Linking Digital Infrastructure, Digital Business Model Innovation, and Performance: Insights from Tunisian Entrepreneurs

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ABSTRACT

The accelerated shift toward digitalization has reinforced the strategic importance of leveraging digital infrastructures and rethinking business models for SMEs and entrepreneurs seeking to enhance competitiveness and performance in an increasingly uncertain environment. This study investigates how digital business model innovation (DBMI) contributes to improving SME performance, with a specific focus on the enabling role of digital infrastructure (DI) and its implications for entrepreneurial activities. A quantitative survey was conducted among 209 Tunisian entrepreneurs managing SMEs, selected using a convenience sampling technique. Data were analyzed using Partial Least Squares—Structural Equation Modeling (PLS-SEM). The findings reveal that a robust digital infrastructure significantly stimulates DBMI, which in turn enhances organizational performance (OP). Furthermore, DI was found to strengthen entrepreneurs' capabilities to redesign value creation, delivery, and capture mechanisms within their ventures. This research contributes to the literature on digital transformation, entrepreneurship, and business model innovation in emerging economies. It also offers actionable insights for entrepreneurs and SME managers seeking to leverage digital technologies to foster sustainable growth, enhance competitiveness, and adapt to rapidly evolving market conditions.

Keywords : Business Model, Digital Business Model Innovation, organizational performance, digital infrastructure, SME, entrepreneurship.

INTRODUCTION

Over the past two decades, entrepreneurship has gained growing attention from both policymakers and scholars due to its central role in economic development and competitiveness (Thurik et al., 2024; Corrêa et al., 2024; Cohen, 2025). This interest is particularly evident in countries where SMEs constitute the backbone of the productive system, as they contribute significantly to job creation, innovation, and economic diversification. In Tunisia, SMEs represent a vital component of the national economy and are widely recognized as an engine for entrepreneurial activity, social inclusion, and regional development (Souissi, 2025). This renewed interest in entrepreneurship stems from its potential to stimulate economic growth at a time when issues such as unemployment, job precarity, and the integration of young graduates remain major national challenges. As a result, both government bodies and academic institutions increasingly view entrepreneurship especially through SMEs as a strategic lever for addressing socio-economic pressures and building a more resilient, innovation-driven economic ecosystem (Arnold, 2021; Thurik et al., 2024).

Entrepreneurship is a multifaceted phenomenon that encompasses economic, social, psychological, and managerial dimensions (Usman et al., 2024; Zarkua et al., 2025). In Tunisia, as in many developing economies, the lack of a universally accepted definition of entrepreneurship reflects its conceptual complexity and the diversity of its manifestations. Since the early 2000s, the country has progressively acknowledged the role of entrepreneurship as a driver of economic, social, and human development (Karamti & Abd-Mouleh, 2023). SMEs, in particular, are considered a key mechanism for fostering innovation and generating employment opportunities. To strengthen the entrepreneurial landscape, the Tunisian government has introduced several support programs and policy reforms, including the widely cited *Startup Act*, which aims to encourage new

venture creation through tax incentives, easier access to financing, and tailored support services (Seheda, 2019; Souissi, 2025).

Despite these initiatives, entrepreneurship in Tunisia continues to face numerous obstacles. Several empirical studies show that many newly created SMEs struggle to survive beyond their first years of existence. According to recent data from the Tunisian Association of Small and Medium-sized Enterprises, nearly 200,000 SMEs went bankrupt in 2023, compared with 120,000 in 2022, illustrating a worrying upward trend. The early stages of a firm's lifecycle have long been identified by organizational scholars as a critical phase that determines long-term survival or failure (Thierry & Bertrand, 2006). While abundant research has focused on factors contributing to entrepreneurial success, understanding the causes of early-stage failure remains essential to shedding light on the specific constraints affecting SMEs (Boutaky et al., 2024). In Tunisia, where SMEs dominate the entrepreneurial landscape, their low survival rate highlights the urgent need to investigate the determinants of failure and performance within the national context.

In this regard, one of the most transformative forces shaping the trajectory of SMEs worldwide is digital transformation. Over the past decade, digital transformation has evolved from a mere technological choice into a strategic imperative for firms seeking to remain competitive, resilient, and innovative in dynamic environments. The rapid development of digital technologies such as artificial intelligence (AI), big data analytics, cloud computing, blockchain, and the Internet of Things (IoT) has profoundly reshaped how firms create, deliver, and capture value (Sabatini et al., 2022; Dong et al., 2024). These technological advancements have not only transformed industries but have also redefined the strategic foundations of business models, organizational processes, and customer interactions (Andreini et al., 2022; Abuseta et al., 2025). Digital transformation therefore extends far beyond technology adoption; it relies on rethinking organizational strategy, structure, culture, and operational logic (Wang & Zhang, 2025; Singh & Anees, 2025).

