



Digital Entrepreneurship and SME Performance: The Mediating Role of Business Model Innovation and the Moderating Role of Digital Readiness

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ABSTRACT

Digital technologies are transforming the ways in which small and medium-sized enterprises (SMEs) discover opportunities, develop value propositions, and compete, but the link between digital entrepreneurship (DE) and measurable outcomes of the firms' performance is not fully understood. This study investigated the link between digital entrepreneurship and the performance of SMEs (SMEP) with business model innovation (BMI) as a mediator, and digital readiness (DR) as a boundary condition to moderate the relationship between DE and SMEP. Data was gathered from 250 owners, managers and senior employees of SMEs across various digitally enabled industries of retail trade, services, manufacturing, information technology, e-commerce and other service industries in Pakistan using purposive sampling as a quantitative research method with cross-sectional design. The analysis of data was done in two stages, namely the analysis of partial least squares structural equation modeling (PLS-SEM). The measurement model showed good indicator reliability (all loadings > 0.80), internal consistency (Cronbach's alpha > 0.89, and composite reliability > 0.89), and convergent and discriminant validity (average variance extracted > 0.70; Fornell-Larcker and Heterotrait-Monotrait criteria met). The digital entrepreneurship-SME performance relationship was partially mediated by the business model innovation variable (indirect effect = .181, 95% bootstrap CI [0.117, 0.253]), which was directly predicted by digital entrepreneurship. A mediating role between digital entrepreneurship and the SME performance variable was found for the business model innovation variable, which significantly and positively predicted SME performance, and which was itself significantly predicted by digital entrepreneurship (indirect effect = 0.181, 95% bootstrap CI [0.117, 0.253]). The direct link between digital entrepreneurship and SME performance was moderated by digital readiness in the sense that the relationship grew stronger with an increase in the level of digital readiness. The model accounted for 36.6% of the variance in SME performance and exhibited good predictive relevance ($Q^2 = 0.354$). The results provide an extension of the resource-based view and dynamic capabilities theory to the digital SME context and suggest managers of SMEs and policymakers towards turning digital entrepreneurial activity into positive performance-based outcomes.



Introduction

Small and medium sized businesses (SMEs) represent the majority of most emerging economies and their ability to absorb and make use of digital technologies is viewed as key to their survival and growth (Bilal et al., 2025). The concept of digital entrepreneurship, which has come to mean entrepreneurship activities that seek opportunities through the development of new products, services, and ventures by leveraging digital technology, has become a significant and autonomous line of inquiry in entrepreneurship research (Sussan & Acs, 2017). Digital entrepreneurship differs from conventional entrepreneurship in using digital platforms and harnessing opportunities that would not otherwise be available to resource-constrained enterprises, making their decisions based on digital information rather than on traditional information, and having a low cost digital channel for identifying and exploiting opportunities (Bilal et al., 2025; Wang et al., 2020). Digital entrepreneurship is especially attractive for SMEs in emerging markets like Pakistan due to its low investment requirements and capacity to empower them to compete in the market amidst infrastructural and financial challenges (Zhao et al., 2024).

However, the link between digital entrepreneurship and firm performance is not a straightforward one. An increasing number of studies have highlighted that the impact of digital entrepreneurship on performance is mediated significantly by business model innovation (BMI), which is defined as the reconfiguration of a firm's value proposition, value-creation processes and value-capture mechanisms in response to digital opportunity (Merín-Rodríguez et al., 2024; Teece, 2010). Corporations that only use digital tools without an actual redesign of their businesses are not actually achieving a significant performance improvement, while firms that leverage digital entrepreneurship as a means for a true business model redesign are reporting much higher performance improvements (Ferraras-Méndez et al., 2021; Reim et al., 2022). This is a mediating logic in line with dynamic capabilities theory, which argues that the competitive advantage of the firm in turbulent settings with technology-rich inputs is not necessarily about resources, but about the ability of the firm to 'configure' its resources and business model in order to respond to the changing opportunity structures (Teece, 2010).

