



Mechanisms for digital business model innovation in international new ventures from developing economies

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ABSTRACT

Digital international new ventures (DINVs) increasingly leverage ecosystem partnerships to drive digital business model innovation (DBMI) and navigate global markets. However, research to examine how such partnerships contribute to DBMI is limited, particularly in resource-constrained firms from developing economies. Drawing on the dynamic capabilities view, organizational learning theory and an ecosystem-based digital learning perspective, we investigate the role of ecosystem partnerships in enabling DBMI through the development of digital learning capabilities. Based on survey data from 147 DINVs in a developing economy, findings suggest that ecosystem partnerships enhance digital learning, which in turn facilitates DBMI. Moreover, foreign market turbulence tends to positively moderate the relationship between ecosystem partnerships and digital learning capability. In addition to demonstrating how DINVs build innovation capacity under volatile conditions, findings help to extend perspectives on capabilities, learning, and ecosystems. Leveraging ecosystem partnerships, digital learning, and digital business model innovation appears to enhance the performance of DINVs. Ecosystem partnerships appear to be especially valuable to DINVs when market turbulence is high. The study offers theoretical and practical insights into the mechanism through which DINVs from developing economies can achieve digital innovation, and provides policy implications for supporting their international growth.

1. Introduction

Digitalization has fundamentally transformed how organizations across sectors develop and deliver value in international markets (e.g., Ojala et al., 2018). The rise of digital technologies and e-commerce is disrupting traditional business models (Cumming et al., 2023; Yoo et al., 2012), prompting firms to adopt new digital business models that support international expansion and value creation — particularly in the scaling of international new ventures (INVs), smaller firms that experience early and rapid internationalization (Knight & Cavusgil, 2004; Mihailova, 2023; Oviatt & McDougall, 2018). Speed, scalability, and adaptability—core digital advantages—are critical for such firms operating across borders. Digital business model innovation (DBMI) refers to new ways of creating and capturing business value enabled by digital technologies (Fichman et al., 2014; Soluk, Miroshnychenko, et al., 2021; Zahoor et al., 2023).

INVs often leverage digital assets to gain competitive advantages

across borders (Ojala et al., 2018). Accordingly, we define digital international new ventures (DINVs) as *digitally enabled international new ventures that utilize digital or platform-based methods for business activities such as digital marketing, e-commerce, stakeholder communication, international coordination, and operations* (Donbesuur et al., 2023). Many such firms seek to acquire capabilities sufficient for developing DBMI. Understanding how they do so is especially important for DINVs from developing economies.

Most existing research in international business (IB) has focused on large multinational enterprises and INVs from the advanced economies (Arikan & Shenkar, 2021; Kim & Cavusgil, 2020; Ott et al., 2023). Digital business models in INVs remain relatively underexplored in academic research (Kim & Cavusgil, 2020). Limited attention has been paid to how INVs build digital capabilities for business model innovation in foreign markets (Ojala et al., 2018; Ojala et al., 2023), especially among ventures from developing economies.

INVs must cope with the limited resources related to finance and

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infrastructure attendant to smaller enterprises. Such companies must also confront lower economies of scale and scope, as well as human resource challenges arising from a reduced ability to hire superior managers and other categories of talent, relative to large firms. Moreover, by definition, INVs are younger firms, characterized by lesser experience and network connections, and, usually, a relatively early phase of learning and knowledge development (e.g., United-Nations, 2024; World-Bank IEG, 2019). On the bright side, however, INVs may possess great agility and entrepreneurial orientation (e.g., Cavusgil & Knight, 2009). For their part, developing economies are characterized by institutional voids and infrastructure limitations as well as economic and human capital deficits (Duttagupta & Pazarbasioglu, 2021; IMF, 2025). Consequently, INVs from such contexts face substantial challenges at both the national and firm levels.

Developing economies are low-income, underperforming economies characterized by limited industrialization (Duttagupta & Pazarbasioglu, 2021; IMF, 2025). Such countries exhibit distinctive conditions such as weaker institutions, limited infrastructure, and resource constraints, as well as political and economic volatility (Duttagupta & Pazarbasioglu, 2021; IMF, 2025). Such conditions are sometimes termed the “liability of origin” (Ramachandran and Pant, 2010) and are associated with home-country disadvantages that hinder internationalization and superior international performance, and make capability development more challenging and distinctive (Duttagupta & Pazarbasioglu, 2021). While INVs from such markets contribute significantly to economic development, we argue that their ability to scale internationally depends on acquiring digital and knowledge capabilities (Zahoor et al., 2023).

DBMI has gained significant attention in international business research, with studies suggesting the importance of understanding the role of ecosystem partnerships (Li et al., 2019a; Nambisan et al., 2017). Ecosystem partnerships are *collaborations among different organizations, businesses, or entities within a shared ecosystem to create value, drive innovation, and achieve mutual goals* (Adner, 2017; Nambisan et al., 2019). In such ecosystems, firms work cooperatively to support the needs of producers, customers, and other stakeholders (Moore, 1993).

As Stallkamp et al. (2023) argue, access to locally embedded complementary assets is essential to effectively exploit digital assets in foreign markets. Accordingly, we argue that ecosystem partnerships enable learning and transformation by facilitating knowledge exchange and access to complementary resources. Such partnerships may also help overcome trust and legitimacy barriers in foreign markets (c.f. Peng et al., 2024; Zhang et al., 2018), especially among INVs from developing economies. Because they typically lack substantial knowledge and resources (Guo & Wang, 2021; Khan & Lew, 2018), such firms often need to develop transformative capabilities through network-based collaborations when they expand abroad (Zhou et al., 2012). However, the mechanisms through which ecosystem partnerships facilitate DBMI in DINVs from developing economies remain underexplored.

The relationship between ecosystem partnerships and DBMI is not always direct. DINVs need a capacity for digital learning and other capabilities to effectively design and implement their business models for international contexts (Knight & Cavusgil, 2004; Rong et al., 2022). Thus, we frame much of our explanation in the dynamic capabilities view (Teece, 2009; Teece et al., 1997) and organizational learning theory (Crossan et al., 1999; Fiol & Lyles, 1985). Dynamic capabilities can be especially relevant in international business where superior performance necessitates developing distinctive knowledge and skills (Teece, 2009, 2016). Organizational learning theory suggests that knowledge creation leads to improved performance through behavioral change (Crossan et al., 1999; Fiol & Lyles, 1985). For DINVs, learning involves the generation and application of digital knowledge that enables strategic innovation and international adaptation. Innovation, in turn, is a primary driver of organizational learning and renewal (Dougherty, 1992; Hortinha et al., 2011). Ecosystems provide the infrastructure for such learning through networks, resource exchange, and collaborative experimentation (Van der Borgh et al., 2012).

Accordingly, the first objective of this study is to explore *how ecosystem partnerships influence the digital learning capabilities of DINVs from developing economies, and how these capabilities in turn shape DBMI*.

In addition, foreign market turbulence — characterized by market and competitive shifts, institutional instability, and technological change — may encourage firms to seek gainful partnerships and strengthen their information capabilities for value creation (Wang et al., 2015). INVs from developing economies must often adapt to new trends, opportunities and other novel phenomena in complex foreign markets (Khan, 2020). Foreign market turbulence is an external variable over which management has very little control. Turbulence is often studied in international business to understand how external conditions affect the development or modification of organizational capabilities (Wang et al., 2015; Wilden & Gudergan, 2015). It is a boundary condition that tests why some firms flounder, while others innovate and thrive, under pressure. Thus, turbulence is especially salient to INVs beset by smaller size and limited resources. Turbulence is known to moderate associations between organizational capabilities and performance. Investigating turbulence can reveal how firms under stress revise their business models (Wang et al., 2015; Wilden & Gudergan, 2015). Ecosystem partnerships may interact with foreign market turbulence to shape the digital learning capabilities of these firms, which are typically considered laggards in digital competencies (Ozkan et al., 2022). Thus, in this study, we also examine how ecosystem partnerships interact with foreign market turbulence to shape digital learning in DINVs. We aim to highlight the contextual role of foreign market turbulence in capability development. We will argue that digitalization is unlikely to operate uniformly across contexts. Rather, among firms from developing economies, digital strategies may facilitate adaptive responses to the institutional voids, infrastructure deficits, and similar limitations that confront such firms in their home countries. Compared to companies from advanced economies, the outcome suggests how digital strategies may emerge and operate differently among firms from developing economies.

