readiness, and humanistic values (Bayrakcı & Narmanlıoğlu, 2021; Eniola, 2020). When these enabling conditions are present, Innovation 5.0 becomes a strategic lever through which entrepreneurs achieve not only financial success but also broader legitimacy and long-term resilience. Accordingly, Innovation 5.0 is expected to contribute positively to entrepreneurial success. This led to the development of the following hypothesis:

H3: Innovation 5.0 has a positive and significant effect on Entrepreneurial Success.

The Moderating Role of Agility in Enhancing Entrepreneurial Outcomes

Although digital literacy enhances entrepreneurs' ability to evaluate information, leverage digital tools, and identify technological opportunities, it does not guarantee entrepreneurial success in environments characterized by rapid change. Dynamic Capabilities Theory suggests that digital literacy constitutes a sensing capability, enabling entrepreneurs to detect new possibilities, but sensing must be complemented by the ability to adapt and reconfigure strategies in response to shifting markets. Agility defined as the capacity to respond quickly, adjust resource allocations, and pivot strategic direction plays a pivotal role in determining whether digital literacy translates into sustained entrepreneurial performance. Empirical evidence confirms that entrepreneurs who combine high digital competence with agility are better able to deploy technology creatively, identify emerging market opportunities, and respond effectively to crises (Chakravarty et al., 2013; Tallon et al., 2019; Shatila et al., 2025). Conversely, digital literacy without agility can lead to strategic rigidity, underutilization of technological resources, or delayed adaptation in volatile environments. This dynamic is particularly salient in emerging economies, where institutional uncertainty, technological volatility, and recurring shocks render static digital capabilities insufficient. For instance, post-COVID evidence from Southeast Asia shows that digitally literate entrepreneurs who quickly transitioned to online platforms and digital financial tools significantly outperformed those who lacked adaptive agility (Tan et al., 2021). Agility thus strengthens the value of digital literacy by transforming digital knowledge into timely action, real-time analytics, responsive market behavior, and flexible customer engagement. Consequently, agility is expected

to amplify the positive relationship between digital literacy and entrepreneurial success. This led to the development of the following hypothesis:

H4a: Agility positively moderates the relationship between Digital Literacy and Entrepreneurial Success.

DEO equips entrepreneurs with a proactive, innovative, and risk-taking posture toward digital opportunities, yet the extent to which DEO enhances performance depends heavily on entrepreneurs' ability to adapt to environmental turbulence. While DEO encourages experimentation with digital technologies and promotes technology-driven strategic initiatives, Dynamic Capabilities Theory highlights that seizing opportunities require complementary reconfiguring capabilities, namely agility. Without agility, digital-oriented firms may struggle with misaligned strategies, delayed decision-making, and rigid operational routines, resulting in inefficiencies and missed opportunities (Ghezzi & Cavallo, 2020; Jia et al., 2023). Agility enables entrepreneurs to adjust digital strategies in response to rapid market changes, regulatory fluctuations, and evolving consumer expectations conditions that characterize digital sectors such as e-commerce, fintech, and platform-based businesses. Evidence shows that firms with strong DEO but low agility face challenges implementing advanced technologies like AI or blockchain due to resistance to change or rigid organizational practices, whereas agile firms can rapidly experiment, scale, and refine digital innovations (Salih et al., 2024). Additionally, studies in Latin America and MENA highlight that entrepreneurs who combine DEO with agility are more successful in deploying digital resources to build platform-based ventures, attract investors, and pursue growth opportunities (Ghezzi & Cavallo, 2020). Hence, agility transforms DEO from a strategic orientation into a performance-enhancing capability by ensuring that digital strategies remain responsive, timely, and adaptively aligned with environmental demands. Therefore, agility is expected to strengthen the relationship between DEO and entrepreneurial success. This led to the development of the following hypothesis:

H4 b: Agility positively moderates the relationship between Digital Entrepreneurial Orientation and Entrepreneurial Success.

ESE is widely recognized as a key psychological driver of entrepreneurial intention, opportunity pursuit, and venture formation; however, its relationship with entrepreneurial success remains inconsistent across empirical studies. While SCT emphasizes that high self-efficacy enhances persistence and proactive behavior, scholars have increasingly noted that in highly turbulent or resource-constrained contexts, confidence alone may result in overestimation of capabilities, excessive risk-taking, or strategic rigidity (McGee & Peterson, 2019). This tension reveals an important boundary condition: ESE produces positive outcomes only when individuals possess the adaptive mechanisms necessary to interpret uncertainty accurately and modify their actions accordingly. Agility provides this adaptive bridge by enabling entrepreneurs to learn quickly from feedback, recalibrate decisions, and pivot strategies when assumptions fail. Dynamic Capabilities Theory suggests that confidence-driven intention (ESE) must be paired with reconfiguring capabilities (agility) to generate performance under uncertainty Several studies support this complementarity. During periods of crisis such as the COVID-19 pandemic entrepreneurs with high ESE but low agility were more prone to sticking to outdated models, delaying necessary pivots, or misjudging market shifts, whereas those with high ESE and agility transitioned rapidly to digital channels, redesigned offerings, and sustained customer engagement (Uy et al., 2015; Tan

et al., 2021). Further, evidence from emerging economies indicates that ESE may even produce negative or neutral performance effects when entrepreneurs lack the agility required to interpret volatile market signals or when institutional uncertainty limits the applicability of prior experience (Diputra et al., 2021). These contradictions collectively illustrate that ESE alone is neither uniformly beneficial nor universally predictive of success; instead, its value depends on the individual's ability to adaptively translate confidence into action. Agility therefore strengthens the ESE–success relationship by filtering entrepreneurial confidence through flexible learning, continuous recalibration, and rapid reconfiguration of strategies. In such contexts, agility ensures that self-belief is expressed in effective action rather than overconfidence, ultimately enhancing entrepreneurial performance. This led to the development of the following hypothesis:

H4c: Agility positively moderates the relationship between Entrepreneurial Self-Efficacy and Entrepreneurial Success.

Innovation 5.0 characterized by sustainability, human-centric design, ethical technology use, and advanced digital capabilities—presents a promising pathway for entrepreneurial competitiveness, yet research suggests that its potential benefits are neither automatic nor universally realized. Although Innovation 5.0 encourages entrepreneurs to integrate green technologies, embed social value, and utilize AI for personalization, studies indicate that these ambitions often fail in practice when firms lack the ability to adaptively manage complexity, stakeholder expectations, and rapid regulatory shifts (Shatila et al., 2025). The literature highlights a persistent tension: Innovation 5.0 demands strategic patience, iterative experimentation, cross-sector collaboration, and continuous learning, but small and medium-sized firms—especially in emerging economies—often lack these adaptive capacities. Agility is therefore critical because it enables entrepreneurs to operationalize the principles of Innovation 5.0, modify business models responsively, and adjust to evolving socio-environmental conditions. Evidence from European sustainability initiatives demonstrates that firms with high agility were significantly better positioned to secure green funding, comply with dynamic regulatory frameworks, and scale socially responsible innovations—outcomes not observed in less agile counterparts, even when their technological capabilities were comparable (Kolić et al., 2024). Conversely, cross-national research highlights that Innovation 5.0 efforts stagnate when entrepreneurs lack the agility to integrate stakeholder feedback, navigate policy uncertainty, or redesign processes in response to environmental pressures (Mohamad et al., 2025). In emerging markets, where institutional instability, weak sustainability infrastructures, and fluctuating digital ecosystems are common, Innovation 5.0 can become prohibitively costly or operationally difficult without agility. Debates in the literature further highlight that Innovation 5.0's emphasis on ethical and social impact requires ongoing stakeholder engagement, which is only viable when firms maintain high responsiveness and adaptability. Agility thus converts the aspirational goals of Innovation 5.0 into actionable, market-relevant, and socially embedded outcomes. Accordingly, agility is expected to amplify the positive effect of Innovation 5.0 on entrepreneurial success. This led to the development of the following hypothesis:

H4d: Agility positively moderates the relationship between Innovation 5.0 and Entrepreneurial Success.