Concurrently, not every SME is in the same position to translate digital entrepreneurial activity into innovations in business models and/or performance. Digital readiness, defined as a company's infrastructural, human resource, and organizational ability to execute its digital transformation, has been cited as an important boundary condition affecting the returns from digital initiatives numerous times (Bilal et al., 2025; Jamil et al., 2025). For example, Pakistani manufacturing SMEs reveal that technological readiness serves as a leverage to enhance the impact of digital and artificial intelligence investments on sustainable performance outcomes, whereas those with low readiness witness less output from the same investments (Jamil et al., 2025). This indicates that the effects of digital entrepreneurship on performance outcomes are not necessarily equal, and that digital readiness can serve as an intervening mechanism that is different, but also complementary, to the mediating mechanism of business model innovation.

Although this joint mediation-moderation model is plausible, few studies have examined this model as a combined type of mediation and moderation. The current literature focuses on either the direct relationship between digital transformation and performance (Wang et al., 2020), or the mediating role of business model innovation but without a mediating role of digital-related constructs as a boundary condition (Ferraras-Méndez et al., 2021; Merín-Rodríguez et al., 2024), or the moderating role of digital-related constructs without a

distinctive mediating business model (Bilal et al., 2025; Zhao et al., 2024). Studies that integrate both mechanisms into a formally-tested structural model, especially in the SME context of a developing economy like Pakistan, are still relatively scarce (Shah et al., 2023).

This study attempts to fill this gap by testing the integrated model that digital entrepreneurship has an indirect impact on the performance of SMEs through business model innovation and a direct effect on the performance of SMEs, while digital readiness moderates the direct effect of digital entrepreneurship on the performance of SMEs. The study employs survey data of 250 SMEs across various digitally enabled industries in Pakistan using the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique and three specific objectives are set. To ensure the reliability and validity of the measurement model for the four constructs of the study, the first step was to establish the reliability of the constructs. Second, to examine the direct and mediated relationship between digital entrepreneurship and SME performance by business model innovation. Third, it was examined if the digital entrepreneurship-SME performance relationship is significantly moderated by digital readiness. The study makes three contributions in doing so. It is a theoretical integration of the resource-based view, dynamic capabilities theory, and digital entrepreneurial ecosystem perspective that is translated into a single mediation-moderation model (Sussan & Acs, 2017; Teece, 2010). Methodologically, it utilizes a rigorous two-stage PLS-SEM approach, which involves bootstrapped mediation testing and simple-slope analysis of moderation effect, which have been called for in the literature to improve the formalism of statistical analysis of digital readiness as a boundary condition (Hair et al., 2019). On the empirical level, it provides Pakistani SME owners, managers, and policymakers with evidence-based recommendations on the effective translation of digital entrepreneurial activity into performance improvements over the long haul (Fan et al., 2021).

Literature Review

Digital Entrepreneurship

Digital Entrepreneurship is the process of creating new venture opportunities, or significantly reconfigure the products, service, or process that is supported by digital technology (Sussan & Acs, 2017). This is unlike generic digital transformation, which is clearly business-like and opportunity-oriented instead of limited to digitizing the present operational processes (Bilal et al., 2025). The empirical studies conducted in various emerging market settings have consistently shown a significant association between digital entrepreneurial activity and better innovation and performance results but with varying degrees of intensity, depending on the presence of complementary organizational capabilities (Dinh et al., 2024; Zhao et al., 2024). After a critical reading of this literature, it is evident that digital entrepreneurship is not always a panacea for performance improvement, with some studies reporting no direct effects between the two, once mediating and/or moderating mechanisms are properly accounted for (Fan et al., 2021; Shah et al., 2023), highlighting the need for the mediation-moderation model of the current study that combines the two approaches.

Business Model Innovation as a Mediator

Business model innovation involves the intentional change of a company's value proposition, value-creation architecture and value-capture mechanism (Teece, 2010). In the digital SME literature, BMI is becoming a central theoretical and empirical focus and is increasingly theorized and empirically validated as the main channel through which digital initiatives create performance gains. A large sample study of Spanish SMEs revealed that digital transformation affects innovative firm performance partially through the intermediate of

business model innovation (Merín-Rodríguez et al., 2024). Likewise, studies of entrepreneurial orientation and new product development performance in SMEs showed that business model innovation plays a significant mediating role in the connection between entrepreneurial orientation and the performance outcomes (Ferraras-Méndez et al., 2021), and studies on SME internationalization found that BMI is a key determinant of successful internationalization of digitally enabled SMEs (Reim et al., 2022). Together, this literature suggests that BMI is not an ancillary product of digital entrepreneurship but the key process in transforming digital opportunity recognition into tangible and relevant organizational change.