However, engaging in digital transformation is particularly challenging for SMEs, which often face financial, technological, and human resource constraints (Müller, 2019; Silva et al., 2022; Omrani et al., 2024). Despite these challenges, SME entrepreneurs increasingly recognize digital transformation as a lever for competitiveness and long-term sustainability. A key outcome of successful digital transformation is digital business model innovation (DBMI), which refers to the redesign or reinvention of a firm’s business model enabled by digital technologies (Bresciani et al., 2021; Broccardo et al., 2023). DBMI enables firms to diversify revenue streams, enhance customer experiences, improve value propositions, and increase organizational agility. Previous research confirms that DBMI significantly improves firm performance by enhancing efficiency, responsiveness, and innovative capabilities (Rachinger et al., 2019; Arany & Popovics, 2024; Christofi et al., 2024). For SMEs, DBMI is particularly essential as it helps them overcome structural limitations and respond more effectively to competitive pressures.

Yet, the ability of SMEs to deploy DBMI and more broadly to undertake digital transformation depends critically on the strength of digital infrastructure (DI). DI constitutes the foundational layer enabling digital connectivity, data exchanges, technological integration, and overall digital capability. Recent research highlights the emergence of a core–periphery DI structure that is increasingly open, interconnected, and capable of generating technological spillovers (Rodon & Eaton, 2021; Inoue, 2021; Du & Wang, 2024). DI includes broadband Internet, mobile networks, cloud computing services, software platforms, digital devices, and integrated data systems (Shenglin et al., 2017). A robust DI reduces connectivity barriers, enhances access to technological resources, supports operational efficiency, and facilitates business activities across geographical boundaries (Wen et al., 2023). In emerging economies such as Tunisia, where digital divides persist, DI plays a decisive role in enabling SMEs to adopt digital tools, develop innovative business models, and strengthen performance (Zhang et al., 2022).

Moreover, DI is closely related to managerial and entrepreneurial activities. Managers increasingly rely on digital tools to identify opportunities, reach customers, mobilize knowledge, and expand market reach (Nambisan et al., 2019; Zahra, Wright & Abdelgawad, 2024). Digital resources enhance decision-making quality, foster opportunity recognition, and stimulate innovation (Autio & Rannikko, 2023). In this context, developing DI is particularly important for Tunisian SME entrepreneurs, where managerial capability and entrepreneurial initiative are essential to overcoming structural constraints and driving competitive advantage.

Despite the growing importance of digital transformation, DBMI, and DI, the existing literature still presents several limitations. First, empirical research examining how DI enables DBMI especially in emerging economies remains limited. Second, the mediating role of DI in the relationship between DBMI and organizational performance has not been sufficiently explored, particularly in the context of SME entrepreneurs in developing countries. Third, academic studies from North Africa and the Middle East, including Tunisia, are few despite accelerated digitalization efforts in these regions.

To address these gaps, the present study investigates how DBMI enhances SME performance through the enabling role of DI, using empirical data collected from 209 Tunisian entrepreneurs managing SME. By examining these interconnected constructs, the study enriches academic discussions on digital transformation, business model innovation, entrepreneurship, and performance in emerging markets. It also offers valuable managerial and policy insights to support SME digitalization, strengthen entrepreneurial ecosystems, and foster sustainable competitiveness within the Tunisian digital economy.

The subsequent sections of this paper are structured as follows. The Literature Review section synthesizes existing research on digital transformation, digital business model innovation (DBMI), digital infrastructure (DI), and organizational performance, and develops the hypotheses guiding this study. The Research Context and Hypotheses Development section further elaborates on the relationships between the constructs and highlights the rationale for examining Tunisian entrepreneurs managing SMEs. The Methodology section details the research design, sampling procedures, data collection, and measurement of variables. The Results section presents the empirical findings derived from data collected from 209 Tunisian entrepreneurs managing SMEs. The Discussion and Implications section interprets these findings in light of prior literature and outlines theoretical and managerial implications. Finally, the paper concludes with the Limitations and Future Research section, identifying constraints of the study and proposing avenues for further investigation.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Digital Business Model Innovation

Today, managers increasingly recognize the central role of digital technologies and place digital transformation at the core of their strategic priorities. However, many initiatives fail because organizations are unable to fully capitalize on their technological investments (Linde et al., 2021). This paradox can be explained by the fact that investing in advanced digital technologies does not automatically guarantee success: digital transformation is, to a greater extent, a managerial rather than a purely technological challenge (Trischler & Li-Ying, 2023). In this regard, El Moutaoukil and Belkacem (2025) argue that digital transformation goes beyond the mere implementation of digital solutions within organizations; it involves a comprehensive reorganization of processes, routines, and capabilities, and fundamentally reshapes the business logic of firms and organizations.