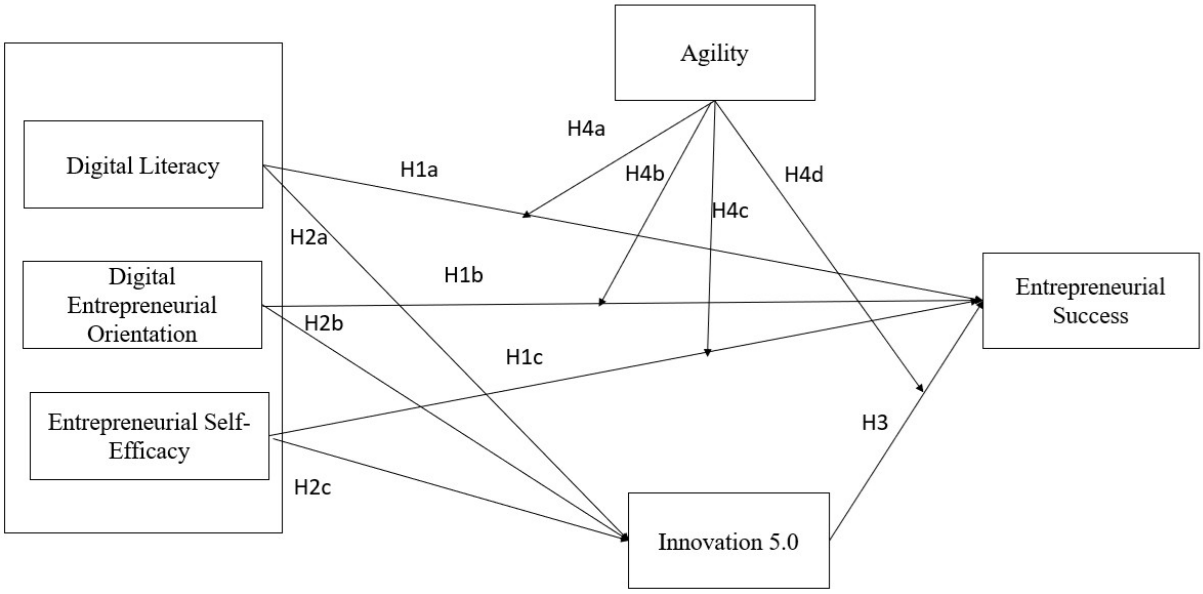


Figure 1 Research Model

Methodology

A quantitative research technique was used to analyze the links between digital literacy, digital entrepreneurial orientation, entrepreneurial self-efficacy, Innovation 5.0, agility, and entrepreneurial success. We gathered data by giving entrepreneurs from Lebanon, Jordan, and Egypt a structured, self-administered questionnaire online. The study was designed to identify people's behavior and thinking when operating within digitally powered entrepreneurial projects. The 379 complete questionnaires gave us a strong dataset that made using SEM in AMOS possible. People who took part in the study were entrepreneurs who had founded or helped to found small to medium-sized companies working in digital spaces. Participants who participated in the study were chosen to ensure they participated in digital innovation and entrepreneurship. The primary focus was reaching out to people with entrepreneurial activities in digital or mixed business models since their answers would best fit the studied concepts. Because the final group of 379 respondents came from many different sectors and countries, it represented general findings in the region's entrepreneurial sector. The data was collected for six weeks between April and May 2025. Participants received the survey through a Google Forms link and a message introducing the research and explaining that it was their choice to participate. Taking part in the questionnaire was seen by respondents as agreeing to participate. The survey was given to a small group of entrepreneurs first, and after collecting their comments, changes were made to the instrument to make it more precise and accurate. Data analysis used only responses that were fully completed, and all data were made anonymous to protect the replies from being traced back to their writers.

Measurement Scale

All constructs in this study were measured using validated scales from recent literature published between 2020 and 2023, with each item rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Digital literacy was assessed using the Digital Literacy Scale (DLS) developed by Bayrakcı and Narmanlıoğlu (2021), which comprehensively measures six

dimensions: ethics and responsibility, general knowledge and functional skills, daily usage, advanced production, privacy and security, and social dimension. Example items include: “I can critically evaluate digital sources for business decision-making” and “I am confident in using new digital tools for my startup activities.” This scale has been widely applied in recent studies on digital competencies and education in entrepreneurial contexts. This study used an adapted version of the Digital Orientation Scale (DOS) developed by Al-Omoush et al. (2021) to measure digital entrepreneurial orientation. This scale reflects an entrepreneurial firm’s strategic posture toward adopting and integrating digital technologies. Sample items include: “Our firm proactively adopts new digital technologies to enhance business processes” and “We prioritize digital innovation in our strategic planning.” The scale has demonstrated robust psychometric properties and relevance in studies involving digital transformation and entrepreneurial performance in small and medium-sized enterprises.

Entrepreneurial self-efficacy was measured using the Internet Entrepreneurial Self-Efficacy Scale (IESES) validated by Zhao et al. (2020). This scale evaluates entrepreneurs’ confidence in executing internet-based business functions and includes three dimensions: leadership, technological capability, and digital marketing. Sample items include: “I am confident in leading a team to develop an online business” and “I can effectively utilize digital tools to market products online.” The IESES has proven dependable in research on digital entrepreneurship and online business readiness. Innovation 5.0 was operationalized using the Responsible Innovation Scale developed by Choudhury et al. (2023), which captures ethical, inclusive, and sustainability-oriented innovation practices. The scale includes anticipation, reflexivity, inclusion, and responsiveness. Sample items include: “Our innovations consider the broader societal impacts” and “We engage stakeholders in the innovation process to ensure ethical outcomes.” This scale aligns closely with the core values of Innovation 5.0, emphasizing integrating technology with social responsibility and human-centric design.

The Workforce Agility Scale by Braun et al. (2022) was employed to capture agility. This instrument measures individual adaptability, responsiveness, and initiative-taking problem-solving in dynamic work environments. Representative items include: “I can quickly adapt to changes in work processes” and “I proactively seek solutions in uncertain situations.” The scale has been validated in studies exploring organizational adaptability and individual-level resilience in fast-changing economic environments. Finally, entrepreneurial success was measured using the multidimensional scale developed by Dej et al. (2020), which captures various indicators of entrepreneurial achievement, including business growth, financial returns, social recognition, and work-life balance. Items from this scale include: “My business has experienced significant growth in the past year” and “I am satisfied with the balance between my work and personal life.” This scale provides a comprehensive and contemporary perspective on how entrepreneurs define and assess success beyond purely financial metrics.

Data Analysis Strategy

Data were run through SEM with AMOS version 29 to evaluate the hypotheses and the model’s fit. SEM was chosen because it can look at complicated approaches combining hidden constructs and observable data. This approach made it possible to estimate both the structural and measurement models, exploring how direct effects from digital literacy, digital entrepreneurial orientation, entrepreneurial self-efficacy, and Innovation 5.0 on entrepreneurial success interact

with agility. Missing values, outliers, and normality were evaluated in the data before performing the analysis in SEM. First, we assessed whether the constructs showed good convergent and discriminant validity. The study was conducted in two main parts. First, CFA was run to evaluate the validity of the measurement model. Reliability of the measures was established by inspecting factor loadings, AVE, and composite reliability for every construct. Secondly, the investigators ran structural tests to determine how much the hypothesized paths contributed. Interactions between agility and the independent variables were found using the product indicator approach to see how moderation worked. CFI, TLI, RMSEA, and Chi-square/df were used to determine whether the models fit well. Confidence intervals and the importance of standardized path coefficients were explored by running a bootstrapping procedure with 5,000 samples.