SME Performance

In general, the performance of SMEs is considered in a multi-dimensional view, including growth performance, profit performance, market performance, customer performance, and competitive performance (Wang et al., 2020). The results of this study from Pakistani and other emerging market SMEs indicate that digital capabilities such as a digital marketing capability, IT capability, and digital innovation are correlated with sizable performance gains in these performance dimensions, though effect sizes are different depending on the sector and the level of complementary organizational readiness (Shah et al., 2023; Tarutė & Gatautis, 2014). To this end, several studies warn that there is only a moderate variance explained by digital capability, indicating the need to also capture mediating and moderating factors, such as business model innovation and digital readiness, to fully explain the link between digital entrepreneurship and performance (Bilal et al., 2025; Fan et al., 2021).

Digital Readiness as a Moderator

Digital readiness is defined as a firm's infrastructural, human capital and organizational readiness to implement and reap the rewards of digital transformation (Jamil et al., 2025). It is now more and more discussed in the literature not as a predictor in itself but as a contingent factor that affects the effectiveness of other digital initiatives in relation to performance. Prior studies on the digital capability-building sustainable performance relationship in high-tech manufacturing firms from Pakistan indicate that digital capability-building activities positively moderate the relationship between digital transformation and sustainable performance of high-tech manufacturing firms (Zhao et al., 2024), and that technological readiness plays a significant role in the relationship between digital capability-building activities and sustainable performance outcomes in manufacturing SMEs (Jamil et al., 2025). In a similar study conducted by researchers from China, they found that IT capability interacts with digital business strategy to jointly influence firm efficiency, further confirming that digital preparedness plays a more moderating than additive effect on firm-level digital business effectiveness (Wang et al., 2020). A critical review of the literature, however, indicates that digital readiness has been more frequently examined directly as a moderator between the digital transformation and the performance relationship, yet this is not the type of moderator that this study focused on, examining it as a moderator in a mediated relationship between digital transformation and performance, which also accounts for business model innovation, as is this research (Bilal et al., 2025).

Theoretical Framework

This research combines three complementary theories. In the resource-based view, the sources of sustained competitive advantage are valuable, rare and hard-to-imitate resources and capabilities, which places the digital entrepreneurial capability itself in the category of resources that can bring advantage (Wang et al., 2020). Dynamic capabilities theory further supports that, in the context of digital environments, which are characterized by rapid change,

the ability to sense opportunities in the environment and reconfigure the business model accordingly is a key driver of advantage, and is the theoretical basis for modelling business model innovation as a mediator between digital entrepreneurship and performance (Teece, 2010). Lastly, the digital entrepreneurial ecosystem perspective highlights that the digital entrepreneurial outcomes are co-produced by the digital entrepreneurial agency and the digital infrastructure and capability context, which is the theoretical foundation for modelling digital readiness as a moderating boundary condition, not as a control variable (Sussan & Acs, 2017).

Critical Synthesis and Research Gap

The literature reviewed here equates to two main conclusions. First, the impact of digital entrepreneurship on the performance of SMEs is markedly mediated and not completely dormant by business model innovation (BMI), which acts as a core mediator, not as a side effect of entrepreneurship, of digital entrepreneurship (Ferrerias-Méndez et al., 2021; Merín-Rodríguez et al., 2024). Second, despite digital readiness having been previously used as a boundary condition and it has been more often used as a moderator of the direct impact of digital transformation rather than a moderator of a mediating condition, its moderating role remains a key boundary condition affecting the strength of the relationship between digital and performance outcomes. Second, although digital readiness has been used as a boundary condition before, its moderating effect has been more extensively tested on the direct impact of digital transformation than on the moderating effect alongside an explicit mediating mechanism (Bilal et al., 2025; Jamil et al., 2025; Zhao et al., 2024). This, however, raises the question as to whether the mediation-moderation model of digital entrepreneurship-performance is direct or indirect, or both, and whether digital readiness moderates these relationships, a question that can only be answered empirically, which is possible with the mediation-moderation model of PLS-SEM applied in this study (Hair et al., 2019; Shah et al., 2023).