To remain competitive in complex digital environments, companies must therefore design, develop, and implement DBMI. This process entails modifications to value propositions, delivery mechanisms, and/or value capture systems. The literature emphasizes that DBMI should be regarded as a distinct phenomenon, separate from traditional forms of business model (Lanzolla et al., 2020; Volberda et al., 2021). Despite its strategic significance, DBMI remains underexplored and poorly understood, largely due to conceptual ambiguities and the lack of coherent definitions (Rachinger et al., 2018; Parida et al., 2019; Li, 2020). Therefore, further efforts are needed to clarify the concept to better guide managers in their digital transformation initiatives.

For Morabito (2014), DBMI refers to the creation and use of new forms of knowledge technological, organizational, or commercial that allow firms to leverage the disruptive potential of the Internet and design business models capable of delivering highly personalized products and services. Venkatesh et al. (2019) define DBMI as the strategic capability to extend the scope of digital technologies, amplify their cross-functional impacts across the organization, and adapt continuously to the dynamic digital market by integrating emerging technologies and reinventing internal processes. According to Mancuso et al. (2023), DBMI also functions as a strategic tool to transform products, services, and operational activities, thereby supporting revenue growth, strengthening competitive advantage, and enhancing overall organizational performance.

Finally, Teoh et al. (2025) highlight that DBMI involves the reinvention of core business model components value creation, value proposition, value delivery, and value capture enabling firms to generate new stakeholder value, develop innovative offerings, leverage digital platforms for new markets, and create new revenue streams and cost structures.

Based on these definitions, DBMI represents a major strategic lever for organizations, enabling them to strengthen their competitive advantage, optimize overall performance, and adapt their business models to the demands of the digital economy. DBMI can be defined as the strategic and systematic use of digital technologies to significantly transform the core elements of the business model value creation, value proposition, value delivery, and value capture with the aim of generating new sources of value. It involves the reinvention of products, services, processes, and customer relationships by leveraging digital technologies, organizational capabilities, and strategic partnerships to respond effectively to the fast-paced dynamics and continuous changes of the digital market.

Organizational Performance

In management research, OP has been a recurring topic, regarded as a central concern for managers seeking to ensure the survival of their organizations. For a long time, the concept of "firm performance" was primarily limited to financial dimensions (Bourguignon, 1997), focusing on achieving short- and medium-term financial objectives and securing the desired profitability in terms of revenue to guarantee organizational survival. Since the second half of the 20th century, the understanding of OP has significantly expanded. The purely financial perspective has been increasingly challenged (Dohou-Renaud, 2007; Bouquin, 2004), and scholarly debates have evolved (Rherib et al., 2021; Otmani & Benkaraache, 2019), leading to the inclusion of additional dimensions such as sustainability, corporate social responsibility, stakeholder engagement, innovation, and knowledge management.

According to Balhadj and El Moudden (2022), OP refers to the way in which a firm organizes itself to achieve its objectives, encompassing multiple factors such as profitability, growth, and customer satisfaction. Maâlej and Affes (2023) argue that OP is less dependent on the firm's mission or competitive capacity and more influenced by other factors that directly affect innovation. Similarly, Brahim and Oubrahimi (2025) emphasize that OP requires a holistic approach, integrating organizational culture, stakeholder satisfaction, innovation, process efficiency, and employee engagement. These interconnected elements not only ensure short-term survival but also enhance the firm's ability to thrive and adapt in dynamic and often uncertain environments.

These definitions highlight two critical dimensions of OP effectiveness, related to the achievement of organizational goals, and efficiency, which reflects the relationship between the use of organizational resources and goal attainment. Thus, OP can be interpreted as a combination of both effectiveness and efficiency. Moreover, it is considered a multidimensional concept, encompassing internal and external factors, qualitative and quantitative indicators, human and technical resources, as well as physical and financial elements, underscoring its inherent complexity.

In this context, Maâlej and Affes (2023) note that performance is a polysemous concept, and its definition depends on the scope of activities considered. This evolution has led to the adoption of the concept of overall or holistic performance, which incorporates various dimensions in business practice. Integral measurement frameworks, such as the Balanced Scorecard (BSC), now consider financial performance, customer perspectives, internal processes, learning and growth, human resources, outcomes, stakeholder satisfaction, alignment of strategy and processes, operational performance, value creation, competitive advantage, and innovation. Ultimately, it is up to researchers to adapt this broad concept to the specific objectives of their studies.

Digital Business Model Innovation and Organizational Performance

The relationship between digital transformation and OP has attracted increasing attention in the scientific literature. Digital transformation is now widely recognized as a strategic lever that enables organizations to enhance their overall performance. The integration of digital technologies contributes to the optimization of

internal processes, supports more informed decision-making, and enriches the customer experience, thereby fostering improved organizational performance.

Numerous empirical studies confirm the positive impact of digital transformation on OP (Lee et al., 2022; Wijaya et al., 2023; Mahmoudi & Najim, 2024; Salih et al., 2024; Radoui & Cherradi, 2025). Organizational success largely depends on the quality of data collected from various stakeholders. Reliable and relevant information enables managers to make informed strategic decisions, particularly those with long-term implications. Implementing an effective information system that ensures data accuracy and relevance is associated with significant improvements in OP and decision-making quality (Salih et al., 2024).