Validity and Reliability Assurance

Reliability and validity were all examined for all constructs ahead of hypothesis testing. Cronbach's alpha and composite reliability (CR) were used to evaluate internal consistency reliability. Cronbach's alpha scores for all constructs were over 0.70, and the estimated CRs were greater than 0.80. Each item was found to load strongly onto the correct latent variable, with a standardized loading above 0.60, and the AVE for each construct was higher than 0.50. The Fornell-Larcker criterion was applied to determine if the square root of the AVE for all constructs was greater than the inter-construct correlations. All of the constructs met the requirement, suggesting that they measured special aspects of being an entrepreneur. Moreover, values from the HTMT measure are all under the conservative threshold of 0.85, which helps prove that the model measures different constructs. These actions ensured the constructs were psychometrically valid and the structural model results were accurate.

Findings

Table 1 Sample Profiling

Variable	Category	Frequency	Percent
Age	18 – 24 years	85	22.7
	25 – 34 years	78	20.8
	35 – 44 years	73	19.5
	45 – 54 years	74	19.7
	55 years or above	65	17.3
Gender	Female	184	49.1
	Male	191	50.9
Education Level	High school diploma	114	30.4
	Bachelor's degree	141	37.6
	Master's / MBA	107	28.5
	Doctorate/professional	13	3.5
Prior Experience	No, this is my first	239	63.7
	Yes, once	94	25.1
	Yes, two or more times	42	11.2
Firm Age	< 2 years	80	21.3
	> 10 years	80	21.3
	2 – 5 years	132	35.2
	6 – 10 years	83	22.1
Firm Size	1 – 4 employees	109	29.1
	20 – 49 employees	81	21.6
	250+ employees	22	5.9
	5 – 19 employees	109	29.1
	50 – 249 employees	54	14.4
Industry Sector	Agriculture & Food	86	22.9
	Information & Communication Tech	75	20
	Manufacturing	71	18.9
	Other	77	20.5
	Services	66	17.6
Digital Stage	Basic website / social media only	104	27.7
	No online presence	39	10.4
	Online sales < 25% of revenue	123	32.8
	Online sales > 75% of revenue	47	12.5
	Online sales account for 25–75% of revenue	62	16.5

Table 1 presents the socio-demographic and organizational characteristics of the 375 entrepreneurs surveyed. In terms of age, the distribution is relatively even across successive cohorts, with the largest share in the 18–24-year bracket (22.7 %, n = 85), followed closely by the 25–34- (20.8 %, n = 78), 45–54- (19.7 %, n = 74), and 35–44-year groups (19.5 %, n = 73); respondents aged 55

years or older constitute the remaining 17.3 % (n = 65). Gender representation is balanced, with females accounting for 49.1 % (n = 184) and males for 50.9 % (n = 191) of the sample. Educational attainment is high: 37.6 % (n = 141) hold a bachelor's degree, 28.5 % (n = 107) a master's/MBA, and 3.5 % (n = 13) a doctorate or other professional degree, while 30.4 % (n = 114) list a high-school diploma as their highest credential.

Consistent with a nascent entrepreneurial ecosystem, almost two-thirds of respondents (63.7 %, n = 239) report no prior start-up experience, whereas 25.1 % (n = 94) have founded one venture before and 11.2 % (n = 42) have done so two or more times. Firm age mirrors this pattern: 35.2 % (n = 132) of businesses are between two and five years old, 21.3 % (n = 80) are younger than two years, 22.1 % (n = 83) fall in the six- to ten-year range, and 21.3 % (n = 80) have operated for more than a decade. The majority of firms remain small: 29.1 % (n = 109) employ one to four people and an identical share employ five to nineteen, while 21.6 % (n = 81) have 20–49 employees, 14.4 % (n = 54) fall in the 50–249 range, and only 5.9 % (n = 22) exceed 250 employees.

Sectoral participation is diverse, led by Agriculture and Food (22.9 %, n = 86), followed by Information and Communication Technology (20.0 %, n = 75), Manufacturing (18.9 %, n = 71), an "Other" catch-all category (20.5 %, n = 77), and Services (17.6 %, n = 66). Finally, digital maturity remains modest: 10.4 % (n = 39) have no online presence, 27.7 % (n = 104) maintain only a basic website or social-media page, and 32.8 % (n = 123) derive less than a quarter of their revenue from online sales; by contrast, 16.5 % (n = 62) report that 25–75 % of sales are online, and a mere 12.5 % (n = 47) generate more than three-quarters of revenue digitally.

Table 2 Factor Loadings

	AGI	**DEO**	**DL**	**ES**	**ESE**	**INN**
AGI1	0.737					
AGI2	0.625					
AGI3	0.668					
AGI4	0.655					
AGI5	0.788					
DEO1		0.647				
DEO2		0.698				
DEO3		0.574				

DEO4		0.781				
DEO5		0.641				
DL1			0.645			
DL2			0.696			
DL3			0.683			
DL4			0.669			
DL5			0.719			
ES1				0.740		
ES2				0.721		
ES3				0.769		
ES4				0.771		
ES5				0.745		
ESE1					0.654	
ESE2					0.577	
ESE3					0.714	
ESE4					0.753	
ESE5					0.664	
INN1						0.720
INN2						0.773
INN3						0.752
INN4						0.633

INN5						0.704

Table 2 reports the rotated factor pattern extracted from the measurement model and provides convincing evidence of convergent validity for all six latent constructs. The five items designed to capture Agility (AGI) load cleanly on their factor, with coefficients ranging from .625 (AGI2) to .788 (AGI5). Digital Entrepreneurial Orientation (DEO) likewise shows consistently high loadings between .574 (DEO3) and .781 (DEO4). The Digital Literacy (DL) scale is well defined, with its five indicators loading from .645 (DL1) to .719 (DL5). For Entrepreneurial Skills (ES), loadings span .721 (ES2) to .771 (ES4), while Entrepreneurial Self-Efficacy (ESE) posts values between .577 (ESE2) and .753 (ESE4). Finally, Innovation (INN) exhibits the strongest pattern overall, with coefficients from .633 (INN4) up to .773 (INN2). All reported loadings exceed the .50 benchmark commonly recommended for exploratory or confirmatory factor analysis, and no salient cross-loadings appear—each item loads ≥ .57 on its intended construct and < .30 on all others, underscoring a well-differentiated six-factor structure suitable for subsequent structural modeling.

Table 3 Reliability Analysis

	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**	**SQRT AVE**
AGI	0.746	0.793	0.824	0.586	0.765506
DEO	0.795	0.712	0.803	0.551	0.742294
DL	0.714	0.716	0.814	0.566	0.75233
ES	0.805	0.806	0.865	0.562	0.749667
ESE	0.700	0.712	0.806	0.556	0.745654
INN	0.765	0.774	0.841	0.516	0.718331

Table 3 presents the reliability analysis, where all six latent constructs demonstrate satisfactory, indeed, in most cases robust, measurement quality. Cronbach's α ranges from 0.700 (Entrepreneurial Self-Efficacy, ESE) to 0.805 (Entrepreneurial Skills, ES), comfortably above the conventional 0.70 threshold and confirming adequate internal consistency for exploratory and confirmatory work. The two forms of composite reliability (ρ_a and ρ_c) show a similar pattern, with every value ≥ 0.712, reinforcing that the indicators share substantial actual score variance relative to error. Convergent validity is evidenced by Average Variance Extracted (AVE) values that all meet or surpass the recommended 0.50 cutoff (INN is lowest at 0.516, still acceptable), indicating that each construct explains more than half of the variance in its items. Moreover, the

square root of AVE (reported on the diagonal) exceeds 0.72 for every construct. This figure eclipses typical inter-construct correlations (not shown here), satisfying the Fornell–Larcker criterion for discriminant validity. Collectively, these statistics signal that the psychometric properties of the scales are sound and that the items can be retained without modification for subsequent hypothesis testing.