Hypotheses

H1: Knowledge about digital entrepreneurship positively influences business model innovation. Research question: Does digital entrepreneurship have a positive influence on business model innovation?

H2: There is a strong positive relationship between Business model innovation and performance of SMEs.

H3: Digital entrepreneurship positively directly influences the performance of SMEs.

H4: Digital entrepreneurship has a significant intervening effect on the relationship between business model innovation and SME performance.

H5: Digital readiness significantly moderates the relationship between digital entrepreneurship and SME performance, such that the relationship is stronger when the digital readiness is stronger.

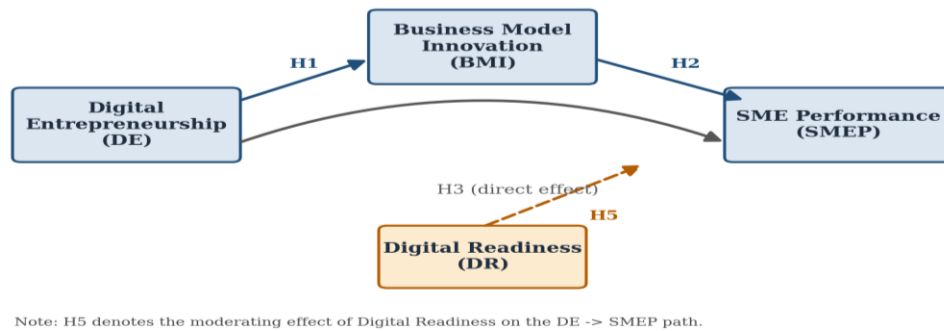


Figure 1: Hypothesized Research Model

Methodology

This study used a quantitative research method, cross-sectional research design to explore the relationship between digital entrepreneurship and SME performance, mediated by business model innovation and moderated by digital readiness. The unit of analysis was the SME and data were gathered from the owner/manager and senior workers of small and medium-sized enterprises (SMEs) who have implemented and/or are actively utilizing digital technologies in their business. Data collection was done using a structured questionnaire. The target population was comprised of SMEs including retail, service, manufacturing, information technology, e-commerce and other digitally enabled SMEs in Pakistan. Respondents were selected using purposive sampling, where a sample of 250 respondents was chosen because they were expected to have a good understanding of their firm's digital activities and performance. The questionnaire was composed of validated multiple item scales for each of the study constructs and was rated on a five-point Likert-type scale, with 1 representing strongly disagree and 5 representing strongly agree. Digital Entrepreneurship (DE) was the independent variable, which captures the level of use of digital technologies, recognition of digital opportunities, creation of digitally enabled products/services, and entrepreneurial approaches to exploit digital opportunities that the SMEs used. The concept of Business Model Innovation (BMI) was treated as the mediating variable and was measured on the extent of change of and/or redesign of the value proposition, value creation processes and value-capture mechanisms through innovative business models of SMEs. The dependent variable was SME Performance (SMEP), which included the overall performance of the firm as evaluated in terms of growth, profitability, market performance, customer related outcomes and competitive performance. To include the moderating variable, Digital Readiness (DR) was introduced and defined as the level of readiness of the firm in the following areas: Digital infrastructure, Digital capabilities of employees, Technological resources, Organizational support, and Readiness for digital transformation. Three control variables were included to help reduce the effect of organizational factors on the SME performance, namely firm size, firm age, and industry type. Partial Least-Squares Structural Equation Modeling (PLS-SEM) was used for data analysis. This analysis took place in two phases. The measurement model was evaluated first to determine the reliability and validity of the measures. Factor loadings were used to test the reliability of the indicators, and Cronbach's alpha and composite reliability were used to test internal consistency. The Average Variance Extracted (AVE) was used to test convergent validity, while the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait (HTMT) ratio (Henseler et al., 2015) were used to test the discriminant validity. The logic of full collinearity assessment as recommended for PLS-SEM (Kock, 2015) was applied for the multicollinearity examination and the results are presented by the Variance Inflation Factor (VIF) values. The second stage involved evaluating the structural model to verify the

