

Bridging Digital Transformation and Firm Performance: The Role of Digital Capability, Digital Innovation, and Digital Leadership in Moroccan SMEs

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Abstract

Digital transformation (DT) has become a strategic priority for small and medium-sized enterprises (SMEs) seeking to compete in increasingly digital environments. However, the mechanisms through which it translates into firm performance (FP) in the context of SMEs in emerging economies remain insufficiently understood. Drawing on dynamic capabilities theory and the technology-organization-environment (TOE) framework, this study examines how DT influences FP in Moroccan SMEs, both directly and indirectly through digital capability (DC) and digital innovation (DI), and tests whether digital leadership (DL) moderates these pathways. The findings indicate that the effect of DT on FP is partially mediated by DC and DI, suggesting that DT improves performance both directly and, in particular, when digital initiatives are embedded in organizational capabilities and converted into innovation outcomes rather than through technology adoption alone. The results further reveal that DL significantly moderates the DT-DI relationship, strengthening the conversion of digital efforts into innovation, whereas its moderating effect on the DT-DC relationship is not statistically significant. The study provides a clearer understanding of DT as an organizational and leadership-driven process rather than a purely technological one, and integrates DT, capability building, innovation, and leadership into a single explanatory framework. Theoretical contributions extend dynamic capabilities theory and the TOE framework, while managerial and policy implications highlight the need for capability building, innovation incentives, and leadership development in SMEs' digitalization programs aligned with the Morocco Digital 2030 strategy.

Keywords

Digital Transformation, Firm Performance, Digital Capabilities, Digital

1. Introduction

In the fast-evolving digital landscape, firms face significant challenges in leveraging their digital capabilities. Therefore, understanding the necessity of Digital Transformation (DT) is fundamental for firms seeking to remain competitive in the digital era (Vial, 2019; Verhoef et al., 2021). The increasing adoption of digital technologies has redefined how organizations are designing products, delivering services, and engaging with customers. This is crucial for Small and Medium-sized Enterprises (SMEs), which are under increasingly pressured to adopt digital technologies to reconfigure their business models, processes, and market offerings (Li et al., 2018; Matarazzo et al., 2021). Thus, understanding the necessity of DT, and the conditions under which it generates value, has become crucial for SMEs to remain competitive while achieving sustainable growth. Despite investing in digital initiatives, majority of SMEs face challenges to translate DT efforts into performance gains, due to their limited resources, capabilities, and leadership (Khurana et al., 2022; Merín-Rodrigáñez et al., 2024). As a result, the success of DT in SMEs depends not only on the adoption of digital tools but also on the development of supplementary digital capabilities, successful digital innovations, and the presence of leadership skills to mobilize organizational resources to reach their digital vision (AlNuaimi et al., 2022; Warner & Wäger, 2019). This raises important questions about how DT fosters firm performance (FP), under which condition it drives firm's growth, and the mechanisms through which DT translates into firm performance. This is especially crucial for SMEs in emerging economies, where resource and infrastructural constraints are challenging. In the context of the global wave of digital transformation, Morocco, as an emerging country, is not immune to these dynamics. SMEs are the backbone of the Moroccan economy, and they play central role in the country's significant economic development. Therefore, examining how Moroccan SMEs engage with digital transformation and innovation is essential for unlocking their full potential and ensuring that economic development is sustained (Adile et al., 2025). In addition, Morocco's national commitment to build a solid digital ecosystem, through supporting startups, fostering innovation centers, and modernizing public services, further underscores the importance of aligning SMEs with the national digital agenda (Ministry of Digital Transition and Administrative Reform, 2024).