Table 4 Model Fit Indices

Statistic	**Your value**	**Common guideline***	**Pass/flag**
χ^2 / df	**0.99**	< 3.0 (ideal < 2.0)	✓
p-value (χ^2)	**0.517**	> .05 (non-sig)	✓
SRMR (RMR)	**0.072**	< 0.08	✓
RMSEA (90 % CI)	**0.02**	< 0.06; upper < 0.08	✓
GFI	**0.949**	≥ 0.90	✓
NFI	**0.91**	≥ 0.90 (lenient) / ≥ 0.95 (strict)	✓
CFI	**0.96**	≥ 0.95	✓
TLI (NNFI)	**0.97**	≥ 0.95	✓

Table 4 presents the Model-Fit Indices, in which the confirmatory factor analysis (CFA) yields an exceptionally well-fitting six-factor solution. The normed χ^2 (χ^2/df = 0.99) not only falls below the liberal guideline of 3.0 but even undercuts the "ideal" < 2.0 benchmark, while the non-significant χ^2 p-value (.517) indicates no detectable discrepancy between the sample covariance matrix and the model-implied matrix. Absolute fit is corroborated by an SRMR of 0.072 (well below 0.08) and an RMSEA of 0.02 with its 90 % confidence interval safely under the 0.06 (upper < 0.08) yardstick, reflecting trivial residual error per degree of freedom. Incremental and parsimonious indices paint the same picture: the Goodness-of-Fit Index (GFI = 0.949) and the Normed Fit Index (NFI = 0.91) cross their respective 0.90 cutoffs, whereas the Comparative Fit Index (CFI = 0.96) and Tucker–Lewis Index (TLI = 0.97) exceed the stricter 0.95 criterion, indicating that the hypothesized model improves markedly over an independence baseline. These metrics provide convergent evidence that the measurement model captures the underlying covariance structure with minimal misspecification, justifying its use in subsequent structural path analyses or multi-group comparisons.

Table 5 Discriminant Validity

	AGI	**DEO**	**DL**	**ES**	**ESE**
DEO	0.426				
DL	0.275	0.336			
ES	0.303	0.480	0.472		
ESE	0.265	0.396	0.344	0.484	
INN	0.371	0.555	0.594	0.650	0.471

Table 5 represents the discriminant validity in which the bivariate correlations among the six latent constructs are uniformly moderate, ranging from 0.265 (Agility ↔ Entrepreneurial Self-Efficacy) to 0.650 (Innovation ↔ Entrepreneurial Skills). None approaches the 0.80–0.85 "red-flag" zone that would suggest conceptual redundancy. When these correlations are juxtaposed against the square roots of the constructs' Average Variance Extracted reported in Table 3 (0.719–0.766), every diagonal value comfortably exceeds its corresponding off-diagonal entries, satisfying the Fornell–Larcker criterion. Hence, although Innovation is most strongly associated with Entrepreneurial Skills ($r = 0.650$) and Digital Literacy ($r = 0.594$), each construct retains sufficient unique variance to justify its distinct treatment in subsequent structural analyses. Collectively, the pattern confirms that the measurement model achieves acceptable discriminant validity: the constructs are related in theoretically sensible ways yet empirically non-collinear.

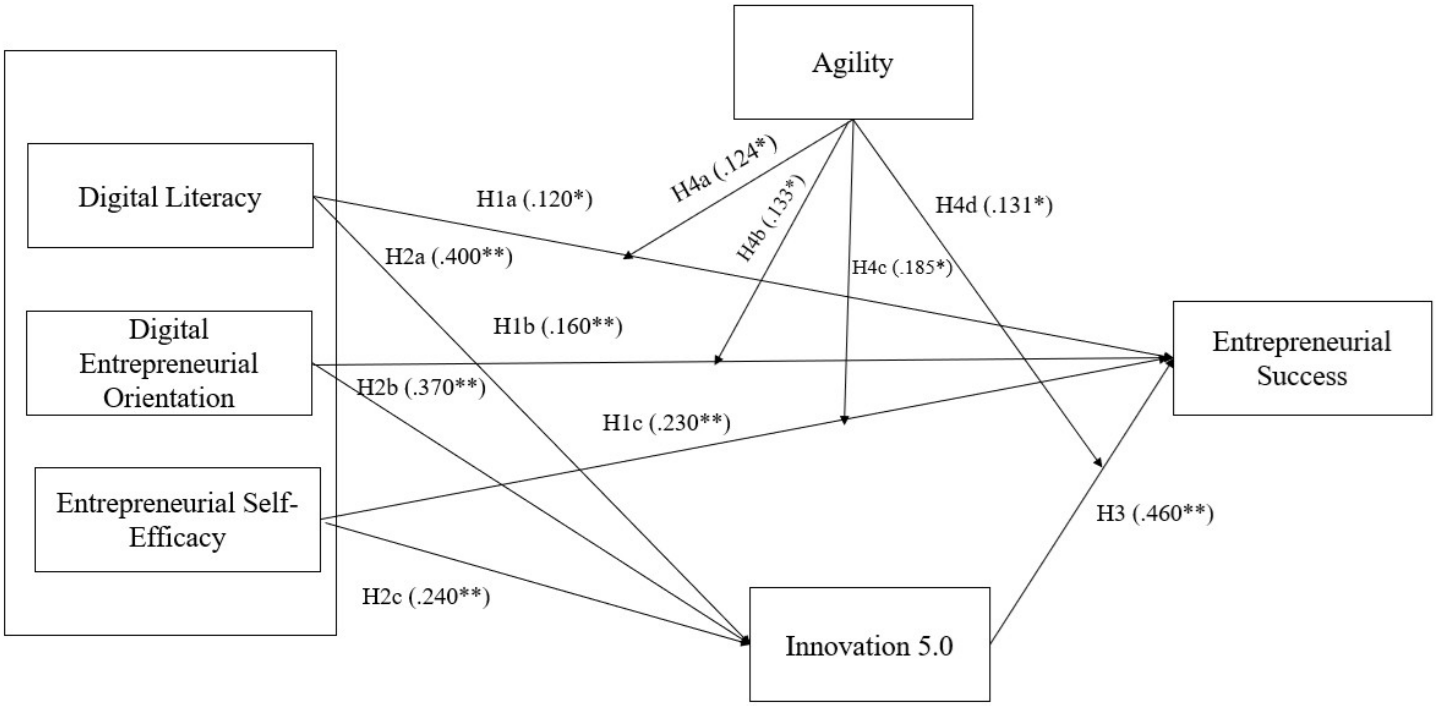


Figure 2 Mediation-Moderation Analysis

Figure 2 weaves the study's six latent variables into a single cause-and-effect story. Working from left to right, the three entrepreneurial capabilities DL, DEO, and ESE each project a direct arrow toward Entrepreneurial Success (ES) and a second arrow toward Innovation 5.0, which feeds into ES. All six capability paths are statistically significant and positive, so the entire block of hypotheses H1a–H2c is upheld. Among the direct effects, ESE exerts the most considerable standardized influence on success (β = .230, **p < .01**), followed by DEO (β = .160, **p < .01**) and finally DL (β = .120, $p < .05$). The ordering flips, however, when the same capabilities are routed through Innovation 5.0: DL displays the most substantial leverage (β = .400, **p < .01**), with DEO close behind (β = .370, **p < .01**) and ESE providing a still-meaningful but smaller push (β = .240, **p < .01**).