In this regard, several studies have emphasized the critical role of firms' IT capabilities, particularly through the integration of Big Data tools and analytical capabilities, in enhancing performance (Orero-Blat et al., 2024; Putra et al., 2024; Wijaya et al., 2023). Additionally, other research highlights the positive and significant effects of artificial intelligence (Al-Alawi et al., 2023; Mikalef et al., 2023; Rana et al., 2024; Singh et al., 2024), social media usage (Al-Alawi et al., 2023; Alalawneh et al., 2022), and robotics (Aguilar-Rodríguez et al., 2023) on OP across diverse sectors such as retail, manufacturing, and education.

The integration of these digital tools allows organizations to digitalize their business model, giving rise to new digital business model innovations (DBMI). Digital technologies influence the mechanisms of value creation and capture in two main ways. First, they transform the structure and composition of traditional products, services, and processes. This transformation, manifested through dematerialization, personalization, and enriched experiential offerings, reduces transaction costs, increases revenues, generates new profit sources, and enhances performance (Parida et al., 2019; Vaska et al., 2021).

Second, digital technologies provide a fundamental infrastructure that removes social, technical, and geographical barriers between firms and their customers, enabling new forms of interaction and collaboration (Mancuso et al., 2023a). Consequently, DBMIs leverage more direct communication channels to strengthen value delivery (Parida et al., 2019), better understand customer needs (Vaska et al., 2021), and promote value co-creation and overall organizational performance (Klos et al., 2021).

Thus, DBMIs exploit digital technologies as a strategic engine (Mancuso et al., 2023) to transform products, services, and operational activities. This transformation fosters revenue growth, sustains competitive advantage, and enhances organizational performance (Schallmo et al., 2017; Li, 2020).

Both academia and industry have shown growing interest in understanding the processes that drive DBMI (Parida et al., 2019; Bosler et al., 2021). Research in this area investigates how digital technologies can be harnessed to create and capture new forms of value (Teece, 2018; Li, 2020). Iconic companies such as Apple, Netflix, Amazon, and Google exemplify this dynamic, successfully leveraging emerging Internet technologies to transform and innovate their traditional business models (Zhang et al., 2016; D'Ippolito et al., 2019). Therefore, we hypothesize as follows :

H1: Digital Business Model Innovation has a positive effect on organizational performance.

The mediator role of digital infrastucture

Digital infrastructure (DI) represents a fundamental pillar for modern businesses, enabling the delivery of advanced services and fostering high levels of efficiency and competence that are critical for enhancing innovation performance (Träskman & Skoog, 2022 ; Hussain et al., 2025). For SMEs, a robust DI is a key determinant of success, encompassing office automation, reliable internet connectivity, and diverse information networks. Collectively, these elements not only drive business development and support the creation of next-generation products and services but also provide the technological foundation necessary for the successful implementation of DBMI (Bhatti et al., 2022a, 2022b; Krenz et al., 2023).

DBMI leverages digital technologies to transform the key components of a business model including value creation, value proposition, value delivery, and value capture by integrating digital capabilities, organizational

knowledge, and strategic partnerships (Mancuso et al., 2023; Teoh et al., 2025). A strong DI facilitates this process by providing the necessary technological backbone, enabling firms to implement innovative products, services, and operational processes efficiently, while responding rapidly to evolving market demands (Tilson et al., 2010).

Moreover, DI supports knowledge sharing, collaborative problem-solving, and the accumulation of intellectual capital, all of which enhance the firm's ability to leverage DBMI for sustained competitive advantage and improved organizational performance (Allwein & Venters, 2017; Cheng et al., 2014). It also reduces social, technical, and geographic barriers, thereby fostering greater interaction with customers, suppliers, and partners, which in turn amplifies the value generated through digital business models (Ovrelid & Kempton, 2020; Queiroz et al., 2020).

In this sense, DI acts as a mediating mechanism that connects DBMI initiatives with organizational outcomes. While DBMI enables firms to redesign their business models and capture new value, the presence of a strong DI ensures that these innovations are effectively implemented, scaled, and integrated across organizational processes, ultimately enhancing overall performance. Based on these insights, the following hypothesis is proposed:

H2: Digital infrastructure mediates the relationship between Digital Business Model Innovation and organizational performance.