Despite the growing research examining the impact of DT on FP, the mechanisms through which DT generates value in SMEs remain insufficiently understood, especially in emerging-market contexts such as Morocco. Building on this perspective, the present study positions Digital Capability (DC) and Digital Innovation (DI) as key mediation mechanisms that explain how DT translates into firm performance, and Digital Leadership (DL) as a moderation factor that en-

hances the effectiveness of DT initiatives. This integrated framework responds to repeated calls in the literature for empirical models that move beyond direct effects and capture the full pathway through which DT creates value in SMEs. Accordingly, this study aims to investigate how DT influences FP in Moroccan SMEs through the mediating roles of DC and DI, and to examine how DL moderates the relationships between DT and these two mediating constructs.

2. Theoretical Background and Significance

2.1. Study Significance

This study holds considerable significance as it addresses a notable gap in the existing body of literature concerning DT and its multifaceted implications for SMEs, with a particular emphasis on the Moroccan context. While prior research examining the drivers of DT in relation to FP has predominantly concentrated on specific industries, often situated within developed economies, the applicability of such findings to developing nations remains questionable due to substantial variations in economic, technological, and institutional development. By positioning local Moroccan SMEs as the central research object, this study contributes a contextually grounded investigation that responds to the need for region-specific empirical evidence, thereby enriching scholarly understanding of how DT initiatives unfold within emerging economies. Furthermore, the study advances the field by introducing mediating and moderating constructs, namely DI and DC, to clarify the underlying mechanisms through which DT translates into superior FP. This analytical approach moves beyond the predominantly direct relationships examined in prior research and offers a more refined understanding of the pathways linking digital initiatives to organizational outcomes. Another dimension of significance lies in the study's adoption of a dynamic capabilities perspective to examine the motivations and determinants of FP within Moroccan SMEs. Although the literature on FP drivers is relatively extensive, comparatively few studies have systematically analyzed the role of DI and DC in shaping FP within a digital context, leaving a meaningful gap that this research seeks to address.

To sum up, this study offers an integrated framework that examines how these factors collectively shape SME performance rather than treating them in isolation. Methodologically, the use of Smart PLS for structural equation modeling enables a rigorous analysis of complex relationships among latent variables, while the inclusion of DL as moderator, alongside mediation analysis of DC and DI, sheds light on the contextual conditions and underlying mechanisms through which DT influences FP. Finally, the study translates its findings into practical implications, equipping Moroccan SMEs with actionable insights to design effective digital strategies, strengthen digital capabilities, and ultimately enhance their performance.

2.2. Theoretical Background

The theoretical background of this study is grounded in two complementary the-

ories that together explain how DT translates into FP through its mediating and moderating mechanisms. As the primary theoretical perspective, Dynamic Capabilities Theory (DCT) (Teece et al., 1997; Teece, 2007) explains the mechanism through which DT generates superior performance. DCT reflects the firm's ability to sense opportunities, seize them, and reconfigure its resources in response to environmental change. It provides direct theoretical justification for positioning DC DI as mediators, since they represent the firm's capacity to integrate and orchestrate digital resources to create value (Warner & Wäger, 2019). This perspective is increasingly applied in DT research to explain how firms convert technological investments into measurable performance outcomes (Vial, 2019). Complementing this perspective, the Technology Organization Environment (TOE) framework (Baker, 2012; Tornatzky & Fleischer, 1990) is employed to contextualize the drivers and boundary conditions of DT, positioning DL within the organizational dimension as a key moderating force that shapes how firms leverage their DC and DI. Together, these theories form a coherent framework in which DCT explains the mechanism through which DT drives FP, and TOE explains the organizational conditions under which this mechanism unfolds.