The dynamic capabilities’ view (e.g., Teece, 2009; Teece et al., 1997) helps to examine capabilities that support internationalization and value creation in resource-constrained INVs from developing economies. Integrating organizational learning theory with ecosystem theory helps contribute new insights on the mechanisms of digital business model innovation. Ecosystem theory posits that a constellation of actors supports distinctive forms of organizing economic activities, with a focus on specific innovations (Jacobides et al., 2018; Moore, 1993). By emphasizing DINVs from developing economies, we also contribute to such perspectives by showing how ecosystem partnerships can enhance digital learning under resource and institutional constraints.

Such insights are particularly relevant given the limited digital competencies and resource constraints faced by many DINVs from developing economies. In such contexts, confidence in digital knowledge is critical for committing to business model transformation. We highlight how digital learning mechanisms function under turbulent international conditions and provide theoretical and managerial insights for enabling DBMI among developing economy firms. This is a significant contribution, especially in the context of DINVs in developing economies, which often lack the digital competencies necessary for vital transformations. At the same time, these firms may be hesitant to make large-scale investments in DBMI due to limited resources unless they are confident in their abilities and knowledge.

While the literature on DINVs has expanded in recent years, studies have seldom examined how firms from digitally immature, resource-constrained settings build innovation capabilities. Leveraging data from a representative developing economy, we contribute to a nascent but important stream of research. We offer both theoretical and practical insights on how DINVs can navigate foreign market turbulence and achieve digital business model innovation through ecosystem-supported learning.

2. Literature review: digital international new ventures and business model innovation

Platform-based business models are increasingly preferred by many internationalizing firms (Wichmann et al., 2022). Such models provide various advantages, and may facilitate internationalization and international operations (Zhao et al., 2026). Digital technologies and platforms provide numerous advantages, including greater access to market knowledge and enhancing innovation along value chains (Chen et al., 2019; Nambisan, 2017; Ojala et al., 2023; Stallkamp & Schotter, 2021; Yoo et al., 2012). Scholars pay increasing attention to the digital platforms and business models of DINVs (Donbesuur et al., 2023; Zahoor et al., 2023), particularly in e-commerce industries and among firms from developing economies.

In its classification of the world's economies, the International Monetary Fund (IMF) has identified a total of 42 countries that it labels 'Advanced Economies'. The IMF recognizes an additional 153 countries described as 'Emerging and Developing Economies' (IMF, 2025). Thus, such less-developed or developing economies constitute about three-quarters of nations worldwide. They possess distinctive characteristics, including unstable economic conditions, underdeveloped infrastructure and institutions, infrastructure gaps, and political and economic volatility (Duttagupta & Pazarbasioglu, 2021; IMF, 2025; Ramachandran & Pant, 2010). At the same time, firms from such countries participate increasingly in global ecosystems and target international markets.

Most extant scholarship in international business is drawn from contexts with relatively stable institutional environments and advanced digital infrastructure (e.g., Arikan & Shenkar, 2021; Ott et al., 2023). Very little research has examined the mechanisms underlying digital model innovation, particularly among DINVs from developing economies. This omission is non-trivial, as it assumes that digitalization operates uniformly across contexts, when in fact, digital strategies in developing economies may emerge as adaptive responses to institutional voids, infrastructure limitations, and similar limitations (Briege et al., 2022; Zahoor et al., 2023). By contrast, DINVs from advanced economies benefit from well-developed institutional environments, lower country risk, access to capital, superior infrastructure, and other advantages that characterize developed economies. Such conditions broadly help to facilitate internationalization and international performance among digital new ventures.

Increasingly, however, a growing number of ventures from developing economies are adopting digital technologies and platforms to expand into global markets (Kim & Cavusgil, 2020; Meyer et al., 2023; Pingali et al., 2023; Soluk, Kammerlander, et al., 2021). We argue that such firms leverage certain *dynamic capabilities* to internationalize and achieve international performance goals. The *dynamic capabilities* view examines how firms renew competences to adapt to complex environmental conditions and change (e.g., Barreto, 2010; Sadraei et al., 2025; Teece, 2007; Teece et al., 1997; Wang & Ahmed, 2007; Winter, 2003). Developing appropriate capabilities allows firms to innovate operations and business models (Barreto, 2010; Schoemaker et al., 2018; Wang & Ahmed, 2007). In this way, dynamic capabilities are salient to both international and high-technology environments, characterized by relatively substantial uncertainty and complexity, and where rapid innovation and competition pressure firms to undertake continuous adaptation (Barreto, 2010; Sadraei et al., 2025; Wang & Ahmed, 2007; Wilden & Gudergan, 2015).

The possession of specific dynamic capabilities implies a capacity to adapt the organization by learning about, adopting, and internalizing critical competences (Barreto, 2010; Sadraei et al., 2025; Winter, 2003). INVs from developing economies often possess distinctive capabilities that are especially valuable in complex international environments, such as resilience, flexibility, and adaptability (Khan & Lew, 2018; Sadraei et al., 2025; Teece, 2009, 2014). Such capabilities may facilitate adjustments needed for successful foreign expansion and superior

international performance (e.g., Teece, 2009; Teece, 2014).

Digitalization provides INVs cost-effective tools to reach overseas clients and bypass traditional export intermediaries, enabling them to internalize services previously provided by export intermediaries and thereby accelerate international expansion (Kim & Cavusgil, 2020). In particular, higher levels of digitalization enhance venture success by improving customer satisfaction and loyalty through tailored digital offerings, as well as increasing operational efficiency via digital processes (Autio, 2017; Rachinger et al., 2019). It also enables these firms to manage both tangible and intangible resources more effectively (Nambisan, 2017; Pergelova et al., 2019).

Digitalization represents a key opportunity to advance theoretical understanding of early internationalizing firms (Monaghan et al., 2020; Ojala et al., 2023; Zhou et al., 2007), especially those from developing economies. By investigating how DBMI unfolds in such contexts, we respond to sustained calls in international business research to treat context not merely as background, but as a theoretically significant dimension that shapes the development, transferability, and even verification of theory (Michailova, 2011; Teagarden et al., 2018; Welch et al., 2022; Welch et al., 2019).

Many developing economies have become major exporters and participants in the global economy (e.g., Duttagupta & Pazarbasioglu, 2021; Ramachandran and Pant, 2010). Ventures arising in such countries contribute significantly to gross domestic product and economic development (Khan & Lew, 2018). Many INVs exhibit agility and flexibility, often leveraging digital technologies to remain competitive in the global marketplace (Zahoor et al., 2023).

Digitalization appears to strongly influence the internationalization of new ventures in environments marked by institutional voids and weak digital infrastructure (Briege et al., 2022). In such settings, DINVs likely benefit more from digitalization than their non-digital counterparts (Briege et al., 2022). Furthermore, ecosystem partnerships may be vital for capability building and resource access, especially among DINVs from developing economies. Given the strategic importance of export sectors and the institutional challenges faced by firms from such countries, we investigate the mechanisms through which DINVs in such settings achieve DBMI to support their international growth. Rather than assuming a universal logic of DBMI, we adopt a contextual lens to explore how digital capabilities emerge and function under the specific constraints and opportunities in developing economies.

Intended Theoretical Contributions

We frame this study in the *dynamic capabilities* perspective (e.g., Teece, 2009; Teece et al., 1997), organizational learning theory (e.g., Crossan et al., 1999; Fiol & Lyles, 1985) and the ecosystem perspective of business (Adner, 2017; Jacobides et al., 2018). Initially, we argue that certain dynamic capabilities are especially relevant to DINVs arising in developing economies that operate in complex international environments. We posit that capabilities related to developing valuable ecosystem partnerships, digital learning and digital business models will likely support internationalisation and global performance in INVs. Dynamic capabilities may be especially important to resource-constrained INVs from developing economies given that such firms both emerge from and navigate complex environments (cf. Khan & Lew, 2018). Possession of appropriate dynamic capabilities helps such businesses attenuate their liabilities of origin and of foreignness. Alongside developing competences internally, INVs may develop dynamic capabilities from external sources by leveraging bonds that they develop with supportive partners in international ecosystems. As we highlight below, acquiring key capabilities from ecosystem partners may be especially valuable to INVs experiencing turbulent conditions in their external environment. Competence in digital technologies provides further advantages in internationalisation and international performance among DINVs from developing economies. Findings will suggest how disadvantaged INVs can develop particular types of knowledge through ecosystem partnerships, driving the development of novel business models that support early internationalisation in diverse

foreign markets.