Research model

Literature on business model innovation, digital transformation, organisational structure, culture, and strategy and DI was consulted, which reported that DI play a vital role in DBMI and the digital transformation process (Pedersen 2022; Verhoef et al. 2021; Wang et al. 2020; Van Tonder et al., 2024 ; Hussain et al., 2025). This can contribute to the overall business performance of SMEs. Figure 1 shows the research model and hypotheses

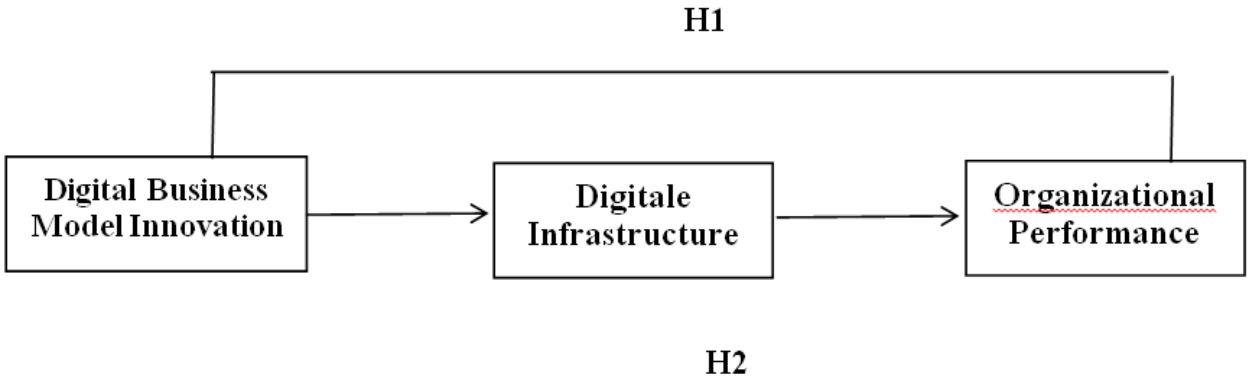

Fig. 1 Theoretical framework of the study

METHODOLOGY

This study employs a quantitative research design based on a structured questionnaire administered to Tunisian SMEs, with a strong focus on entrepreneurs who lead or co-manage digital transformation initiatives within their firms. Data collection was conducted with the collaboration of SME owners and entrepreneurs, who facilitated access to employees and ensured that respondents were familiar with the company's digital practices. A convenience sampling approach was used to target entrepreneurs, managers, and staff involved in strategic or operational decision-making. The questionnaire was first developed in English and then translated to french using a rigorous back-translation procedure involving bilingual experts. Prior to full deployment, it was pre-tested with a small group of Tunisian entrepreneurs to ensure clarity, coherence, and cultural relevance. The final instrument included firm characteristics (age, size), respondent demographics (education, gender, experience), and items measuring DI, DBMI and OP.

A total of 260 questionnaires were distributed both online and in person, generating 209 valid responses, corresponding to a response rate of 80.38%. The sample consisted mainly of Tunisian entrepreneurs (firm owners and co-founders), alongside senior managers and operational supervisors, ensuring strong familiarity with digital activities and innovation practices. Among respondents, 73.8% were men and 26.2% were women, reflecting the gender distribution commonly observed in the Tunisian entrepreneurial landscape. Participants displayed diverse educational backgrounds, with 18.6% having completed secondary or vocational training, 52% holding a bachelor's degree, and 29.4% possessing a master's degree. Professional experience ranged between 3 and 10 years, capturing a solid mix of emerging and experienced entrepreneurs actively involved in SME management. All respondents were informed of the study's objectives and assured of anonymity and confidentiality. Data were analyzed using PLS-SEM, a method suitable for exploratory research and medium-sized samples, allowing for the examination of the mediating role of DI.

Measurement

To test this study hypothesis, multi-item scales were adapted from prior literature to measure the variables.The details of each item for scales used in this study are shown in the Appendix. However, 5-point scales were used for this study construct, ranging from 1=strongly agree to 5=strongly disagree.

Digital Business Model Innovation

In prior empirical studies, no standardized and universally validated measurement scale for DBMI existed. As a result, researchers have commonly assessed DBMI by combining two complementary dimensions: digital transformation and business model innovation (Ramadan et al., (2023)). In this study, these dimensions were measured using the five-item scale developed by Nasiri et al. (2020) and the seven-item scale proposed by Bouwman et al. (2019), respectively. Using these two established instruments provides a robust and reliable empirical approximation of the DBMI construct.

Organizational performance

To measure OP, we relied on previous studies by Danso et al. (2016), Guo et al. (2016), Anwar and Sahah (2020), and Ngouni Noupele and Mayéglé (2022). We identified three dimensions related to financial performance (e.g., return on assets, return on equity, and return on investment) and five dimensions related to non-financial performance (customer satisfaction, employee satisfaction, product quality and service quality, development of new products/services, and overall organizational outcomes) in the questionnaire.

Digital infrastructure

In this study, we utilized a 7-point Likert scale to assess the level of DI. Drawing on the works of Ghosh (2009), Greenstein (2019), and Hussain et al. (2024), this scale was specifically adapted to capture the multifaceted nature of digital infrastructure relevant to our research. It enables the evaluation of multiple dimensions, offering a comprehensive understanding of how digital infrastructure influences organizational outcomes.