3. Literature Review

3.1. Digital Transformation and Digital Capability

DT concepts are defined as an organizational strategic process in which firms integrate digital solutions into their products and services, processes, and business models in order to restructure their value creation and delivery (Vial, 2019; Warner & Wäger, 2019). Based on the DCT perspective, this restructuring is not a consequence of technology adoption but a driver of capability building through sensing digital opportunities, seizing them through investment, and transforming internal processes. Therefore, through DT, firms accumulate digital capabilities such as abilities to integrate, deploy, and reconfigure digital resources (Teece, 2014; Warner & Wäger, 2019). Empirically, Rupeika-Apoga et al. (2022) emphasize the relationship between DC and DT in SMEs context, while Li et al. (2018) demonstrate that entrepreneurial SMEs use DT initiatives to deliberately build digital competencies that they previously lacked. Recent evidence from SME contexts further confirms that engaging in DT strengthens their digital capabilities (Zhang et al., 2024). Accordingly, the literature converges on the view that DT actively enables and drives DC in SMEs, therefore, the following hypothesis is derived:

H1: The organization's digital transformation positively relates to its digital capability

3.2. Digital Transformation and Firm Performance

Recent empirical studies position DT as a direct antecedent of organizational performance, especially in resource-constrained SMEs. Evidence from SMEs studies consistently shows that DT enhances growth, productivity, and competitiveness

(Bellakhal & Mouelhi, 2023; Chouaibi et al., 2022; Skare et al., 2023; Teng et al., 2022). This effect is especially important for SMEs, where digital tools help mitigate structural disadvantages and level the playing field with larger competitors (Parra-Sánchez & Talero-Sarmiento, 2024). Drawing on DCT, scholars argue that DT improves operational efficiency, customer responsiveness, and strategic agility, which in turn enhance performance outcomes (Vial, 2019; Verhoef et al., 2021). In a study of Spanish SMEs, Merín-Rodrigáñez et al. (2024) found that DT has a significant positive effect on SMEs performance. Similar findings were demonstrated in Chinese SMEs (Guo & Xu, 2021), and Indian SMEs (Khurana et al., 2022), where DT is linked to revenue growth, productivity, and competitiveness. AlNuaimi et al. (2022) further emphasize how DT translates into superior performance by enabling firms to capture data-driven insights and reconfigure their business models. Therefore, the following research hypothesis is proposed:

H2: Digital transformation is positively related to firm performance

3.3. Digital Transformation on Digital Innovation

DI is conceptualized as the creation of new products, services, processes, or business models enabled by digital technologies (Nambisan et al., 2017). The literature consistently positions DT as a driver to DI. It reduces experimentation costs and expands the combinatorial possibilities through which SMEs generate novel offerings, by introducing digital infrastructures, data platforms, and digitized routines (Nambisan et al., 2017; Vial, 2019). Empirical studies by Bilal et al. (2025) and Bilal et al. (2025) on SMEs in developing economies confirm that DT significantly enhances digital and innovative performance. Similarly, Matarazzo et al. (2021) show that DT facilitates new distribution channels and reshapes customer value propositions, which are both core forms of DI. Moreover, Khin and Ho (2019) indicate that digital orientation and DT activities translate technological investments into digital product and service innovation. Therefore, the following hypothesis is proposed:

H3: Digital transformation is positively related to digital innovation

3.4. Digital Capability and Firm Performance

DC is widely considered a critical determinant of competitive advantage in digitally disrupted markets (Khin & Ho, 2019; Warner & Wäger, 2019). For SMEs, the capability to mobilize digital resources offsets their disadvantages and enables more agile market responses (Li et al., 2018). Empirically, Hoang and Hien (2024), in a study of manufacturing SMEs, demonstrated that their digital capabilities positively impact their performance. Similar results are reported by Huong et al. (2024), who show that DC directly improves SMEs' performance under conditions of technological uncertainty. Cenamor et al. (2019) further establish that digital platform capabilities improve SME performance by enabling network resource mobilization and operational flexibility. In the context of emerging markets, Khanra et al. (2022) strengthen these findings by demonstrating that DC converts into measurable performance gains. Consequently, the following hy-

pothesis is suggested:

H4: Digital capability positively relates to firm performance.