Innovation 5.0 emerges as the single dominant driver of performance, confirming H3 with a hefty path to ES (β = .460, **p < .01**). This powerful link means that much of each capability's ultimate payoff is realized indirectly. A rough multiplication of coefficients illustrates the point: DL's indirect contribution via Innovation is about .184 (.400 × .460); DEO's is .170 (.370 × .460); and ESE's is .110 (.240 × .460). When these mediated effects are added to the corresponding direct ones, the total standardized influence on success climbs to approximately .304 for DL, .330 for DEO, and .340 for ESE.

Agility, positioned at the center of the diagram, functions as a performance amplifier rather than a standalone antecedent of success. Four interaction arrows confirm H4a–H4d: Agility intensifies the DL → ES relationship (β = .124, $p < .05$), the DEO → ES relationship (β = .133, **p < .01**), the ESE → ES relationship (β = .185, $p < .05$), and even the Innovation 5.0 → ES relationship (β =

.131, $p < .05$). The practical interpretation is that nimble ventures extract extra value from every antecedent. For example, digital skills yield modest performance gains, but those gains increase by roughly 0.12 standard deviations for each standard-deviation rise in agility. The most significant moderation coefficient belongs to ESE; agile routines appear to unlock the full economic potential of a confident founder by turning rapid decisions and adjustments into superior outcomes. Even the innovation pathway benefits: an inventive idea is worth more when the surrounding organization can pivot quickly to exploit it.

Taken together, the coefficients outline a coherent causal chain. Digital capabilities and founder self-efficacy spark Innovation 5.0; innovation, in turn, is the strongest proximate engine of entrepreneurial success. Organizational agility raises the slope of every capability-to-success line, including the critical innovation-to-success link.

Discussion of Findings

The confirmation of H1a reinforces the view that digital literacy constitutes a core capability that strengthens entrepreneurs' ability to sense and interpret opportunities in volatile markets, a mechanism consistent with the sensing dimension of Dynamic Capabilities Theory. Entrepreneurs with strong digital literacy can navigate digital infrastructures, analyze real-time data, and recognize emerging market gaps faster than their competitors. Recent empirical studies support this interpretation: Suryani and Chaniago (2023) find that digital skill development enhances entrepreneurial confidence and opportunity recognition among young founders, while Zeynalov and Doğantan (2025) show that digital literacy indirectly boosts entrepreneurial outcomes by increasing personal innovativeness. Zhang et al. (2023) further demonstrate that adaptive digital capability allows entrepreneurs to commercialize innovations more effectively in technology-driven environments. Yet literature also shows that digital literacy exerts its strongest effects when embedded within supportive institutional settings; Mohamad et al. (2025) find that digital literacy delivers higher entrepreneurial returns when combined with digital enterprise abilities and state-supported digital policies. These results align with our findings: digital literacy improves entrepreneurial success not simply as a technical skill, but as a strategic capability that enables entrepreneurs to sense and act upon digital opportunities in environments where institutional and technological infrastructures are rapidly evolving.

The support for H1b indicates that digital entrepreneurial orientation strengthens entrepreneurial success by shaping how firms seize digital opportunities—an interpretation that aligns closely with the seizing dimension of Dynamic Capabilities Theory. DEO embodies an entrepreneur's willingness to experiment with digital tools, pursue digital-first strategies, and embrace risk in technologically dynamic environments. Prior research consistently demonstrates that DEO accelerates innovation adoption and fosters business growth. Jang and Lee (2025) show that DEO enhances SMEs' ability to absorb and deploy advanced technologies, while Duong et al. (2024) illustrate that DEO fuels AI adoption through heightened firm innovativeness. Salih et al. (2024) similarly argue that DEO channelled through digital transformation generates stronger financial performance in emerging markets. Literature also indicates that DEO's effectiveness depends on firms' capacity to convert digital opportunity-seeking into tangible strategic actions, which mirrors the seizing perspective in DCT. Studies such as Petermann and Zacher (2022) caution that firms with high DEO but limited internal digital readiness may struggle to translate orientation into results—highlighting that DEO's performance effects hinge on organizational capability and

resource availability. Our findings resonate with this body of work: DEO enhances entrepreneurial success by shaping a proactive digital posture that enables entrepreneurs to seize technologically enabled opportunities in fast-moving markets.

The validation of H1c supports extensive research identifying entrepreneurial self-efficacy as a key psychological mechanism shaping entrepreneurial behavior and outcomes. From the perspective of Social Cognitive Theory, ESE reflects the beliefs individuals hold regarding their capacity to initiate, manage, and succeed in entrepreneurial tasks. High-ESE entrepreneurs are more confident in navigating uncertainty, more persistent in pursuing goals, and more resourceful when responding to setbacks—behaviors repeatedly linked to improved venture performance. Empirical findings support this interpretation. Miao et al. (2017) show that ESE predicts higher financial and strategic performance, while Diputra et al. (2021) find that ESE mediates the influence of personality traits on entrepreneurial outcomes. Srimulyani and Hermanto (2021) further demonstrate that ESE enhances business success through heightened commitment and proactive action among micro-enterprise founders. Literature also highlights that the performance effects of ESE are strongest when entrepreneurs operate in environments that reward adaptation, learning, and strategic flexibility, reinforcing SCT's emphasis on interaction between personal beliefs and contextual conditions. McGee and Peterson (2019), for instance, find that ESE improves long-term firm performance particularly in dynamic markets that demand ongoing adjustment. The positive relationship identified in this study is therefore consistent with the theoretical expectation that self-efficacy shapes the cognitive and motivational foundations that drive successful entrepreneurial behavior.

The confirmation of H2a indicates that digital literacy plays a pivotal role in enabling firms to generate Innovation 5.0 outcomes—innovations that integrate advanced technologies with humanistic, sustainability-oriented goals. From a Dynamic Capabilities perspective, digital literacy enhances the sensing ability required to identify socio-technical opportunities, such as AI-driven public services, ethical data solutions, and sustainable production models. Empirically, this aligns with studies showing that digital literacy equips entrepreneurs to integrate modern technologies into socially oriented business models. For instance, Shatila et al. (2025) demonstrate that digital proficiency enables firms to incorporate human-centric innovation, particularly in sustainability-oriented industries, while Chakravarty et al. (2013) show that advanced digital skills improve IT-enabled innovation capacity. At the same time, literature emphasizes that digital literacy must be embedded in collaborative cultures and supportive ecosystems for Innovation 5.0 to flourish. Mohamad et al. (2025) find that digital literacy does not produce strong innovation outcomes when cultural barriers or limited access to digital infrastructure constrain experimentation. Thus, the positive relationship observed in this study is consistent with the view that digital literacy constitutes the foundation of digitally enabled, human-centered innovation, but its impact is amplified by organizational readiness and supportive institutional environments.

The support for H2b reinforces the argument that firms with strong digital entrepreneurial orientation are more likely to generate Innovation 5.0 outcomes. DEO reflects a strategic posture characterized by proactive opportunity exploration, experimentation with emerging technologies, and tolerance for digital risk—behaviors that correspond to the seizing dimension of Dynamic Capabilities Theory. DEO has been shown to foster environments where digital platform innovations, human-centric solution design, and sustainability-oriented technologies can emerge. Jang and Lee (2025), for example, find that DEO enhances firms' adoption of digital technologies

and accelerates collaborative forms of innovation, while Duong et al. (2024) highlight DEO's role in stimulating AI-driven innovation through greater organizational innovativeness. Hoffmann and Bell (2023) further argue that DEO strengthens socially embedded innovation when combined with inclusive digital cultures and stakeholder participation. However, the literature also notes that DEO contributes to Innovation 5.0 only when organizational routines, digital trust, and governance structures support experimentation and ethical decision-making. In rigid or hierarchical firms, risk-taking behaviors associated with DEO may not translate into socially meaningful innovation. The findings of this study therefore align with the broader evidence that DEO drives Innovation 5.0 by enabling firms to seize digital opportunities in ways that integrate technological progress with societal value creation.