Our findings also contribute to organizational learning theory and the role that learning plays in internationalisation and navigating foreign markets. The ability to acquire, interpret, and integrate new knowledge is critical among firms operating in complex or highly uncertain environments (e.g., [Fiol & Lyles, 1985](#); [Sullivan & Nonaka, 1986](#)). We argue that DINVs will benefit from a learning orientation that supports leveraging digital technologies to develop or improve business models. In general, learning plays a key role in developing and transforming capabilities to enhance the performance of internationalisation and international operations ([Khan et al., 2019](#); [Sullivan & Nonaka, 1986](#); [Zahra et al., 2000](#)). When DINVs affiliate with ecosystem partners, digital technologies should facilitate learning and knowledge acquisition. We argue that digital ecosystems foster multi-directional and continuous learning that transcends traditional organizational boundaries. However, digitalisation may not operate uniformly across contexts – for INVs from developing economies, digital strategies may be especially vital to helping firms respond more effectively to institutional voids, infrastructure limitations, and similar limitations that characterize such regions ([Briege et al., 2022](#); [Zahoor et al., 2023](#)).

Our findings further illuminate the business ecosystems perspective by showing how developing-economy DINVs can leverage ecosystem partnerships to enhance learning and superior performance in complex environments. While such partnerships are known to facilitate learning and innovation (e.g., [Zahra et al., 2000](#)), digital technologies can strengthen such relationships through creation of more fluid and scalable processes. We expect that ecosystem-based knowledge exchange aimed at acquiring valuable knowledge may necessitate the development of innovative digital business models that facilitate collective learning across multi-actor ecosystems.

Importantly, we will argue that ecosystem partnerships are not equally beneficial across all contexts. The value of such alliances may depend on the level of foreign market turbulence. In turbulent markets, we suggest that ecosystem partnerships may enhance the ability of INV partners to acquire valuable knowledge through digital pathways. At higher levels of turbulence, such partnerships likely become active learning mechanisms rather than passive relational assets. Using a moderated mediation approach, our findings will suggest that DBMI emerges not only from partnerships alone but especially from the learning processes that they enable under turbulent conditions. Foreign market turbulence is likely to transform the partnerships into dynamic capabilities that support DBMI. Thus, the value of ecosystem partnerships may be especially salient to INVs when market turbulence is significant or rising. Turbulence and other complex conditions are seen to demand more agile, technology-driven learning capabilities. The finding can further illuminate key assumptions and outcomes in the dynamic capabilities view in the developing economy context. Ecosystem partnerships may operate as latent capabilities whose value becomes especially visible when environmental turbulence prompts firms to draw on them.

3. Hypotheses development

We next offer a collection of hypotheses. Key study constructs and hypotheses are summarized in [Fig. 1](#). The firm's ability to acquire information, assimilate it, and create new knowledge is an important aspect of dynamic capabilities (e.g., [Salvato, 2003](#); [Verona & Ravasi, 2003](#)). Organizational learning theory ([Argyris & Schön, 1997](#); [Cangelosi & Dill, 1965](#)) asserts that ventures can adapt, improve, and evolve overtime by acquiring new knowledge that helps refine their processes and business models. In the context of DBMI, resource-constrained firms face the challenge of acquiring learning capabilities and sources of new knowledge. Digitalization and the creation of platform-based capabilities represent opportunities to drive DBMI, transitioning from traditional business models to digital ones ([Volberda et al., 2021](#)). Such transitions encourage INVs to transform their business models in order to capture market share in global markets ([Ojala et al., 2018](#)). Given their youth and relative inexperience, INVs may rely on network relationships to develop foreign market capabilities and drive innovation ([Cano-Kollmann et al., 2018](#); [Coviello, 2006](#); [Evers & O'Gorman, 2011](#)).

Networks that connect developing economy firms with better-resourced actors abroad can play a vital role in supporting learning and innovation in the less advantaged enterprises ([Cano-Kollmann et al., 2018](#)). Digitalization tends to enhance knowledge development and value creation due to increased interconnectedness in supportive ecosystems (e.g., [Cano-Kollmann et al., 2018](#); [Ojala et al., 2018](#)). While much past research on digital firms has emphasised their learning orientations, mechanisms through which learning occurs remain under-explored, particularly regarding digital international commerce ([Li et al., 2019b](#); [Meyer et al., 2023](#)). Prior research has neglected how learning from ecosystems unfolds among DINVs from developing economies.

Unlike firms in mature ecosystems, INVs from developing economies may lack access to formal digital infrastructure, skilled digital labor, and reliable knowledge spillovers. As such, ecosystem partnerships in these contexts serve not just as enablers of innovation, but as strategic substitutes for underdeveloped institutional and digital support systems. This makes the learning role of ecosystem partnerships more critical in developing economies — where digital innovation depends less on firm-internal routines and more on external scaffolding provided by partners. INVs that access appropriate ecosystems can obtain significant advantages in digital commerce ([Li et al., 2019a](#); [Rietveld & Schilling, 2021](#)). Interconnectedness with ecosystem partners opens opportunities for collaboration, coordination, information sharing, learning, innovation, and value creation ([Ganco et al., 2020](#); [Li et al., 2019a](#); [Shaheer et al., 2020](#)).

An ability to undertake digital learning and to develop digital business models reflects a capacity to develop, deploy, and advance complex technological knowledge ([Wilden & Gudergan, 2015](#)). In digital contexts, learning capabilities are not merely about absorbing knowledge but involve active experimentation with digital tools, platform integration, data-driven customer interaction, and the ability to scale digital offerings across borders (cf. [Monaghan et al., 2020](#)). These activities often rely on digitally embedded partnerships, as they require access to

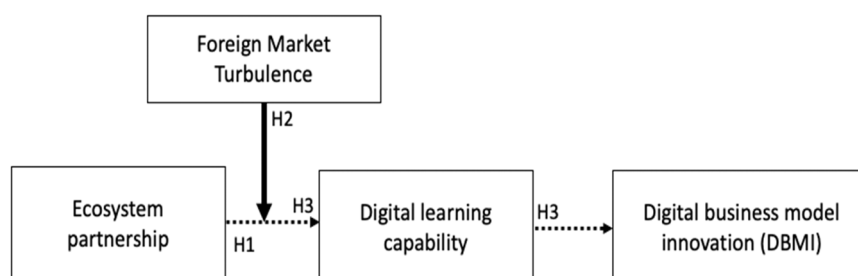


Fig. 1. Conceptual Framework.

digital infrastructure, technical support, and specialized know-how—resources that DINVs from developing economies often cannot access internally. Firms may seize opportunities to collaborate with complementary partners, supporting smaller firms to develop appropriate technologies through R&D and exploratory projects (Teece, 2009). The dynamic capabilities that arise in such partnerships may facilitate the firms' migration from more traditional methods and operations to digital platforms (e.g., Duysters, 1996; Hagedoorn & Schakenraad, 1990; Kilubi, 2016).

Ecosystem dynamics provide DINVs with opportunities to harness digital capabilities, which supports foreign market expansion. DINVs from developing economies often are keen to learn and acquire unique digital knowledge and related capabilities in order to transform into digital business models that enhance their competitiveness (Ojala et al., 2018). The transition to DBMI may be crucial for their survival and growth, but can require access to critical and unique digital learning capabilities. Network partnerships can facilitate the utilization and development of digital technologies and related capabilities (Laurell et al., 2017; Li et al., 2019a; Vasilchenko & Morrish, 2011; Yang et al., 2023). Ecosystem partnerships also enable DINVs to engage with key stakeholders, such as customers, suppliers, distributors, governments—allowing them to identify, source, and integrate emergent technologies for digital transformation. Such partnerships may play a key role in driving the digital learning capabilities of DINVs from developing economies. Accordingly, we argue that ecosystem partnerships can enable DINVs to develop unique digital learning capabilities. This leads to our first hypothesis.