3.5. Digital Innovation and Firm Performance

DI is increasingly recognized as a key driver of SME performance in the digital economy (Nambisan et al., 2017; Khin & Ho, 2019). By developing new digital products, services, and business processes, SMEs can differentiate themselves, access new markets, and create strong competitive positions (Khin & Ho, 2019; Yoo et al., 2010). Khin and Ho (2019) argue that DI positively impacts the financial and operational performance of SMEs. Similarly, Usai et al. (2021) show that DI outcomes significantly improve European SME competitiveness, while Ferreira et al. (2019) demonstrate that DI improves both revenue growth and customer satisfaction in SMEs. Moreover, Zhang et al. (2024) demonstrate that DI performance is strongly associated with overall SME outcomes in dynamic environments. Therefore, this study proposes the following hypothesis:

H5: Digital innovation is positively related to firm performance.

3.6. The Mediating Role of Digital Capability

Researchers argue that the relationship between DT and FP is emphasized through intermediate capabilities (Vial, 2019; Warner & Wäger, 2019). Therefore, DC is one of the most significant mediators identified, since DT initiatives only generate value when firms develop the capacities needed to leverage their digital investments (Teece, 2014; Warner & Wäger, 2019). Rupeika-Apoga et al. (2022) demonstrated that the effect of DC on SMEs outputs is driven by DT, highlighting the relationship among these three constructs. Similarly, Cui and Pan (2022) and Saputra et al. (2023) find that DC mediates the relationship between DT and SME performance, which indicates that DT enhances performance indirectly by building the firm's capacity to operate digitally. Heredia et al. (2022) argue that digital and technological capabilities mediate the link between digitalization efforts and firm performance, particularly in less-developed economies. These findings suggest the following hypothesis:

H6: Digital capability mediates the relationship between digital transformation and firm performance.

3.7. The Mediating Role of Digital Innovation

Another stream of research suggests that DT improves FP through the mechanism of DI (Nambisan et al., 2017; Vial, 2019). The logic is that DT supplies the technological infrastructure and organizational restructuring for the firm, which are necessary to produce digitally-enabled innovations, and in turn drive its market performance. Merín-Rodríguez et al. (2024) provide empirical evidence from Spanish SMEs, and suggest that digital innovation (through business model innovation) partially enhance the impact of DT on performance. Bilal et al. (2025) and Bilal et al. (2025) extend this finding to SMEs in other developing markets, showing that DI transmits the performance effects of DT. In the Chinese SME context,

Wang and Zhang (2025) similarly report that digitalization drive and innovation outcomes strengthen the relationship between digital adoption and innovation performance. Collectively, these studies suggest the following hypothesis:

H7: Digital innovation mediates the relationship between digital transformation and firm performance.

3.8. The Moderating Role of Digital Leadership

DL refers to the leaders' ability to communicate a digital vision, mobilize digital resources, and manage organizational change in technology-driven environments (AlNuaimi et al., 2022; Zeike et al., 2019). In SMEs, leadership exerts a strong influence on whether DT initiatives translate into actual capability development, since decision-making is typically concentrated in owner and managers (Deeb & Aldehayyat, 2025; Li et al., 2018). Sawaeen and Aburumman (2025) show that DL shapes DC in SMEs and that this leadership-driven capability strengthens innovation outcomes. Yao et al. (2024) argue that DL acts as a boundary condition that enhances the capability building effects of DT by aligning vision, resource allocation, and culture. AlNuaimi et al. (2022) similarly find that the impact of digital strategy on organizational capability is stronger under high DL. Building on these findings, the following hypothesis is suggested:

H8: Digital leadership moderates the relationship between digital transformation and digital capability

Moreover, the innovation outcomes of DT depend heavily on the organization's leadership ability to foster psychological safety, allocate experimentation investments, and foster digital risk-taking (AlNuaimi et al., 2022; Schiuma et al., 2022). For SMEs, DL has been proven to determine whether DT produces gradual adoption or major DI. Deeb and Aldehayyat (2025), argue that DL positively shapes both digital culture and innovation outcomes within DT efforts. Bilal et al. (2025) and Yao et al. (2024) provide evidence that leadership roles enhance the relationship between DL and DI. Schiuma et al. (2022) also suggest that digital leaders' ability to interpret market trends and direct technology toward innovative improves DT's innovation outcomes. Therefore, this study suggests the following hypothesis:

H9: Digital leadership moderates the relationship between digital transformation and digital innovation

4. Theoretical Model and Research Methodology

4.1. Theoretical Model

The research framework explores how DT, DC, DI, and FP are connected, with DL acting as a moderator and firm size as a control variable. Drawing on the Dynamic Capabilities View (Teece, 2007) and the Resource-Based View (Barney, 1991), the model suggests that DT influences FP directly (H2) and indirectly through DC (H1, H4) and DI (H3, H5), which jointly mediate this relationship. By embracing DT, firms develop the necessary capabilities and innovative capacity to reconfigure their resources, processes, and offerings, which in turn trans-

lates into performance outcomes. DL strengthens these relationships by guiding the deployment of digital initiatives and fostering an environment to build capability and innovation. This emphasizes the importance of integrating DL, DI and DC development to enhance SME competitiveness and performance. **Figure 1** and **Table 1** present the research conceptual framework of this study.

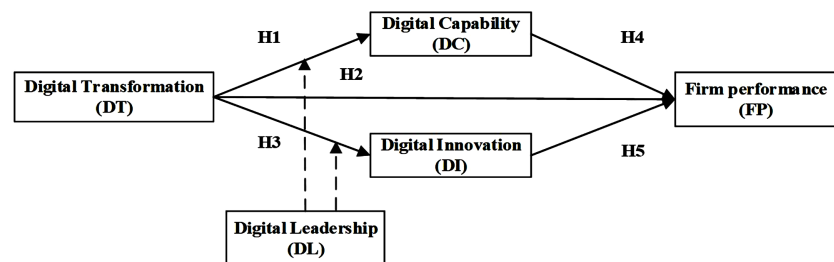


Figure 1. Research construct's model.

Table 1. Definitions of the study's constructs.

Construct	Definition	Source from literature
Digital Transformation	DT is defined as a process aiming to enhance an entity by stimulating significant changes to its properties through combinations of information, computing, communication, and connectivity technologies (p. 118). It is not only technology adoption but also an ongoing organizational process in which digital technologies reconfigure existing value-creation paths and foster strategic, structural, and cultural responses.	Vial (2019)
Digital Capability	DT is a firm-level capability enabling a firm to sense customer needs, link with stakeholders through digital channels, and convert digital data into actionable insights to co-create value with customers.	Lenka et al. (2017)
Digital Innovation	DI is defined as "the creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology" (p. 224). It covers both the novel digital outcomes (products, services, platforms) and the digitally enabled processes through which those outcomes are produced.	Nambisan et al. (2017)
Firm Performance	FP is defined as a multidimensional construct capturing the firm's profitability, its customer retention, its return on investment and its sales growth (Tippins & Sohi, 2003). It is a measure of how well a firm is able to reach its goals compared with its primary competitors (Cao & Zhang, 2011).	Tippins & Sohi (2003)

4.2. Research Methodology

This study adopted structural equation modeling (SEM), and Partial Least Squares (PLS) analysis using SmartPLS statistical tool. It is often used to analyze complicated relationships in a theoretical model. These methods investigate how all the latent variables are related and give a strong statistical framework for checking and validating the hypotheses (Hair et al., 2017).

Moroccan SMEs were asked to fill out surveys as part of the study. The purpose was to collect useful data about their digital transformation practices, digital capabilities, innovation, leadership and performance metrics. Using SmartPLS, the collected data was then processed and analyzed to yield useful results and explain them. This choice of methodology shows how important empirical rigor and statistical validity are for understanding how digital transformation, capabilities and innovation affect firm's performance in the specific context of Moroccan SME. The quantitative method presents results that can be applied to a wide range of situations, helps researchers learn more about these processes, and has real-world implications for both academics and professionals in the field.