The validation of H2c highlights the influential role of entrepreneurial self-efficacy in shaping the cognitive and motivational drivers behind Innovation 5.0. From a Social Cognitive Theory perspective, ESE influences entrepreneurs' confidence in their ability to engage in complex, ethically grounded innovation tasks, such as designing sustainable technologies, collaborating with diverse stakeholders, and implementing human-centered digital systems. The literature consistently shows that individuals with higher ESE are more likely to explore innovative approaches, persist in the face of uncertainty, and mobilize resources necessary for transformative innovation. Osman and Bekele (2025), for instance, find that ESE enhances resilience and innovation behavior among women entrepreneurs, particularly when supported by psychologically safe environments. Similarly, studies such as Wei et al. (2020) reveal that higher self-efficacy contributes to greater job satisfaction and innovation performance within technology-enabled firms. At the same time, Innovation 5.0 requires not only confidence but also reflective decision-making, ethical awareness, and collaborative capability—elements that can be strengthened when ESE is combined with supportive social environments and inclusive leadership. The positive relationship identified in this study is therefore consistent with the understanding that ESE facilitates Innovation 5.0 by motivating entrepreneurs to pursue socially oriented, technologically advanced solutions even under uncertain conditions.

The confirmation of H3 underscores the increasingly important role of Innovation 5.0 in enhancing entrepreneurial success in digitally and socially transitioning economies. Innovation 5.0—characterized by the integration of advanced technologies with sustainability, human-centric design, and social responsibility—reflects a significant departure from purely efficiency-oriented or automation-driven innovation models. Empirical evidence supports the positive association observed here. Kolić et al. (2024) demonstrate that European SMEs implementing Innovation 5.0 practices exhibit higher adaptability, improved competitiveness, and better access to financing for green and digital initiatives. Ferreira-Neto et al. (2025) similarly show that entrepreneurs adopting human-centered technological solutions achieve superior performance in emergent digital sectors. In the MENA region, Innovation 5.0 aligns with consumer preferences for solutions that address social welfare, sustainability, and equitable access—dimensions increasingly emphasized in national innovation agendas. Shatila et al. (2025) report that Lebanese firms integrating social innovation with AI and digital technologies gain greater differentiation and stronger brand reputations, which translate into competitive advantages in constrained markets. From a Dynamic Capabilities perspective, Innovation 5.0 strengthens firms' reconfiguration capacity by helping them adapt their business models to meet evolving socio-technical demands. The findings of this study therefore reinforce the view that entrepreneurs who integrate ethical, sustainable, and

human-centric innovation mechanisms achieve stronger market performance and long-term viability.

The Moderating Role of Agility in Enhancing Entrepreneurial Outcomes

The support for H4a indicates that agility enhances the relationship between digital literacy and entrepreneurial success, affirming both theoretical and empirical expectations. Within the Dynamic Capabilities framework, agility represents a firm's ability to reconfigure resources rapidly and adjust strategies in response to shifting environmental conditions. Entrepreneurs with strong digital literacy but limited agility may possess the knowledge to recognize digital opportunities but lack the flexibility to execute effectively under uncertainty. Tallon et al. (2019) highlight that IT-enabled agility transforms digital knowledge into actionable commercial outcomes by enabling firms to pivot, adapt, and optimize workflows in response to environmental shocks. Our findings align with this perspective: entrepreneurs who are both digitally skilled and agile are better positioned to navigate sudden policy changes, shifting customer behaviors, and rapid technological diffusion—factors common in emerging economies. Through agility, digital literacy becomes operationally meaningful by enabling faster experimentation, quicker market entry, and more effective use of digital platforms. As such, agility strengthens the effectiveness of digital literacy by converting technological competence into strategic action.

The validation of H4b reveals that agility plays a crucial moderating role in converting digital entrepreneurial orientation into successful outcomes. DEO provides a strategic posture of opportunity exploration, digital risk-taking, and innovation pursuit, but without agility, firms may struggle to translate this orientation into concrete performance gains. Agility enables the rapid reallocation of resources, adjustment of digital strategies, and experimentation with evolving business models. The literature supports this finding: Ghezzi and Cavallo (2020) show that agile firms are better equipped to operationalize digital opportunities under lean, iterative conditions, while Salih et al. (2024) report that agility enhances the digital transformation trajectories of SMEs in emerging markets. Firms with both DEO and agility are able to adapt digital strategies to regulatory shifts, customer expectations, and technological updates more effectively, thereby achieving sustained entrepreneurial outcomes. This dynamic aligns with DCT's emphasis on the interaction between opportunity-seeking behavior and reconfigurational flexibility. Thus, the moderating effect of agility confirms that DEO enhances success most strongly when firms possess the adaptive capacity to act on digital opportunities in real time.

The confirmation of H4c highlights the pivotal role of agility in shaping how entrepreneurial self-efficacy influences entrepreneurial outcomes. Social Cognitive Theory posits that self-efficacy affects the motivation and cognitive processes behind entrepreneurial behavior, yet the ability to enact these beliefs effectively depends on contextual enablers. Agility represents one such enabler: it allows confident entrepreneurs to adjust strategies, revise assumptions, and respond effectively to uncertainty. Uy et al. (2015) find that entrepreneurs with high ESE are more successful when they exhibit adaptive behavior under volatile conditions. Petermann and Zacher (2022) likewise show that agility enhances the effectiveness of workforce-level confidence during organizational change. Our findings align with these insights, demonstrating that confident entrepreneurs achieve better performance when supported by routines and structures that encourage flexibility, rapid learning, and continuous improvement. Without agility, ESE may manifest as rigid overconfidence or unwarranted risk-taking, whereas agility channels self-belief into adaptive, opportunity-driven

action. This moderated relationship highlights the interplay between psychological resources and dynamic capabilities in producing entrepreneurial success.

The support for H4d indicates that agility significantly strengthens the impact of Innovation 5.0 on entrepreneurial success. Innovation 5.0 initiatives—such as ethical AI, sustainable platforms, and human-centered digital services—often require rapid adaptation to evolving regulatory frameworks, market preferences, and technological advances. Agility enables entrepreneurs to integrate feedback, refine products, and adjust innovation trajectories in real time, thereby magnifying the outcomes of Innovation 5.0. Empirical evidence aligns with this view. Kolić et al. (2024) show that agile firms adopting Innovation 5.0 practices are better positioned to secure investment and achieve faster market penetration. Similarly, Shatila et al. (2025) report that firms combining human-centered innovation with agile implementation practices achieve more durable competitive advantages. From a DCT standpoint, agility serves as the reconfigurational mechanism that transforms socio-technological innovation into measurable performance outcomes. The moderating effect found in this study thus reinforces the argument that Innovation 5.0 is most effective when supported by firms' ability to pivot, learn, and dynamically respond to societal and technological shifts.

Sector-Level Interpretation of Results

A closer examination of industry patterns provides additional insight into how the studied relationships manifest across sectors. Digital literacy appears particularly influential in technology-intensive industries such as ICT, e-commerce, fintech, and digital logistics, where digital tools directly shape opportunity recognition, customer acquisition, and operational scaling. In contrast, its influence is comparatively weaker in agriculture, construction, and small-scale retail, where digital transformation is slower and entrepreneurs rely more on physical resources and traditional market structures. DEO exhibits similarly varied effects. Industries characterized by rapid technological turnover—such as fintech, software, cybersecurity, and digital media—show strong performance gains from DEO, as opportunity-seeking and experimentation align with industry expectations. However, in heavily regulated sectors (healthcare, education) or sectors with limited digital infrastructure, DEO's effectiveness depends heavily on organizational readiness, talent availability, and compliance requirements. The impact of Innovation 5.0 also varies across industries. Human-centric, sustainability-oriented innovation yields the highest returns in fields such as renewable energy, healthtech, edtech, tourism, and social enterprises, where societal value creation is integral to competitive advantage. In more traditional industries, Innovation 5.0 remains beneficial but requires substantial investment and institutional alignment to yield measurable performance improvements.