Analysis

In order to test and analyze the research model of the study (Figure 1), PLS-SEM was used due to the presence of latent variables in the aforementioned model. Moreover, normal distribution was not a concern, and statistical significance could be attained with a smaller sample (Hair et al., 2017).

The evaluation of the proposed theoretical model employed the PLS-SEM technique, which is widely used in social sciences, information systems, and business research (Hair et al. 2017). PLS-SEM accommodates reflective, formative, and composite models (Dijk- stra and Henseler 2015), making it applicable in various research settings (descriptive, exploratory, confirmatory, explanatory, and predictive), as noted by Henseler (2018). This software was utilized as it is known for handling models efficiently, including constructs, indicators, and their relationships (Bari et al. 2023; Li et al. 2023). It allows for evaluating both measurement models (relationships between indicators and constructs) and structural models (relationships

between constructs).

RESULTS

To validate the measurement model, several reliability and validity assessments were performed. Specifically, Table 1 reports Cronbach's alpha, Rho Average, and Composite Reliability (CR), which evaluate internal consistency, together with the Average Variance Extracted (AVE), which assesses convergent validity. As illustrated in Table 1, all indicator loadings exceed the recommended threshold of 0.70. Cronbach's alpha, Rho Average, and CR values also fall within the acceptable range of 0.70 to 0.90 (Diamantopoulos et al., 2012; Dijkstra & Henseler, 2015; Hair et al., 2019; Jöreskog, 1971). Moreover, the AVE values are higher than 0.50, confirming adequate convergent validity (Hair et al., 2017; Henseler et al., 2015). Collectively, these indicators confirm that the measurement model is robust and suitable for further structural analysis.

Table 1. Measurement model.

Constructs	**Indicators**	**Outer Loadings**	**Alpha**	**Rho A**	**CR**	**AVE**
	DI1	0.816				
Digital	DI2	0.841				
Infrastructure	DI3	0.752	0.831	0.758	0.729	
	DI4	0.956				
	DI5	0.711				
	DI6	0.824				
	DI7	0.834				
	OP1	0.851				
	OP2	0.813				
Organizational	OP3	0.863	0.851	0.854	0.722	
Performance	OP4	0.745				
	OP5	0.799				
	OP6	0.701				
	OP7	0.718				
	OP8	0.784				
	DBMI1	0.863				
Digital	DBMI2	0.823				
Business Model	DBMI3	0.788				
Innovation	DBMI 4	0.708				
	DBMI5	0.877	0.880	0.895	0.847	0.581
	DBMI6	0.750				

	DBMI7	0.809				
	DBMI8	0.832				
	DBMI9	0.755				
	DBMI10	0.717				
	DBMI11	0.862				
	DBMI12	0.811				

Table 2 encompasses the confirmatory factor analysis (CFA) results obtained by comparing four theoretical models, differing by the number of factors. The fol- lowing measures are used to determine the fit of the model include chi-square (χ^2), degrees of freedom (Df), chi-square divided by degrees of freedom ratio (χ^2/Df), root mean square error of approximation (RMSEA), goodness of fit index (GFI), and comparative fit index (CFI). Of these, the Three-factor model achieves the best fit; it has the lowest χ^2 value and shows acceptable, in fact, χ^2/Df ratio under 3, as well as good RMSEA, GFI, and CFI scores, being close to 1.0. Low fit quality in simple models (fewer factors) shows the vital forces of the 3-factor model that allow it to represent data structure accurately.

Table 2 Confirmatory factor analysis (CFA)

Model description	χ^2	Df	χ^2/df	RMESA	GFI	CFI
Hypothesized Three-factor model	1074.62	455	2.234	0.05	0.94	0.95
Two-factor model	1152.21	365	2.952	0.12	0.84	0.85
Single-factor model	1285.35	375	3.428	0.18	0.74	0.75

Table 3 in the study offers a detailed statistical analysis that helps illuminate the interconnections and impacts among digital business model innovation, digital infrastructure and organizational performance. The metrics provided include means and standard deviations, which indicate the central tendencies and variabilities of the data, and correlation coefficients, which explore the relationships between pairs of variables. The analysis reveals several vital relationships: a moderate but significant positive correlation (0.22, $p < 0.001$) between DBMI and digital infrastructure suggests that improvements in DBMI can enhance performance. Similarly, a stronger correlation (0.282**, $p < 0.001$) between digital infrastructure and organizational performance indicates that digital infrastructure initiatives likely substantially impact overall performance.

Importantly, the analysis shows no issues of multicollinearity, as all variance inflation factor (VIF) values fall well below the threshold of 10. This indicates that each variable contributes unique information to the model, reinforcing the credibility of the results. Consequently, the findings demonstrate that both DBMI and digital infrastructure exert meaningful and independent effects on organizational performance, supported by strong statistical evidence.