H1. : Ecosystem partnerships positively influence the digital learning capabilities of DINVs from developing economies, (implying eco-system facilitating access to complementary digital resources and knowledge that are otherwise scarce in these contexts)

High market turbulence is inevitable in global business and can be caused by shifts in both market and non-market forces (Galkina et al., 2023). Organization learning theory asserts that organizations behave in ways that reduce turbulence and uncertainty (Sullivan & Nonaka, 1986), focusing on developing knowledge to navigate such challenges (Casey, 2005). Under high market complexity and fluctuating competitive conditions, exporting ventures from developing economies need to develop agility and knowledge to navigate cross-border intricacies (Khan, 2020). During high market turbulence, the network strength of these internationalizing firms can buffer the impact of market fluctuations, as firms leverage the social capital and knowledge derived from their networks (Lee, 2010). This social capital can positively influence the digital learning capabilities of DINVs, driving their business model transformation (Galkina et al., 2023).

We argue that foreign market turbulence interacts with ecosystem partnerships to influence the digital learning capabilities of DINVs. This arises because turbulence is a key factor in firms' external environment and may be especially salient to young or small firms operating internationally. In such environments, firms often develop or modify organizational capabilities to respond to market turbulence (Wang et al., 2015; Wilden & Gudergan, 2015; Zhou et al., 2019). In this way, turbulence can moderate the link between organizational capabilities and performance, and reveal how affected firms may revise their business models (Wang et al., 2015; Wilden & Gudergan, 2015; Zhou et al., 2019). High market turbulence exacerbates the challenges that international ventures face in collecting useful and reliable information (Ju et al., 2018). Under such conditions, digital business model innovation may rely on unique digital knowledge and insights from stakeholders drawn from ecosystem partners. Such partners can also provide useful knowledge and perspectives on dynamic and evolving market trends and environments (Day, 2011; Ju et al., 2018). International marketing literature suggests that international partnerships and alliances enhance the knowledge, resources, and capabilities of firms in the face of high market turbulence (Tower & Nath, 2025).

Nevertheless, how these dynamics unfold in the digital domain remains underexplored, particularly for DINVs from developing economies where market turbulence is compounded by institutional fragility, digital immaturity, and similar phenomena. In such environments, digital learning is relatively challenging but may be more critical for survival and success. Unlike digital ventures in advanced economies that can leverage stable infrastructures and mature market institutions (cf. Ojala et al., 2023), DINVs from developing economies must navigate multiple layers of volatility simultaneously. Accordingly, DINVs from developing economies may need to depend disproportionately on external partners for digital capability development, especially under turbulent conditions.

Under high foreign market turbulence, the need for DINVs from developing economies to engage ecosystem partnerships may be especially pressing in order to develop and strengthen digital learning capabilities and navigate foreign market volatility. By integrating into ecosystem partnerships, the knowledge-based resources arising through digital organizational learning can be strengthened even in the face of substantial uncertainty (Sullivan & Nonaka, 1986). Therefore, we argue that the interaction between foreign market turbulence and ecosystem partnerships is conditioned by the digital and institutional limitations of developing economies. In these settings, turbulence acts not merely as a "moderator" in a traditional sense, it may intensify and increase the value of INVs' reliance on external partnerships by fostering digital learning to compensate for internal capability deficits. As environmental volatility increases, the role of ecosystem partnerships becomes even more critical for digital learning and innovation, effectively functioning as strategic substitutes for missing resources and knowledge. This context-dependent mechanism leads us to the next hypothesis:

H2. : Foreign market turbulence positively moderates the relationship between ecosystem partnerships and digital learning capability in DINVs from developing economies.

For competitiveness in an international setting, business models must be able to address requirements of foreign markets (Eriksson et al., 2022). Exploring business model dynamics is particularly relevant in international business, especially for internationalizing smaller firms, such as INVs (Galkina et al., 2023; Rissanen et al., 2020). Prior research has examined how business ecosystems develop in international markets and affect market structure (Nambisan et al., 2019) and the upgrading of strategies (Li et al., 2019a; Sturgeon, 2021). However, there has been almost no scholarly attention given to the contributions that ecosystem partnerships make to digital learning for DBMI in DINVs, particularly those from developing economies (Rong et al., 2022).

Digital businesses require unprecedented agility and coordination within networks with stakeholders that offer complementary resources (Cahen & Borini, 2020). Digital intensity, connectivity, and partnerships can pave the way for digital transformations (Bharadwaj et al., 2013; Pagani, 2013). Through ecosystem partnerships, DINVs can orchestrate assets, reduce information and product development costs, and exchange essential information and knowledge within networks (Banalieva & Dhanaraj, 2019; Šilenskytė et al., 2024; Stallkamp & Schotter, 2021). Such knowledge is crucial for organizational learning for transformation. Specifically, foreign networks or partnerships allow firms from weak institutional settings to innovate (Khan et al., 2018). In our context, ecosystem partnerships may enable DINVs from developing economies to extract key resources related to digital learning, which is essential for their DBMI. Here, digital learning serves as a context-sensitive capability that mediates the firm's capacity to absorb and apply external knowledge in an environment where institutional and technological gaps prevail. This digital learning not only facilitates model adaptation but also equips DINVs with the agility required for navigating competitive foreign markets. Arguably, ecosystem partnerships enable DINVs to extract key resources related to digital learning for DBMI (Cahen & Borini, 2020).

Moreover, digital learning is crucial as it enables resource-

constraints DINVs from developing economies to acquire the necessary knowledge and skills to effectively transform their business models in response to foreign market dynamics. Through these ecosystem partnerships, DINVs can access essential resources such as digital tools, data analytics, and industry insights that are important for their digital transformation. Digital learning and similar capabilities may influence business models by enhancing the firm's ability to adapt to evolving technological and market conditions (Anwar et al., 2022). In various ways, ecosystem partnerships can play a crucial role in supporting INVs in transforming their business models through digital learning, providing them with the competencies necessary to operate effectively in foreign markets. In other words, digital learning may be the critical mechanism through which ecosystem partnerships influence DBMI. The resources and knowledge accessed via ecosystem partnerships enable DINVs from developing economies to strengthen their digital learning capabilities, which then drives the transformation of their business models in response to foreign market demands. Learning is critical to developing capabilities, which in turn can explain a firm's international growth (Banerjee et al., 2015; Puthusserry et al., 2020; Zahra et al., 2000). We argue that digital learning capability serves as a key mediating factor in the proposed relationship between ecosystem partnerships and DBMI. The impact of ecosystem partnerships on DBMI is enhanced by digital learning capability, as DINVs from developing economies may require it to absorb and apply knowledge and resources from ecosystem partnerships to create value, as per organizational learning theory. This leads to our final hypothesis.

H3. : *Digital learning capability mediates the relationship between ecosystem partnerships and DBMI of DINVs from developing economies.*

4. Methodology

4.1. Sampling frame and data collection procedure

We collected data from INVs in Pakistan, a representative developing economy. Like many developing economies, Pakistan is characterized by limited infrastructure, a relatively weak institutional environment, and other country-of-origin liabilities, as well as lesser-known brands (Khan et al., 2025). As in various past studies, we defined INVs as small- and medium-sized entrepreneurial firms that internationalize through exporting within three years of founding, and generate at least 25% of their sales from international sources (Cavusgil & Knight, 2009). We utilized the services of trained research assistants for data collection. They identified 343 exporting firms through directories of industry and export, and the local Chamber of Commerce. We applied two key criteria to ensure that firms met the study requirements: a minimum of 25% sales from exporting and internationalization within 3 years. Since our focus was on exporting, we chose firms from the product manufacturing sector.

The research assistants explained the purpose of the study and verbally asked managers to confirm their use of digital or platform-based methods for activities such as digital marketing and promotion, information exchange with stakeholders (such as importers and suppliers), digital e-commerce, digital interactions with international importers, resource exploitation, or other operational and management activities (Donbesuur et al., 2023). The final sample consisted of INVs whose activities reflected digitally enabled firms in international business, using digital technologies for the aforementioned purposes.