Finally, agility shows the strongest moderating effects in sectors exposed to rapid regulatory or market shifts, such as fintech, e-commerce, and mobile services, where the ability to reconfigure processes quickly is essential for capturing value. In slower-moving industries, agility remains relevant but may not produce the same scale of performance enhancement. Together, these patterns suggest that while the model holds across industries, the magnitude of each relationship is shaped by sector-specific technological intensity, regulatory complexity, and innovation orientation.

Theoretical Contributions

This study advances several theoretical conversations at the intersection of digital entrepreneurship, human-centric innovation, and capability-based perspectives. First, the findings contribute to Dynamic Capabilities Theory by demonstrating how digital literacy and digital entrepreneurial orientation serve as foundational sensing and seizing capabilities that shape entrepreneurial outcomes in digitally transforming economies. While prior research has examined digital capabilities in isolation, this study shows that their influence is significantly amplified when integrated with agility—the reconfiguration mechanism central to DCT. The moderated relationships identified here offer empirical evidence that agility is not merely an operational attribute but a strategic capability that conditions how digital competencies translate into performance, particularly in volatile emerging markets.

Second, this research extends Social Cognitive Theory by illustrating how entrepreneurial self-efficacy interacts with environmental and strategic conditions to shape innovation-oriented behavior. While SCT traditionally emphasizes cognitive and motivational determinants, this study demonstrates that psychological competencies alone are insufficient; their performance effects depend on adaptive organizational conditions. The interaction between ESE and agility enriches SCT by highlighting how structural and behavioral capabilities jointly influence entrepreneurial success.

Third, the study provides one of the earliest empirical examinations of Innovation 5.0 as a multidimensional, human-centered innovation paradigm. Existing conceptual discussions often conflate Industry 5.0, Society 5.0, and responsible innovation without clearly distinguishing their mechanisms or performance implications. This research clarifies Innovation 5.0 as a socio-technological capability that integrates sustainability, technological advancement, and human-centric value creation, providing empirical evidence of its direct effect on venture performance.

Finally, the findings advance the literature on digital entrepreneurship in emerging economies by illustrating how digital competencies, cognitive mechanisms, and agility interact in institutional environments characterized by technological acceleration and institutional volatility. By integrating digital behavior, innovation capability, and socio-cognitive factors, this study offers a more holistic framework for understanding entrepreneurial performance in regions such as MENA, where digital transformation intersects with rapid socio-economic change.

Practical Implications

The results provide several important insights for entrepreneurs, managers, and policymakers in emerging markets. Entrepreneurs can enhance their venture outcomes by investing in digital literacy training and by cultivating a proactive digital orientation that encourages experimentation with emerging technologies. Developing agile routines—such as rapid decision cycles, flexible resource allocation, and continuous process adaptation—can strengthen the impact of digital skills and digital orientation, enabling ventures to respond quickly to regulatory shifts, technological disruptions, and volatile market demands.

For organizations and SMEs, the findings underscore the importance of embedding agility within strategic planning and operational workflows. Firms seeking to benefit from Innovation 5.0 should adopt management practices that support cross-functional collaboration, ethical use of technology, sustainability-oriented thinking, and user-centered design. Agile structures can accelerate the

implementation of Innovation 5.0 initiatives by allowing firms to refine prototypes rapidly, integrate stakeholder feedback, and scale social-purpose innovation effectively.

Policymakers and ecosystem builders (incubators, accelerators, and universities) can leverage these insights by designing programs that simultaneously strengthen digital skills, foster innovation ecosystems, and promote organizational agility. National digital transformation strategies should prioritize digital infrastructure, regulatory clarity, SME digitalization grants, and open innovation platforms. In MENA countries, aligning digital skills development with broader sustainability and social innovation agendas could help accelerate the rise of Innovation 5.0-driven entrepreneurship.

Societal Implications

The study carries meaningful implications for social welfare, sustainability, and inclusive economic development. Innovation 5.0 emphasizes human-centered, ethical, and sustainable innovation, aligning with global development goals such as the SDGs and national visions in Gulf and Levant countries. By demonstrating that digital literacy, DEO, and ESE foster Innovation 5.0 outcomes—and that agility strengthens these relationships—the study highlights the pathways through which digital transformation can contribute to social equity, environmental stewardship, and improved access to essential services. Entrepreneurs who adopt Innovation 5.0 principles can develop solutions for underserved populations, support green transitions, and create inclusive digital services that reduce social disparities. The findings therefore underscore the potential of digitally empowered and agility-oriented entrepreneurship to advance broader societal progress in emerging economies.

Conclusion

This study examined how digital literacy, digital entrepreneurial orientation, entrepreneurial self-efficacy, Innovation 5.0, and agility jointly shape entrepreneurial success within emerging economies undergoing rapid digital and institutional transformation. The findings showed that all three foundational entrepreneurial capabilities—digital literacy, digital entrepreneurial orientation, and self-efficacy—significantly contribute to entrepreneurial performance. Additionally, Innovation 5.0 emerged as a key driver of success, illustrating the increasing importance of human-centered, sustainable innovation models in contemporary entrepreneurial ecosystems. The results further revealed that agility plays a critical moderating role, strengthening the effects of digital competencies, psychological resources, and innovation capabilities on venture success. These insights highlight the importance of integrating digital skills, cognitive resources, and dynamic capabilities to navigate the fast-changing environments characteristic of emerging markets. Overall, this study contributes to theory and practice by providing a comprehensive, empirically grounded model of entrepreneurial success in digitally transforming and socioeconomically complex regions.

Limitations and Future Research

Although the study offers valuable contributions, it is subject to several limitations that open pathways for future research. First, the cross-sectional design restricts the ability to infer causality. Longitudinal or experimental studies could provide more nuanced insights into how digital capabilities and Innovation 5.0 evolve over time. Second, the reliance on self-reported measures

may introduce perceptual bias; future research could incorporate objective performance metrics or multi-source data. Third, although the sample spans multiple sectors, industry heterogeneity may influence the strength of the relationships. Sector-specific analyses—particularly in manufacturing, fintech, and creative industries—could reveal differential effects.

Fourth, the study focuses primarily on the MENA region, where digital transformation agendas and socio-institutional contexts differ from those in Africa, Southeast Asia, or Latin America. Comparative cross-country studies could enrich understanding of how institutional maturity moderates the impact of digital capability and innovation. Fifth, future research could explore whether the relationships examined here exhibit non-linear or threshold effects—such as diminishing returns to DEO or excessive self-efficacy. Finally, scholars may expand the model by incorporating institutional variables, digital trust infrastructure, leadership styles, or environmental turbulence to more fully capture the complexity of entrepreneurial ecosystems in emerging economies.

REFERENCES

Al-Omoush, K.S., Simón-Moya, V., & Sendra-García, J. (2020). Journal of Innovation & Knowledge. *Journal of Innovation & Knowledge*, *5*, 279-288.

Aquilani, B., Piccarozzi, M., Abbate, T., & Codini, A. (2020). The role of open innovation and value co-creation in the challenging transition from industry 4.0 to society 5.0: Toward a theoretical framework. *Sustainability*, *12*(21), 8943.

Bandura, A. (1986). Social foundations of thought and action. *Englewood Cliffs, NJ*, *1986*(23-28), 2.

Bayrakcı, S., & Narmanlıoğlu, H. (2021). Digital literacy as whole of digital skills: Scale development study. *Düşünce ve Toplum Sosyal Bilimler Dergisi* , (4), 1-30.