Table 3 Correlation matrix

Variable	Mean	SD	α	1	2	3	4	5	6
1 BusinessAge	3.00	1.05	0.82	1.00					
2 BusinessSize	1.22	0.40	0.30	1.52**	1.00				

3 Respondent Experience	1.45	0.44	0.82	0.015	0.025	1.00			
4 Digital Business ModelInnovation	3.15	0.34	0.84	0.138**	0.016	0.032	1.00		
5 Digital Infrastructure	3.16	0.32	0.85	– 0.019	0.074*	0.042**	0.022	1.00	
6 Organizational performance	1.18	0.37	0.81	0.019	0.001	– 0.03	0.268**	0.282**	1.00

Table 3 shows the mean, standard deviation, and correlation

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed test), respectively

Table 4 presents the results of hypothesis H1 that provides a detailed examination of the impact of DBMI on organizational performance. The analysis reveals that a one-unit increase in DBMI correlates with a 0.26 increase in OP, as reflected by the unstandardized regression coefficient (*B*). This positive relationship is statistically validated with an *F*-sta- tistic of 14.009, indicating a highly significant model fit. Although the *T*-statistic is reported as 0.1037, which seems anomalously low, the significance level (Sig) documented at 0.000 robustly confirms the validity of these findings, conclusively rejecting the null hypothesis. Hence, the hypothesis that enhancements in DBMI positively affect OP is strongly supported.

Table 4 Hypothesis testing

Model	Hypothesis description	*B*	*F*	*T*	Sig	Remarks
Model 01	Digital Business Model Innovation to Organizational Performance	0.26	14.009	0.1037	0.000	Accepted

Table 5 presents the analysis of the mediating effect of digital infrastructure in the relationship between DBMI and OP. The data shows a point estimate integrating DI into the DBMI to optimize performance outcomes.

Table 5 Mediating effect of DI between DBMI and OP

Model detail	Data	Boot	SE	Lower	Upper	Sig
DBMI→DI→OP	0.2833	0.2615	0.39	0.2245	0.3442	0.000

DISCUSSION AND IMPLICATIONS

In the context of emerging markets characterized by volatility, complexity, and high uncertainty entrepreneurs face constant pressure to innovate and remain competitive. Tunisian entrepreneurs, in particular, operate in an environment where rapid technological change and intensified competition make it increasingly challenging to leverage digital tools effectively and sustain high levels of performance. To cope with these pressures, entrepreneurs are compelled to adapt to fast-evolving digital infrastructures, explore new practices, and develop innovative products and services capable of meeting market expectations.

In this regard, DBMI emerges as a critical strategic lever. Beyond reshaping value creation and delivery mechanisms, DBMI strengthens firms' ability to respond to market changes and unlock new performance opportunities. This aligns with recent literature highlighting the role of digitalisation BM in fostering the development of new offerings and improving organizational outcomes (Mancuso et al., 2023; Wijaya et al., 2023; Singh et al., 2024; Radoui & Cherradi, 2025). Following these theoretical insights, H1 posits a positive

impact of DBMI on the performance of Tunisian SMEs, reflecting its capacity to stimulate innovation, enhance strategic alignment, and support the introduction of digitalized services and processes.

At the same time, digital infrastructure plays a central role in facilitating the successful implementation of DBMI. It encompasses core IT components such as internet connectivity, digital communication systems, software platforms, and data management tools that enable firms to adopt, manage, and scale digital innovations. Prior studies (Deshmukh & Pasumarti, 2023; Krenz et al., 2023; Teoh et al., 2025) emphasize that digital infrastructure not only supports the development of new technologies and organizational solutions but also reduces structural disparities by ensuring broader access to digital capabilities. For Tunisian entrepreneurs operating across geographically diverse regions, such infrastructures help mitigate digital gaps and create more equitable conditions for adopting technologically advanced practices.

Furthermore, digital infrastructure enhances innovation performance by enabling SMEs to leverage advanced technologies such as IoT, AI-enhanced systems, VR/AR applications, and integrated digital platforms (Papadonikolaki & Morgan, 2020). These technologies improve firms' capacity to design innovative services, optimize processes, and refine customer experiences, ultimately contributing to higher performance levels. Additionally, cognitive diversity and adaptive organizational capabilities strengthen the benefits brought by digital infrastructure, as they encourage continuous learning and experimentation (Øvrelid & Kempton, 2020).

Empirical findings from our study confirm that digital infrastructure not only exerts a direct influence on performance outcomes but also acts as a mediating mechanism in the relationship between DBMI and performance, as formulated in H2. Specifically, digital infrastructure enables Tunisian SMEs to effectively implement DBMI initiatives, adopt sophisticated digital tools in shorter timeframes, and reduce disparities in technological access. This mediating effect accelerates the deployment of digital platforms, innovative services, and new business models, thereby strengthening the overall impact of DBMI on performance.