hypothesized relationships between the digital entrepreneurship, business model innovation, SME performance, and digital readiness. Bootstrapping was used to obtain the path coefficients, t-values and p-values, using 5000 resamples. The mediating role of business model innovation was explored by testing the indirect effect of digital entrepreneurship to SME performance via business model innovation. A moderating effect of digital readiness was evaluated by building a mean-centering interaction term between digital entrepreneurship and digital readiness, and studying the interactions' effects on SME performance. In addition to the aforementioned, the coefficient of determination (R²), effect size (f²), predictive relevance (Q²) and model fit indicators were investigated, which are widely used in reporting the explanatory and predictive power of the structural model (Hair et al., 2019). Interpretation of mediation and moderation results was done at 95% confidence level.

Measurement Model and Structural Model Results

Sample Profile

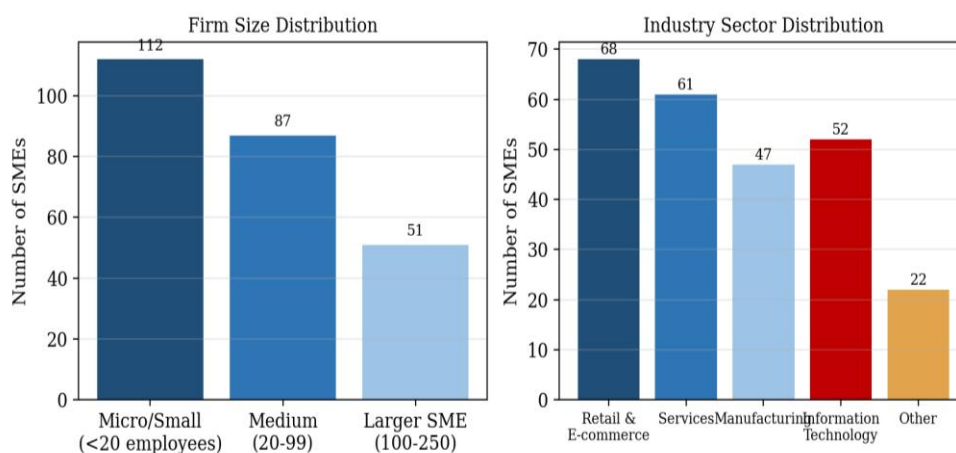


Figure 2: Sample Profile: Firm Size and Industry Sector (N = 250)

The vast majority of the SMEs that participated (44.8%) were micro or small enterprises with less than 20 employees, followed by medium sized enterprises (34.8%) and larger SMEs (20.4%) of 100-250 employees, as illustrated in Figure 2. At the industry level, the retail and e-commerce companies made up the largest share (27.2%), services (24.4%), information technology (20.8%), manufacturing (18.8%) and other digitally enabled industries (8.8%). The profile is representative of a wide cross-section of the digitally active SME population in Pakistan and justifies the purposive sampling methodology used as described in Section 3.

Measurement Model Assessment

Table 1: Indicator Loadings, Reliability, and Convergent Validity

Construct	Items	Loading Range	Cronbach's Alpha	Composite Reliability	AVE
Digital Entrepreneurship (DE)	5	0.819 - 0.848	0.894	0.922	0.703
Business Model Innovation (BMI)	5	0.834 - 0.862	0.905	0.930	0.726
SME Performance (SMEP)	5	0.826 - 0.873	0.902	0.928	0.721
Digital Readiness (DR)	5	0.833 - 0.881	0.908	0.932	0.732

Note. N = 250. All the loadings were above 0.70; Cronbach's alphas and composite reliability values were greater than 0.70; all AVE values were above 0.50 as recommended by Fornell and Larcker (1981).

The high correlations for all indicators listed in Table 1 indicated good indicator reliability. Cronbach's alpha and composite reliability were between .894 and .932, which exceeded the .70 threshold, indicating good internal consistency for the four constructs. Convergent validity was adequate with average variance extracted values between .703 to .732, which are above .50.