The research assistants oversaw completion of the survey, using a convenience sampling approach that were easily accessible, and targeting senior managers in the firms. While probability sampling reduce the potential selection bias, we employed a convenience sampling and personalized approach to data collection as it suggested in Pakistan as typically SMEs are reluctant to respond to postal surveys (Zahoor et al., 2022, 2023). Furthermore, we were needed to consider the convenient access to the firms. A total of 109 exporting firms completed the

questionnaire, yielding a response rate of approximately 32%. An additional 38 responses were obtained with the assistance of export managers, who helped snowball the questionnaire within their network based on their knowledge of firms that could be classified as DINVs. This brought the final sample size to 147 firms. Data were collected in 2023 in a single wave. All firms in our sample were small- and medium-sized enterprises (with a maximum of 250 employees). Average number of employees per firm was 231 approximately and average foreign markets served by the firms was 7.5. In terms of firm's international experience by market types, 91 sample firms reported having their international experience mostly in developing economies, while 56 reported the experience mostly in the advanced economies.

4.2. Sample size robustness and response bias

To ensure the adequacy of the sample size, we adopted a post-hoc G*power calculation approach. Testing the path-by-path correlation coefficients for the hypothesized relationships, we determined that the lowest power value was 0.974, exceeding the 0.800 threshold. This approach is also adopted in the internationalization literature (Von Delft et al., 2019), and supports the adequacy of the sample size for examining the proposed relationships. To examine potential response bias due to the data collection method, independent *t*-tests were conducted on the control and main variables for two groups: (i) data collected by research assistants and (ii) responses collected via snowball sampling. The results showed no significant differences (*p*-values ranged from .137 to .856), suggesting that response bias was not a concern.

4.3. Scales and control variables

For this study, we adopted scales that had demonstrated strong reliabilities in previous studies. The scales were then shared with two experts in the INV literature for validity checks and refinements. In the survey, managers were requested to answer questions with regard to their most important (key) foreign market. The surveys utilized 1–7 scales. The marker scale was anchored by very dissatisfied to very satisfied, and the digital learning capability scale was anchored by very slow to very fast. All other scales were anchored by strongly disagree to strongly agree. Additional information on the scales is provided in Table 1. In terms of control variables, we controlled for firm size and firm age, as these factors typically influence innovation in exporting firms (Najafi-Tavani et al., 2025). Exporters focusing more on developing versus advanced economies differ in terms of innovativeness; therefore, we controlled for the type of international markets in which the firm has the most experience (i.e., developing or advanced economies) (Xie & Li, 2018). Since export intensity can also have confounding effects on innovation, we controlled for the number of markets the firm has internationalized thus far (Xie & Li, 2018).

4.4. Common Method Bias Assessment

To mitigate potential confounding effects due to common method bias (CMB), we employed both procedural and analytical strategies. Procedurally, we designed the survey using simple, clear language to reduce ambiguity, and we mixed the order of scales to reduce response pattern bias and make it harder for respondents to infer hypothesized relationships. Analytically, we employed the marker variable technique (Lindell & Whitney, 2001), incorporating a theoretically unrelated construct, *restaurant performance*, into the survey.

Following Lindell and Whitney (2001), we first examined the correlation between the marker variable and the main constructs of the study. The marker variable did not significantly correlate with any of the main constructs (lowest $p = .127$); therefore, it satisfies the condition to be used as a marker. Second, we used the lowest possible correlation between the unrelated marker variable (restaurant performance) and the main variable (digital BMI; $r = .003$) as a proxy to adjust for the bias.

Table 1
SCALE CHARACTERISTICS AND FACTOR LOADINGS.

Constructs	Loadings
Ecosystem Partnership (CR =.781). Adapted from Ghosh et al. (2022). <i>Extent to which the firm collaborate with stakeholders for industry 4.0 digital transformation initiatives for the key foreign market.</i>	
1. Delivering industry 4.0 solutions with partners (customers, suppliers, importers, distributors, and other stakeholders) for digital transformation.	.718
2. Partners fulfil industry 4.0 solutions gap for digital transformation initiatives.	.950
3. We engage with partners for digital transformation opportunities.	.724
Digital Learning Capability (CR =.837). Adapted from Zahra et al. (2000). <i>Questions on the key foreign market in terms of:</i>	
1. Identifying emerging technologies	.699
2. Sourcing emerging technology	.747
3. Integrating emerging technologies	.702
4. Funding emerging technology	.729
5. Forecasting emerging technological trends	.755
6. Transferring emerging technologies across international border	.849
7. Protecting emerging technology trade secrets	.772
Foreign Market Turbulence (CR =.727). Adapted from earlier studies (Olson et al., 2005; Zhou et al., 2019). <i>In the key foreign market.</i>	
1. Customer preferences change quickly.	.605
2. New customers we serve are different from our traditional customers.	.880
3. It is very difficult to predict demand for our products.	.807
Digital Business Model Innovation (CR =.862). Adapted from Zahoor et al. (2023). <i>In context of digital technology adoption for the key foreign market, our business model</i>	
1. 1. offers new combinations of processes, products, services, and information	.562
2. 2. attract a lot of new customers	.756
3. 3. attract a lot of new suppliers and other business partners	.731
4. 4. bring together internal and external participants in novel ways	.744
5. 5. is revolutionizing the way business deals are made	.801
<i>In context of digital technology adoption for the key foreign market, we frequently introduce:</i>	
6. new ideas and innovations in our business model	.778
7. new processes, routines, and norms in our business model	.741
8. in context of digital technology adoption, we are pioneers with our business model	.788
9. all in all, and in the context of digital technology adoption, our business model is novel	.785
Marker Variable (CR =.800). Included for common method bias testing, adapted from Zhou et al. (2019). <i>Managers were asked to evaluate their level of satisfaction with a restaurant that they have last visited, using four items.</i>	
1. Friendliness of service personnel	.754
2. Availability of healthy meals	.781
3. Cleanliness of the place	.824
4. Presentation of meals	.784

CR = composite reliability

The adjusted correlations that were significant prior to the adjustment remained significant (with the highest $p = .050$, which is considered significant), suggesting CMB is unlikely to have influenced results meaningfully.

While these steps help address CMB concerns, we recognize the growing expectations in contemporary research for multi-wave or multi-source data collection. Due to contextual constraints in Pakistan, including access and resource limitations, such approaches were difficult in this study. We acknowledge this as a limitation and recommend that future research in similar settings employ more robust, multi-wave data collection designs to further mitigate common method bias risks.

4.5. Endogeneity Assessment

Endogeneity arises when predictor variables correlate with the error term of the dependent variable, potentially biasing the estimations (Ebbes et al., 2021; Rutz & Watson, 2019). To address this concern, we applied the Gaussian copula approach, a contemporary method suitable for detecting endogeneity in PLS-SEM models (Eckert & Hohberger, 2023; Park & Gupta, 2012), using Smart-PLS v4 software. The copula

terms were found to be statistically insignificant (p -values ranged from .802 to .072), indicating that endogeneity is unlikely to be a serious concern in the study.

Although we took appropriate analytical steps, we also recognize the increasing standards in addressing endogeneity, particularly through the use of instrumental variables or panel data. In this context, identifying valid instruments was not feasible. However, we believe the Gaussian copula approach represents a robust alternative given the constraints. Future studies may consider employing richer data structures to strengthen causal inference further.

5. Analysis and main findings

Analysis of the factor loading using the maximum likelihood method reveals that all items loaded onto their respective factors, with the lowest loading being .562. Furthermore, the lowest of composite reliability of scales were .727. More details on the scales and on factor loadings are provided in Table

Results for discriminant validity are presented in Table 2. The lowest average variance extracted (AVE) was .556, which is above the required threshold of .500 for convergent validity. Furthermore, the AVE is greater than the square of the correlations, meeting the criteria for discriminant validity (Fornell & Larcker, 1981). The heterotrait-monotrait (HTMT) ratios are all below the recommended threshold of .85 (Henseler et al., 2015), further supporting to discriminant validity.

We analyzed the hypothesized relationships using the Process Macro (Hayes, 2017), specifically, employing Process Macro 7 to test the moderated-mediation model. This macro generates an index to assess conditional indirect effects and provides lower-and upper-level confidence intervals for more precise estimation of the relationships. A confidence interval that includes zero between the two levels indicates a statistically insignificant effect. Given the nature of the hypothesized relationships, this analytical approach is appropriate and robust. It has also been widely used in prior studies (Davvetas & Diamantopoulos, 2018).