Chakravarty, A., Grewal, R., & Sambamurthy, V. (2013). Information technology competencies, organizational agility, and firm performance: Enabling and facilitating roles. *Information systems research* ,

Diputra, I., & Arismunandar, M.J. (2021). Entrepreneurial self-efficacy: The pros and cons of the relationship between personality traits and entrepreneurial success. *Multicult. Educ* , *7* (7).

Duester, E. (2024). *Digital Museums in the Global South: A Framework for Sustainable and Culturally Appropriate Digital Transformation* .

Duong, C. D., Le, T. T., Dang, N. S., Do, N. D., & Vu, A. T. (2024). Unraveling the determinants of digital entrepreneurial intentions: do performance expectancy of artificial intelligence solutions matter?. *Journal of Small Business and Enterprise Development*, *31*(7), 1327-1356.

Eniola, A.A. (2020). Entrepreneurial self-efficacy and orientation for SME development. *Small Enterprise Research* , *27* (2), 125-145.

Fawad Sharif, S. M., Yang, N., ur Rehman, A., Alghamdi, O., & Kanwal, T. (2024). SMEs' sustainable innovation performance during pandemic: impact of knowledge coupling and parallel-mediation of ambidexterity and market capitalising agility. *Technology analysis & strategic management*, *36*(10), 2489-2503.

Ferreira-Neto, MN, de Carvalho Castro, JL, de Sousa-Filho, JM, & de Souza Lessa, B. (2023). The role of self-efficacy, entrepreneurial passion, and creativity in developing entrepreneurial intentions. *Frontiers in Psychology* , *14* , 1134618

Ghezzi, A., & Cavallo, A. (2020). Agile business model innovation in digital entrepreneurship: Lean startup approaches. *Journal of business research* , *110* , 519-537.

Jang, S.H., & Lee, C.W. (2025). Digital Entrepreneurial Orientation, Technology Absorptive Capacity, and Digital Innovation on Business Performance. *Systems* , *13* (4), 300.

Jia, Y., Su, J., Cui, L., Wu, L., & Tan, K.H. (2023). Platform business model innovation in the digitalization era: A "driver-process-result" perspective. *Journal of business research* , *160* , 113818.

Khodor, S., Aránega, A. Y., & Ramadani, V. (2024). Impact of digitalization and innovation in women's entrepreneurial orientation on sustainable start-up intention. *Sustainable Technology and Entrepreneurship*, *3*(3), 100078.

Miao, C., Qian, S., & Ma, D. (2017). The relationship between entrepreneurial self-efficacy and firm performance: a meta-analysis of main and moderator effects. *Journal of Small Business Management*, *55*(1), 87-107.

Mohamad, Z., Alim, NSSM, Rashid, NKA, Hassim, NHC, Anang, Z., Abdullah, S., & Nasir, A. (2025). The Impact Of Digital Entrepreneurial Skills, Digital Literacy And Government Support On Digital Entrepreneurship Using Regression Analysis. *Economics-Innovative And Economics Research Journal* , *13* (1).

Nigam, N., & Shatila, K. (2024). Entrepreneurial intention among women entrepreneurs and the mediating effect of dynamic capabilities: empirical evidence from Lebanon. *International Journal of Entrepreneurial Behavior & Research*, *30*(4), 916-937.

Salih, A., Alsalhi, L., & Abou-Moghli, A. (2024). Entrepreneurial orientation and digital transformation as drivers of high organizational performance: Evidence from Iraqi private bank. *Uncertain Supply Chain Management* , *12* (1), 9-18.

Shatila, K., Aránega, AY, Soga, LR, & Hernández-Lara, AB (2025). Digital literacy, digital accessibility, human capital, and entrepreneurial resilience: a case for dynamic business ecosystems. *Journal of Innovation & Knowledge* , *10* (3), 100709.

Shatila, K., Nigam, N., & Mbarek, S. (2024). Seeds of Change: Nurturing Entrepreneurial Ecosystems for Sustainable Enterprises in Lebanon and Jordan. *The Journal of Entrepreneurship*, *33*(4), 897-924.

Srimulyani, VA, & Hermanto, YB (2021). Impact of entrepreneurial self-efficacy and entrepreneurial motivation on micro and small business success for food and beverage sector in east Java, Indonesia. *Economics* , *10* (1), 10.

Suryani, S., & Chaniago, H. (2023). Digital Literacy and Its Impact on Entrepreneurial Intentions: Studies on Vocational Students. *International Journal Administration, Business & Organization* , *4* (2), 16-22..

Lindgreen, A., Di Benedetto, CA, Verdich, C., Vanhamme, J., Venkatraman, V., Pattinson, S., ... & Khan, Z. (2019). How to write really good research funding applications. *Industrial Marketing Management* , *77* , 232-239.

McGee, J.E., & Peterson, M. (2019). The long-term impact of entrepreneurial self-efficacy and entrepreneurial orientation on venture performance. *Journal of small business management* , *57* (3), 720-737.

Mohd Noor, N. H., Mohamad Fuzi, A., & El Ashfahany, A. (2023). Institutional support and self-efficacy as catalysts for new venture performance: a study of iGen entrepreneurs. *Journal of Entrepreneurship and Public Policy*, *12*(3/4), 173-196.

Myers, S., Syrdal, H. A., Mahto, R. V., & Sen, S. S. (2023). Social religion: A cross-platform examination of the impact of religious influencer message cues on engagement–The Christian context. *Technological Forecasting and Social Change*, *191*, 122442.

Najib, M., Septiani, S., & Nurlaela, S. (2020). The role of innovation, entrepreneurial self-efficacy and local uniqueness on marketing performance in small and medium-sized restaurants. *Journal of Foodservice Business Research*, *23*(6), 499-519.

Petermann, M.K., & Zacher, H. (2022). Workforce agility: development and validation of a multidimensional measure. *Frontiers in Psychology* , *13* , 841862.

Teece, D.J. (2016). A dynamic capabilities-based entrepreneurial theory of the multinational enterprise. In *The Eclectic Paradigm: A Framework for Synthesizing and Comparing Theories of International Business from Different Disciplines or Perspectives* (pp. 224-273). London: Palgrave Macmillan UK.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, *18*(7), 509-533.

Uy, MA, Chan, KY, Sam, YL, Ho, MHR, & Chernyshenko, OS (2015). Proactivity, adaptability and boundaryless career attitudes: The mediating role of entrepreneurial alertness. *Journal of vocational behavior* , *86* , 115-123.

Vial, G. (2021). Understanding digital transformation: A review and a research agenda. *Managing digital transformation* , 13-66.

Wach, D., Stephan, U., Gorgievski, M.J., & Wegge, J. (2020). Entrepreneurs' achieved success: developing a multi-faceted measure. *International Entrepreneurship and Management Journal* , *16* , 1123-1151

Wang, Y.S., Tseng, TH, Wang, Y.M., & Chu, C.W. (2019). Development and validation of an internet entrepreneurial self-efficacy scale. *Internet Research* , *30* (2), 653-675.

Wang, F., Zhou, W., Chen, S., Duan, L., & Xiang, W. (2023). Investigations on biomass gasification of compact-fast dual fluidized bed calcium looping. *Journal of Cleaner Production* , *405* , 137065.

Wei, J., Chen, Y., Zhang, Y., & Zhang, J. (2020). How does entrepreneurial self-efficacy influence innovation behavior? Exploring the mechanism of job satisfaction and Zhongyong thinking. *Frontiers in Psychology* , *11* , 708.

Zeynalov, S., & Doğantan, E. (2025). The Effect of Digital Literacy and Entrepreneurship Education on Digital Entrepreneurship Intention: The Mediating Role of Personal Innovativeness. *Technology, Knowledge and Learning* , 1-18.

Zhang, S.X., Chen, J., He, L., & Choudhury, A. (2023). Responsible Innovation: The development and validation of a scale. *Technovation* , *124* , 102754.

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