Table 2: Discriminant Validity: Fornell-Larcker Criterion

Construct	DE	BMI	SMEP	DR
DE	0.839			
BMI	0.502	0.852		
SMEP	0.448	0.487	0.849	
DR	-0.025	-0.029	0.219	0.856

Note. Diagonal values (bold-equivalent) are the square roots of AVE; off-diagonal values are inter-construct correlations.

Table 3: Discriminant Validity: Heterotrait-Monotrait (HTMT) Ratio

Construct	DE	BMI	SMEP	DR
DE	-			
BMI	0.558	-		
SMEP	0.498	0.538	-	
DR	0.047	0.059	0.242	-

Note: All HTMT values were well below the conservative 0.85 threshold, confirming discriminant validity.

The discriminant validity of the measurement model is confirmed in tables 2 and 3. The Fornell-Larcker criterion was satisfied as the square root of each construct (AVE from .839 to .856) is larger than the correlations between the constructs (max of .942). All of the ratios (from .047 to .558) under the more conservative HTMT criterion, however, were well below the cutoff of .85, offering greater confirmatory evidence that DE, BMI, SMEP, and DR are empirically distinct constructs. The variance inflation factors of the structural model predictors ranged from 1.001 to 1.347, which are clearly lower than the traditional five, thus not introducing multicollinearity into the path estimates of the structural model.

Structural Model: Direct, Mediated, and Moderated Effects

Table 4: Structural Model Path Coefficients (Bootstrapped, 5,000 Resamples)

Path	Coefficient (β)	Std. Error	t-value	p-value	Hypothesis Supported
DE -> BMI	0.522	0.057	9.145	< .001	H1: Yes
BMI -> SMEP	0.347	0.054	6.402	< .001	H2: Yes
DE -> SMEP (direct)	0.299	0.059	5.104	< .001	H3: Yes
DR -> SMEP	0.229	0.049	4.648	< .001	-
DE x DR -> SMEP	0.167	0.064	2.618	0.009	H5: Yes

Note: N = 250. Bootstrapped 95% confidence intervals excluded zero for all reported paths.

The results of the structural model are shown in Table 4. Digital entrepreneurship had a significant and positive relationship with the business model innovation ($\beta = .522$, $t = 9.145$, $p < .001$), thus supporting H1. The innovation of business model was found to positively and significantly predict the performance of SMEs ($\beta = .347$, $t = 6.402$, $p < .001$) and was found to be able to support H2. To reinforce H3, digital entrepreneurship was found to have a strong direct effect on the performance of SMEs, apart from BBI ($\beta = .299$, $t = 5.104$, $p < .001$). As

is most centrally the case, digital readiness significantly moderates the relationship between digital entrepreneurship and SME performance ($\beta = .167$, $t = 2.618$, $p = .009$), lending support to H5, with a positive sign indicating that digital readiness positively influences this relationship.

Table 5: Mediation Analysis: Indirect Effect of Digital Entrepreneurship on SME Performance via Business Model Innovation

Effect	Coefficient	Bootstrap SE	95% CI Lower	95% CI Upper	p-value
Indirect effect (DE -> BMI -> SMEP)	0.181	0.035	0.117	0.253	< .001
Direct effect (DE -> SMEP)	0.299	0.059	0.184	0.415	< .001
Total effect (DE -> SMEP)	0.480	0.058	0.366	0.593	< .001

Note: Bootstrap 95% confidence intervals excluding zero indicate statistically significant effects. Because both the direct and indirect effects were significant, the mediation is classified as complementary partial mediation.

Table 5 confirms H4. The bootstrapped indirect effect of digital entrepreneurship on SME performance through business model innovation was significant (indirect effect = .181, 95% CI [.117, .253]), and, because the direct effect of digital entrepreneurship on SME performance also remained significant (.299, 95% CI [.184, .415]), the pattern is classified as complementary partial mediation: business model innovation transmits a meaningful share of digital entrepreneurship's effect on performance, but digital entrepreneurship also continues to exert an independent, non-mediated effect. Digital entrepreneurship exerted an indirect effect of around 37.7% of the total effect on SME performance (.181 / .480), highlighting the substantive role of business model innovation as a transmission mechanism.