The results show that ecosystem partnerships positively influence digital learning capability of DINVs from developing economies ($\beta = .249$, LLCI = .091; ULCI = .407; $p = .002$), leading to the acceptance of hypothesis 1. Furthermore, the relationship between the ecosystem partnerships and foreign market turbulence positively interacts in influencing the digital learning capability ($\beta = .226$, LLCI = .047; ULCI = .406; $p = .014$), such that the effects are significant at moderate ($\beta = .306$, LLCI = .146; ULCI = .466; $p = .0002$), and high levels ($\beta = .424$, LLCI = .224; ULCI = .623; $p < .001$) of market turbulence. These results support hypothesis 2; that is, foreign market turbulence positively moderates the relationship between ecosystem partnerships and the digital learning capability of DINVs from developing economies (see

Table 2
DISCRIMINANT VALIDITY AND CORRELATIONS.

Construct	Mean (SD)	AVE	EP	DLC	MT	DBMI
EP	5.023 (1.129)	.647	–	.274** (.075)	.154 (.024)	.171* (.029)
DLC	4.562 (.965)	.565	–	–	.234 (.015)	.210 (.140)
FMT	5.183 (1.212)	.597	–	–	–	.374** (.021)
DBMI	4.616 (.887)	.556	–	–	–	–

EP = ecosystem partnership, DLC = digital learning capability, FMT = foreign market turbulence, DBMI = digital business model innovation; ** represents correlation significance below .01, *significance below .05.

Square of correlation is stated in bracket.

HTMT ratios are reported in bold and italics.

Table 3
MODERATED MEDIATION MODEL.

MAIN VARIABLES	Digital Learning Capability			
	coefficient	p-value	LLCI	ULCI
EP	.249	.002	.091	.407
FMT	.145	.095	-.026	.315
EP X FMT	.226	.014	.047	.406
<u>Controls</u>				
Firm size	.004	.287	-.003	.011
Firm age	.075	.695	-.305	.455
No of internationalized countries	.058	.311	-.055	.172
Type of international market experience	-.013	.937	-.331	.306
CONDITIONAL EFFECTS				
Low FMT	.058	.619	-.172	.287
Moderate FMT	.306	.0002	.146	.466
High FMT	.424	< .001	.224	.623
MAIN VARIABLES	Digital Business Model Innovation			
	coefficient	p-value	LLCI	ULCI
Ecosystem partnership (EP)	.079	.339	-.084	.241
Digital Learning Capability (DLC)	.354	< .001	.190	.517
<u>Controls</u>				
Firm size	.002	.493	-.005	.009
Firm age	.083	.667	-.297	.462
No of internationalized countries	-.031	.587	-.145	.082
Type of international market experience	-.020	.898	-.334	.293
DIRECT EFFECTS: EP → DBMI				
	.079	.339	-.084	.241
INDIRECT EFFECTS:				
EP → DLC → DBMI				
Low FMT	.021	---	-.081	.119
Moderate FMT	.108	---	.046	.189
High FMT	.150	---	.066	.257
INDEX OF MODERATED MEDIATION				
	.080	---	.007	.177

EP = eco-system partnership; FMT = foreign market turbulence; DLC = digital learning capability; DBMI = digital business model innovation

Table 3). The marginal effects of the ecosystem on digital learning capability across different levels of foreign market turbulence are plotted in Fig. 2.

In addition, it is notable that the indirect effects of ecosystem

partnerships on digital BMI via digital learning capability is significant at the moderate ($\beta = .108$, LLCI = .046; ULCI = .189), and high levels ($\beta = .150$; LLCI = .066; ULCI = .257) of the foreign market turbulence. The index of the moderated mediation is also positive and significant ($\beta = .080$, LLCI = .007; ULCI = .177), supporting the moderated-mediation effects between the ecosystem partnerships and digital BMI.

Next, we examined the mediation-only model, presented in Table 4. The results show that the independent variable i.e., ecosystem partnerships, positively influences the mediator i.e., digital learning capability ($\beta = .283$; LLCI = .123; ULCI = .440; $p = < .001$). The effect of ecosystem partnerships on the digital BMI in the presence of the digital

Table 4
MEDIATION MODEL.

MAIN VARIABLES	Digital Learning Capability			
	coefficient	p-value	LLCI	ULCI
EP	.283	< .001	.123	.440
<u>Controls</u>				
Firm size	.105	.191	-.002	.012
Firm age	.048	.555	-.270	.501
No of internationalized countries	.089	.280	-.052	.178
Type of international market experience	.032	.696	-.256	.382
MAIN VARIABLES	Digital Business Model Innovation			
	coefficient	p-value	LLCI	ULCI
EP	.079	.339	-.084	.241
DLC	.350	< .001	.190	.517
<u>Controls</u>				
Firm size	.054	.493	-.005	.009
Firm age	.034	.667	-.297	.462
No of internationalized countries	-.044	.587	-.145	.082
Type of international market experience	-.010	.898	-.334	.293
TOTAL EFFECT OF EP → DBMI				
	.178	.034	.013	.343
DIRECT EFFECTS: EP → DBMI				
	.079	.339	-.084	.241
STANDARDIZED INDIRECT EFFECTS:				
EP → DLC → DBMI				
	.099	---	.040	.180

EP = eco-system partnership; DLC = digital learning capability; DBMI = digital business model innovation

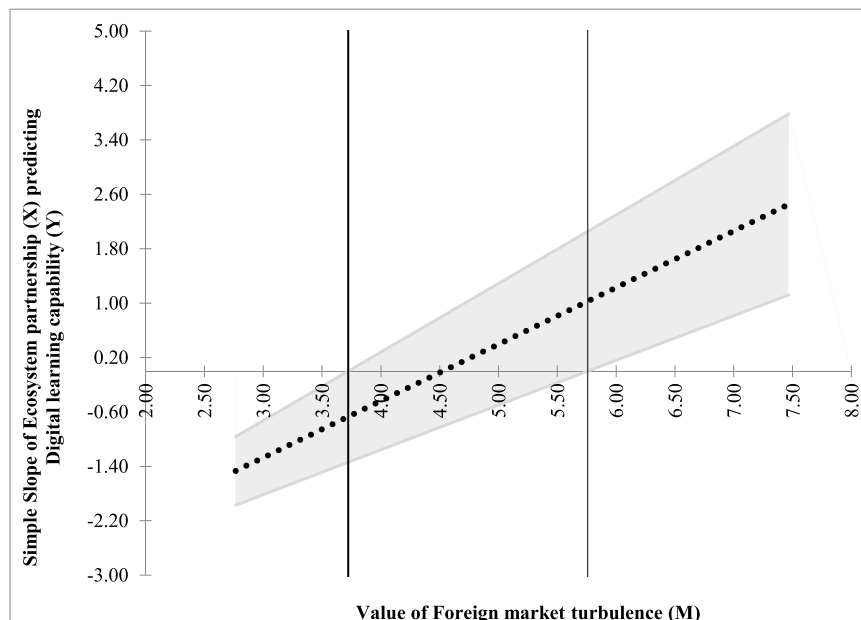


Fig. 2. Marginal Effect of Ecosystem Partnership on Digital Learning Capability Across Foreign Market Turbulence

learning capability is insignificant ($\beta = .079$; LLCI = $-.084$; ULCI = $.241$; $p = .339$). The effect of digital learning capability on DBMI is positive and significant ($\beta = .350$; LLCI = $.190$; ULCI = $.517$; $p < .001$).

The direct effect of the ecosystem partnerships on DBMI is insignificant ($\beta = .079$; LLCI = $-.084$; ULCI = $.241$; $p = .339$). The indirect effect of ecosystem partnerships on DBMI via digital learning capability is positive and significant ($\beta = .099$; LLCI = $.040$; ULCI = $.180$). The total effects are also positive and significant ($\beta = .178$; LLCI = $.013$; ULCI = $.343$; $p = .034$). Collectively, these results support hypothesis 3; that is, digital learning capability mediates the relationship between ecosystem partnerships and the DBMI of DINVs from developing economies.