In sum, the results underscore the strategic importance of both DBMI and digital infrastructure in enhancing the performance of Tunisian entrepreneurs. While DBMI drives the reconfiguration of value creation mechanisms, digital infrastructure provides the technological backbone that enables firms to fully exploit these innovations both directly and through a meaningful mediating effect.

This study contributes to the literature on digital transformation by demonstrating the central role of DBMI in enhancing the performance of Tunisian SMEs. The findings confirm that DBMI constitutes a key strategic mechanism through which entrepreneurs reconfigure value creation processes and strengthen competitiveness in volatile and resource-constrained environments.

Furthermore, the study advances theoretical understanding by showing that digital infrastructure mediates the relationship between DBMI and performance. This highlights digital infrastructure not merely as a technical resource but as a foundational enabler that allows SMEs to operationalize and amplify the benefits of business model innovation. By examining this mechanism within the Tunisian entrepreneurial context, the study extends existing research, which has predominantly focused on large firms or advanced economies. It also contributes to emerging discussions on digital inclusion by illustrating how improved digital infrastructure reduces technological disparities and facilitates more equitable innovation adoption among entrepreneurs.

The results offer several implications for Tunisian SME managers and policymakers. Entrepreneurs should prioritize investments in reliable digital infrastructures including connectivity, data systems, and digital platforms as these elements substantially strengthen the impact of DBMI on firm performance. SMEs are also encouraged to adopt DBMI as a core strategic practice by redesigning their offerings, digitizing processes, and integrating advanced technologies into their business models.

Additionally, the study underscores the importance of capacity-building programs aimed at improving digital skills among entrepreneurs. Policymakers and support institutions should develop targeted training initiatives that enable SMEs to effectively use digital tools and maximize the returns on digital infrastructure investments. Finally, fostering collaboration between SMEs, universities, and innovation hubs can accelerate technology transfer and strengthen the national entrepreneurial ecosystem.

CONCLUSION

This study provides meaningful insights into how Digital Business Model Innovation and digital infrastructure jointly enhance the performance of Tunisian SMEs. The findings confirm the direct positive effect of DBMI on entrepreneurial performance and highlight the mediating role of digital infrastructure in strengthening this relationship. These results underscore the strategic importance of digital transformation as a lever for competitiveness and value creation in emerging economies.

Despite its contributions, the study presents several limitations. First, the relatively small sample size may restrict the generalizability of the findings and calls for caution in extrapolating the results to the broader SME population in Tunisia. Second, the exclusive reliance on self-reported questionnaires may introduce response biases and limit the depth of collected data. Future research could therefore benefit from mixed methods such as longitudinal studies, interviews, or case studies to gain a more holistic understanding of digital transformation dynamics.

Moreover, while this research examined digital infrastructure as a mediator, future studies could explore additional moderating variables such as organizational culture, digital leadership, environmental turbulence, or innovation orientation to enrich the conceptual model and provide a more comprehensive explanation of performance outcomes. Expanding the investigation to other sectors and regions would also strengthen the external validity of the framework.

Overall, this study contributes to emerging knowledge on digital transformation in Tunisian SMEs and opens promising avenues for further theoretical and empirical development.

APPENDIX

Items	Construct
Digital infrastructure	Information is being delivered and shared in our firm
Dinf-1	Firm systematize online databases and user orientation programs
Dinf-2	We discuss all issues problem faced during use of online data-bases
Dinf-3	We are satisfied with time taken for connectivity of the service and reliability measures of service
Dinf-4	We provide remote access to required information
Dinf-5	Our firm database is user-friendly and up-to-date We frequently use internet use
Dinf-6	We used high quality digital solutions as compared to competitors
Dinf-7	Return on assets / Return on equity/ Return on investment / Customer satisfaction / Employee satisfaction/ Product/service quality / Development of new products/services/ Overall firm performance
Organizational performance	In my organization, we aim to digitalize everything that can be digitalized.
OP1 / OP2/ OP3/ OP4 / OP5	In my organization, we collect large amounts of data from different sources.
OP6/ OP7/ OP8	In my organization, we aim to create more robust networking with
Digital Business Model Innovation	

DBMI-1	digital technologies between the different business processes.
DBMI-2	In my organization, we aim to enhance an efficient customer interface with digitality.
DBMI-3	In my organization, we aim at achieving information exchange with digitality.
DBMI-4	In my organization, business model innovation requires enhancing the components of the entire business model.
DBMI-5	In my organization, business model innovation requires evaluating and changing in the business model components.
DBMI-6	In my organization, the business model changes have helped us gain a competitive advantage.
DBMI-7	In my organization, business model innovation is derived from the strategy.
DBMI-8	In my organization, business model innovation is driven by market needs and circumstances.
DBMI-9	In my organization, there is/are team(s) that are involved in business model experimentation and innovation.
DBMI-10	In my organization, in-depth analysis takes place before starting to change the business model.
DBMI-11	
DBMI-12	

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