Table 4 shows a significant interaction that is represented in Figure 3. The simple slope of digital entrepreneurship on SME performance was positive and grew systematically across digital entrepreneurship's three levels, ranging from low (-1 SD) to high (+1 SD). This pattern demonstrates that digital entrepreneurship has a positive impact on SME performance throughout the entire spectrum of digital readiness of the SMEs analysed, but that its performance enhancing effect is significantly strengthened with increased digital infrastructure, employee digital capability and organizational readiness for digital transformation.

Moderation: Simple Slope Analysis

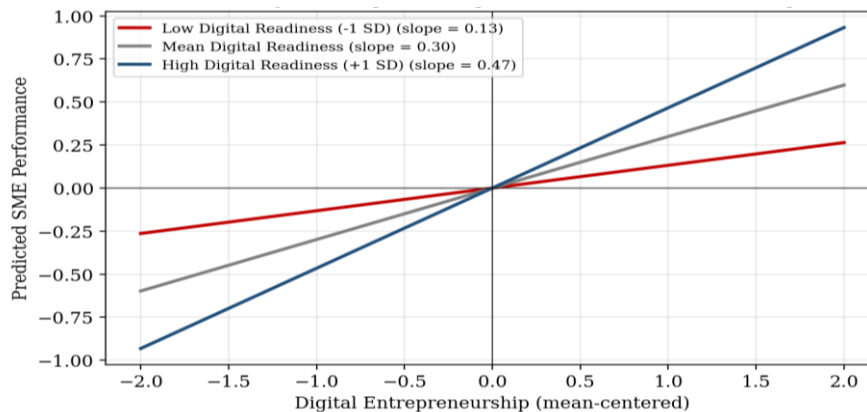


Figure 3: Simple Slopes: Moderating Effect of Digital Readiness on the Digital Entrepreneurship-SME Performance Relationship

Explanatory and Predictive Power of the Structural Model**Table 6: R2, Adjusted R2, Effect Size (f2), and Predictive Relevance (Q2)**

Endogenous Construct	R2	Adjusted R2	Q2 (Predictive Relevance)
Business Model Innovation (BMI)	0.252	0.249	0.238
SME Performance (SMEP)	0.366	0.356	0.354

Note: Q2 values greater than zero indicate acceptable predictive relevance, computed via a five-fold cross-validation procedure analogous to the blindfolding approach.

Table 7: Effect Sizes (f2) of Predictors on SME Performance

Predictor	f2	Effect Size Magnitude
Digital Entrepreneurship (DE)	0.097	Small-to-medium
Business Model Innovation (BMI)	0.143	Medium
Digital Readiness (DR)	0.087	Small
DE x DR (interaction)	0.027	Small

Note: f2 values of .02, .15, and .35 represent small, medium, and large effect sizes, respectively (Cohen's conventions as applied in PLS-SEM).

As presented in Table 6, the model had moderate levels of explanatory power – 25.2% of variance for business model innovation and 36.6% of variance for SME performance. The out of sample predictive relevance of the model is confirmed by the corresponding Q2 values (.238 and .354, respectively) being well above zero, so that the model is not just a within-sample statistical artifact. Table 7 reveals that the effect for business model innovation was the largest (f2 = .143, medium) followed by the direct effect of Digital entrepreneurship (f2 = .097, small-to-medium) and Digital readiness (f2 = .087, small-to-medium), whereas the DE x DR interaction term was small but statistically significant (f2 = .027), which is typical for interaction terms in behavioral research.

Discussion

The results validate the hypothesized mediation-moderation model for the study. Business model innovation was a clearly significant predictor of digital entrepreneurship (H1) and digital entrepreneurship was a clearly significant predictor of SME performance (H2), thus providing support for the notion that BMI is a key transmission mechanism that turns digital entrepreneurial activities into performance-relevant organizational change (Ferrerias-Méndez et al., 2021; Merín-Rodrigáñez et al., 2024). Similarly, as in H3 and H4, digital entrepreneurship had a significant direct effect on SME performance and a significant indirect effect via business model innovation, which led to a complementary partial mediation relationship: that, digitally entrepreneurial SMEs benefit both from the fact that they directly make use of digital opportunities and from the fact that they increasingly redesign their business models as a result of this action (Reim et al., 2022; Teece, 2010).