6. Discussion and implications

INVs from developing economies constitute a growing category of companies that seek economic growth through internationalization. Many such firms utilize exporting as the main means for early internationalization (Zahoor et al., 2023). Our findings suggest that such firms seek to develop and innovate digital business models to attain greater access to global markets. Scholars and practitioners want to understand the mechanisms of digital transformation for effective foreign market activities.

We focused on ecosystem partnerships as enablers of digital learning, a distinct and context-specific mechanism that drives DBMI in DINVs from developing economies. Unlike prior work that broadly links partnerships to innovation outcomes, we found that digital learning capability is vital in environments marked by institutional voids, weak digital infrastructure, and low innovation spillovers. In such environments, digital learning appears to serve not merely as an enabler, but as a critical conduit through which external knowledge and digital assets are absorbed, recombined, and transformed into business model innovation. The findings help expand existing theory by showing that the pathway from partnerships to innovation can be mediated through learning mechanisms that are deeply shaped by institutional and infrastructural conditions.

We framed the study in the dynamic capabilities' perspective (e.g., Teece, 2009; Teece et al., 1997). Possessing such capabilities is vital in the complex environments that characterize international business. For internationalizing INVs, the capacity to develop valuable ecosystem partnerships, as well as capabilities related to digital learning and digital business models, constitute types of intangible capabilities that support international expansion and performance. Dynamic capabilities may be especially important to resource-constrained INVs from developing economies as they arise in complex environments while having to deal with diverse foreign environments simultaneously (cf. Khan & Lew, 2018). Our findings can imply that possession of such capabilities helps firms attenuate the liability of origin. Among DINVs from developing economies, our findings highlight the mechanisms that arise through ecosystem partnering and resultant digital learning. Furthermore, the effects of ecosystem partnerships appear to interact with market turbulence in promoting firms' efforts towards digital learning capabilities for DBMI.

Among high-performing INVs, our findings suggest how learning and innovation can benefit from integrating digital technologies as a means to develop or improve business models. In our study, transformation of capabilities highlights the role of accessing new information from complementary partners, and then developing and integrating acquired knowledge into internal operations. On their own, capabilities related to learning and innovation can engender a proactive approach to internationalization. Increasing internationalization results in ongoing learning opportunities due to the range of unique environments and competitive situations to which these firms are exposed.

Prior research suggests that digitalization positively affects the internationalization of new ventures, with these effects being more pronounced in contexts beset by institutional voids and weak digital

infrastructure (Briege et al., 2022). The present study contributes to and extends this literature by empirically demonstrating how INVs from developing economies — despite facing weak digital infrastructure, institutional voids, and potentially limited legitimacy in their home-country environments — can develop digitalized business models tailored to target international markets.

Findings also extend prior literature on the ecosystem perspective by validating digital organizational learning capability as a competitive advantage obtained through ecosystem partnerships. These findings contribute to the limited body of knowledge on DINVs from the advantage creation perspective (cf. Monaghan et al., 2020; Ojala et al., 2023), specifically for firms from developing economies. This is important, as prior studies have tended to emphasize the liabilities associated with ecosystem integration, such as governance issues (Rong et al., 2022), or they have highlighted how ecosystems benefit digital commerce and conceptualized such advantages in terms of gaining access to complementary resources and opportunities for innovation (Li et al., 2019a). The present study empirically validates the importance of ecosystem partnership advantages in organization learning focused on digital competencies for DBMI. We contribute to the advantage-based perspective on eco-system theory in the nascent context of DINVs from developing economies. We highlight how ecosystem partnerships can more effectively enhance these firms' digital learning capabilities, particularly when they are exposed to and must navigate the turbulence of foreign market conditions.

Overall, our findings extend research on business model innovation in INVs, building on recent studies by (e.g., Khan et al., 2025; Najafi-Tavani et al., 2025).

6.1. Theoretical implications

DINVs are becoming prevalent across countries and industries, but research on such firms remains scarce (cf. Monaghan et al., 2020; Ojala et al., 2023). This study contributes to a nascent but critical conversation on ecosystem-enabled digital learning under market turbulence, particularly within the under-theorized context of developing economies.

Study findings have implications for organizational learning theory, particularly with the integration of the ecosystem perspective, in the following ways. First, this study extends international entrepreneurship theory (e.g., Cavusgil & Knight, 2015; Oviatt & McDougall, 2005; Oviatt & McDougall, 2018) by demonstrating how DINVs from developing economies—characterized by limited technological infrastructure and other liability-of-origin effects—can develop digital learning capabilities through ecosystem partnerships. By engaging with foreign suppliers, distributors, and other value-chain partners, these firms acquire, develop, and integrate emerging digital technologies, enabling them to overcome contextual disadvantages and compete effectively abroad. This helps clarify how digital capabilities specifically help firms from such challenging environments mitigate origin-related liabilities, a finding with implications for research in international entrepreneurship. The findings enhance perspectives on early internationalization by uncovering how firms in digitally underdeveloped environments might externalize capability development through networks. Finally, the findings enrich understanding of how INVs can acquire important capabilities from external partnerships as well as from internal sources. Broadly, the study has implications for the internationalization and international performance of resource-constrained firms in general. Leveraging ecosystem partnerships, digital learning, and digital business model innovation appears to enhance the performance of such firms.

Importantly, the integration of digital technologies into this process represents a significant shift from traditional learning capabilities in ecosystem partnerships. Previous research (cf. Zahra et al., 2000) explored how partnerships facilitate learning and innovation, but the digital dimension can fundamentally redefine such relationships through the creation of more fluid and scalable processes acquired

within globally networked ecosystems. This fluidity requires firms not only to develop digital capabilities but also to cultivate adaptive relational and learning capabilities to navigate complex, dynamic network positions. In this way, digital technologies act not only as enablers but also as disruptors of conventional partnership dynamics, accelerating knowledge exchange and necessitating new forms of collective learning across multi-actor ecosystems. By studying this phenomenon in the context of developing economies, our findings show how digital fluidity interacts with infrastructural constraints, creating a duality of friction and flexibility that reshapes learning trajectories in ways not accounted for in prior ecosystem or digital innovation studies. Findings also advance ecosystem theory by pushing the theoretical conversation toward understanding of networked learning processes.

Our findings also have important theoretical implications for understanding when and how ecosystem partnerships matter in cross-border settings. Our results show that ecosystem partnerships are not equally beneficial across all contexts. Their value depends on the level of foreign market turbulence. In relatively stable markets, partnerships do little to enhance digital learning. This suggests that firms do not actively use knowledge available through these partnerships. As market turbulence increases, firms rely more heavily on their partners to identify, interpret, and combine digital knowledge. At higher levels of turbulence, partnerships become active learning mechanisms rather than passive relational assets. The moderated mediation results further show that DBMI emerges not from partnerships alone but from the learning processes they enable under turbulent conditions. In this way, turbulence acts as a contextual trigger that turns ecosystem partnerships into a dynamic capability that supports digital business model innovation in international markets. This conditional activation pattern also reinforces the dynamic capabilities view by showing that ecosystem partnerships operate as latent capabilities whose value becomes visible only when environmental turbulence prompts firms to draw on them (cf. Eisenhardt & Martin, 2017; Teece, 2007). Among developing economy INVs that leverage ecosystem partnerships in international business, the presence of significant foreign market turbulence appears to enhance digital learning capability, especially the firm's capacity to identify, source, and integrate vital emergent technologies. Similarly, the findings support organizational learning theory by illustrating that uncertainty increases firms' need to acquire, interpret, and integrate new knowledge, making digital learning more actively utilized under turbulent conditions (Huber, 1991; Levinthal & March, 1993).

Second, this study enhances understanding of DBMI by proposing and validating a moderated-mediation model. Specifically, we demonstrate that ecosystem partnerships indirectly influence DBMI through digital learning capabilities, with foreign market turbulence moderating this effect. This intersection of foreign market turbulence, digital learning, and contextual capability formation responds to calls for more multilevel theorizing in international business that links micro-processes (firm-level learning) with macro-contextual conditions (institutional turbulence) (Meyer & Peng, 2016).

We also highlight the contingent and dynamic nature of digital ecosystem value creation, showing that the benefits of ecosystem partnerships for digital business model innovation may be context-dependent and amplified under conditions of market turbulence. This dynamic interaction emphasizes the non-static and emergent character of digital ecosystems, where firms must continuously adapt their learning and innovation processes in response to changing market demands. By integrating external contextual dynamics with learning capabilities, this perspective addresses the capabilities view and deepens ecosystem theory, particularly in the context of digitally enabled international ventures (cf. Elia et al., 2020; Ojala et al., 2023; Zahra et al., 2023). In doing so, we contribute to the emerging stream of international business research that views ecosystems not only as structural networks but also as adaptive learning environments that co-evolve with firms' capability trajectories in constrained institutional settings (cf. Cha, 2020; Li et al., 2019b; Nambisan et al., 2019).

Third, the findings highlight that when DINVs face greater foreign market turbulence, ecosystem partnerships can generate meaningful insights and knowledge, allowing firms to learn contemporary and emerging technologies for digital transformation. This learning feeds into their competencies, enabling them to rejuvenate their business models and transition to digital ones. Such transformation helps them address exogenous market turbulence and build resilience under adverse market conditions. These findings emphasize the important role of organizational learning in digital transformation, created through ecosystem partnerships, especially when customer and competitive conditions in foreign markets are evolving. This is one of the key implications for research on ecosystems, as it illustrates how contextual factors, such as foreign market turbulence, can amplify or diminish the influence of ecosystem partnerships on firms' capabilities. It further demonstrates that the value of ecosystems is not fixed but varies depending on external environmental conditions (e.g., market instability or competitive dynamics), a phenomenon we can refer to as contextual volatility. Such insights are particularly salient in developing economies, where firms are not just adapting to foreign market demands but are simultaneously building foundational digital capacity for international market competitiveness—thus operating in “double liability” environments rarely addressed in mainstream international business theory.

Furthermore, this study provides important insights into how the unique challenges of developing economies—such as limited resources, infrastructural challenges, and changing regulatory environments—intersect with ecosystem dynamics. This intersection creates opportunities for learning and innovation. These markets present a dual opportunity for DINVs. They face higher levels of foreign market turbulence, which demand more agile, technology-driven learning capabilities. At the same time, these environments create opportunities for market-creating innovations through digital transformation.

Our findings elucidate how digital ecosystems foster a multi-directional and continuous learning process that transcends traditional organizational boundaries. In contrast to classical views that posit learning mainly within the firm or in dyads, digital ecosystems enable more open, frequent, and multi-actor knowledge flows. These flows generate emergent competencies that evolve alongside the ecosystem itself. This provides a more nuanced understanding of how learning capabilities are socially constructed and co-created within digital networks. It highlights the interplay between technology-enabled connectivity and firm-level strategic adaptation. The findings also extend ecosystem theory by demonstrating how digital ecosystems support dynamic and emergent learning that depends on both technological change and the institutional contexts of developing economies (Jacobides et al., 2018).

The dynamic capabilities' view explains how firms sustain competitive advantage in complex environments by building and integrating internal and external competencies. Firms need knowledge-based, internal capabilities that support internationalization and subsequent success in foreign markets (e.g., Teece, 2009; Teece et al., 1997). Overall, the study contributes to perspectives on dynamic capabilities by revealing how competence in digital technologies can give rise to internationalization advantages among DINVs from developing economies. Our findings imply how disadvantaged INVs can develop particular types of knowledge through ecosystem partnerships, which drives the development of novel business models that support early internationalization in diverse international markets. Specific capabilities support the opening of new markets and developing or reinventing business models to serve those markets. In this study, we revealed and confirmed the importance of specific organizational capabilities that engender international success in INVs.

In addition, the study contributes to organizational learning theory, which argues that learning can reduce uncertainty (Sullivan & Nonaka, 1986) by focusing on developing knowledge (Casey, 2005). It highlights the important mechanism of ecosystem partnerships through which

learning can be created, particularly in relation to digitalization, which is critical for success and competitiveness in global market activities (cf. Ojala et al., 2023). By theorizing ecosystem-enabled digital learning under turbulence and contextual volatility, this study provides important insights into how DINVs from developing economies transform their business models.

6.2. Implications for policy and practice

From a practical perspective, managers need to become skilled in appropriately adapting, integrating, and re-configuring learning-based capabilities toward international environments. Developing new models and processes in young international ventures is fluid and dynamic, with ongoing market expansion and redefinition necessitating frequent competitive improvements to company models and approaches. The relative agility of INVs can enhance an ability to transform models and processes into business activities that drive superior international performance.

The findings imply how DINVs should actively collaborate and engage with stakeholders to extract information and insights on emerging technologies for DBMI. Collaborative ecosystems foster support systems for digital learning and transformations, enabling DINVs to attract and engage with new customers, suppliers and other stakeholders while revolutionizing business processes. Partnering with others can allow experimentation with new platforms and the integration of emerging technologies, which promotes innovation and the adoption of contemporary technologies. Such partnerships also provide access to shared resources, such as knowledge and digital infrastructures, which enhance INVs' adaptability, agility, and flexibility in turbulent market conditions. Accordingly, study findings underscore the importance of creating ecosystem partnerships with key stakeholders to drive learning and digital transformation.

Technology developers can also play a crucial role in facilitating the DBMI of DINVs. They can assist by providing detailed, individualized information and resources to help firms implement platform-based and digital business models. Access to such resources and support can increase firms' willingness to adopt emerging technologies for digital transformation.

The study can also provide guidance to resource-constrained firms in general. Leveraging ecosystem partnerships, digital learning, and digital business model innovation appears to enhance the internationalization and international performance of such firms.

From a policy perspective, government institutions can provide resources to DINVs in developing economies. Specifically, governments might provide subsidies to encourage these ventures to experiment with digital business model innovations, as such transformations often involve significant risks. Resource-constrained firms are often reluctant to make large-scale investments in risky projects. By supporting DINVs in adopting DBMIs, governments can enhance the legitimacy and competitiveness of these firms in foreign markets, while simultaneously contributing to the country's digital commerce growth and overall economic development.

Governments can also provide opportunities for international collaboration and networking opportunities. For example, they might support firms by subsidizing attendance at international trade and export conferences. Furthermore, governments can help DINVs from developing economies — often considered technological laggards — by facilitating ecosystem partnerships with relevant stakeholders and value-chain members. These partnerships can accelerate the development of digital competencies, enabling firms to learn quickly and gain competitive advantages in global markets.

6.3. Limitations and Future Research Directions

The limitations of this study can provide avenues for future research. From a theoretical standpoint, future studies could examine the drivers

and challenges of ecosystem partnerships in the context of DBMI among INVs from developing economies. Studies should also explore the role of ecosystem partnership in facilitating cross-border knowledge transfer. Furthermore, studies could investigate the roles of non-market actors within these partnerships in enhancing firms' DBMI. In addition, future studies may consider other potential moderating factors, such as technological turbulence at the industry and market levels.

From a methodological perspective, sole reliance on survey data and convenience approach in data collection is a limitation of this research, which could lead to common method and selection bias. This might be addressed in future research by combining survey data with in-depth qualitative interviews to provide case-specific insights into the development and implementation of DBMIs. Interviews can also be conducted to distill managerial perspectives on the aggregate findings of the study to ensure generalizability. Such methods can enrich understanding of the underlying challenges that firms from developing economies face when adopting DBMIs. Given our data is cross-sectional, future studies could employ a longitudinal research design e.g., using panel data to examine the long-term performance, dynamism and sustainability of DBMIs. However, given increasing methodological expectations, future research might also consider multi-wave or multi-source data collection to further mitigate concerns around common method bias. We acknowledge for the lack of identification for the valid instruments for the potential endogenous variables. Addressing endogeneity more explicitly through instrumental variables or quasi-experimental methods, where feasible, would help strengthen causal inference and align with emerging standards in the field.

Lastly, in terms of contextual extensions, our study focuses on INVs from a single country, which may limit generalizability. Future research should consider DINVs from varying types of developing economies (e.g., Bangladesh, Brazil, China, Nigeria) to compare their internationalization experiences. A comparative analysis could shed light on the similarities and differences in how firms from different market contexts leverage ecosystem partnerships and DBMI, thereby offering a more comprehensive understanding of the global digital transformation landscape.

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Right retention statement

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Declaration of Competing Interest

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Data availability

The authors do not have permission to share data.

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