Of special interest is the moderation finding for H5. The direct digital entrepreneurship-SME performance relationship was significantly strengthened by digital readiness, confirming the findings of Jamil et al. (2025) in Pakistani manufacturing SMEs, which found that the technological readiness enhances the performance returns to digital capability-building, and in the case of Pakistani high-tech firms that digital literacy fortifies the impact of digital transformation on the performance of a firm (Zhao et al., 2024). The simple slope effect seen here (the stronger the relationship between DE-SMEP between low and high digital readiness), implies that digital readiness is not a contextual factor of low significance but rather a near-essential complement to digital entrepreneurial activity: the firms that are poorly

prepared to digitalize their entrepreneurship appear to be extracting only a part of the performance boost that is available for higher preparedness. This aligns with the digital entrepreneurial ecosystem perspective that entrepreneurial agency and surrounding digital capability context also contribute together to the outcome of the venture (Sussan & Acs, 2017).

It is also necessary to make a brief discussion of the measurement model results. All constructs showed high levels of reliability and validity, and the ratios of the HTMT in particular (maximum .558) were far below the conservative threshold of .85, suggesting that the constructs measured were empirically and conceptually different from one another, rather than overlapping or redundant, which has been a concern raised about closely related constructs related to digital-transformation elsewhere in the literature (Hair et al., 2019; Henseler et al., 2015). The model's R² (36.6%) for SME performance is moderate in line with other studies conducted in Pakistan (Fan et al., 2021; Shah et al., 2023) but slightly lower than other studies. The significant Q² values indicate that the model's predictive abilities are not limited to the specific population from which the sample was drawn.

Conclusion

To investigate the impact of digital entrepreneurship on SME performance, the mediating role of business model innovation and the moderating role of digital readiness were examined, respectively, for digital entrepreneurship and SME performance. For this purpose, survey data associated with 250 SMEs of Pakistan was analyzed through the PLS-SEM approach. The measurement model showed good reliability, convergent validity and discriminant validity for the four constructs. The structural model results showed that digital entrepreneurship significantly explained business model innovation, SME performance, and that business model innovation partially and significantly mediated the digital entrepreneurship-SME performance relationship, and that digital readiness significantly moderated the digital entrepreneurship-SME performance relationship, significantly boosting SME performance for better prepared firms. Together, these insights suggest that the business model innovation and digital readiness are two complementary and necessary levers to translate the occurrence of digital entrepreneurial activity into lasting performance improvements of SMEs.

Recommendations

Digital entrepreneurship should not be seen as an end goal but as a catalyst to planned business model redesign, as this study indicated that the greatest impact on SME success was business model innovation.

To ensure digital entrepreneurship initiatives are effective in enhancing corporate performance, firms should create digital readiness capabilities – such as digital readiness infrastructure, employee digital skills, and organizational readiness capabilities – before or while implementing digital entrepreneurship initiatives, because significantly higher performance returns are found among digital readiness high firms in comparison to digital readiness low firms in SMEs.

4. Digital-inclusion programs should be designed by policymakers and SME support agencies to deliver entrepreneurship training and digital-readiness capacity building in a combined manner, instead of providing digital adoption alone, for maximum impact of public investment.

5. SMEs that are digitally less ready should not be discouraged from becoming digital entrepreneurs as the direct and indirect effect remained positive and significant even at low levels of readiness; but, SMEs who are less ready should focus on closing the readiness gaps to reap the substantially higher rewards offered by more prepared SMEs;

Based on the important partial mediation result, managers should institutionalize regular business model review processes, instead of viewing business model innovation as a one-off activity, to continue to reap the performance benefits of continuous digital entrepreneurial activity.

Future research should build on this model in order to test the mediation-moderation pattern found here across a longitudinal and more variety of emerging-market contexts, to ensure that the pattern extends beyond the Pakistani SME sectors that were examined in this study.

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