4.3. Construct Measurement

Measurement items for the key constructs in this study were extracted from previously validated measures in the literature. Then, they were refined and adapted to the context of SMEs in order to align with this study's objectives and contextual framework. DT is measured using the five items adopted from the study of AlNuaimi et al. (2022), which captures the extent to which an organization integrates digital technologies across its core business operations. The items presented strong psychometric in the original validation by AlNuaimi et al. (2022), and its empirical validation in a large-scale survey (N = 513), supports its credibility and methodological rigor, making it well-suited for the present study. DC is measured using 5 items adopted from Khin and Ho (2019) study. The items assess the firm's capability related to acquiring digital technologies, identifying new digital opportunities, responding to digital transformation, mastering the state-of-the-art digital technologies, and developing innovative products, service, or process using digital technologies. DI is measured using 6 items adopted from the study of Paladino (2007), and further validated by Khin and Ho (2019). These six items include assessment of the quality of the company's digital solutions compared to competitors, its digital solutions feature compared to competitors, the applications of digital solutions compared to competitors, the differentiation of digital solutions in terms of product platform compared to competitors, the improvements of existing products related to digital solutions, and the novelty of the digital solutions at the time of launching. DL's measurement items were adopted from the study of Erhan et al. (2022) and further validated by Jaboob et al. (2025). They are 6 items describing the awareness-raising and guiding role of digital leaders in SMEs, who inform stakeholders about IT risks, identify value-adding technologies for organizational processes, set ethical standards for IT use, ease re-

sistance to technological innovation, and share personal experience to highlight opportunities that boost organizational contributions. FP is measured using items adopted from the study of [Tippins and Sohi \(2003\)](#), and validated in further research by [Nwankpa and Roumani \(2016\)](#). The items assess the firm performance compared to its direct competitors, in terms of profitability, customer retention, return on investment and sales growth.

Because the sample is cross-industry, firm sector was included as a control variable so that the hypothesized relationships could not be attributed to differences in industry composition. Industry has been shown to account for a substantial share of the variance in firm performance, and its influence differs markedly between manufacturing and non-manufacturing sectors ([McGahan & Porter, 1997](#)); controlling for it is therefore important when manufacturing and non-manufacturing firms are pooled in a single sample. Sector was coded as a categorical variable distinguishing manufacturing from non-manufacturing firms (services, trade, and other activities) and was entered into the same structural model as an additional predictor of firm performance, consistent with the recommended treatment of control variables in PLS-SEM.

4.4. Research Instrument

This study adopts well-established measurement scales developed in previous studies, which ensures the results' validity and reliability. To guarantee the robustness of this study's instrument, we asked 5 SME managers and 3 postgraduate researchers from relevant fields to assess if the constructs were well structured and accurately represented through the measurement items. According to their suggestions, modifications were implemented to ensure the clarity of the questionnaire. A pilot study was not conducted since the items were derived from previous established studies ([Nybakk & Jenssen, 2012](#)). This study used the Likert scale of 7 points to measure the constructs. This scale offers a structured framework for participants to assess their agreement or disagreement and reflect their attitudes toward each construct. The values represent the respondents' level of agreement or disagreement, satisfaction, frequency of occurrence, or other relevant factors, where (Strongly Disagree = 1), while (Strongly Agree = 7). This systematic method assures that the data collected is consistent and quantitative, which facilitates statistical analysis and the testing of hypotheses ([Dawes, 2008](#)). Moreover, questions are formulated in the SmartPLS framework, in a way to extract quantitative responses, which enables numerical measurement and rigorous statistical analysis ([Hair et al., 2014](#)). This research adhered to the ethical standards, including securing informed consent from all participants, safeguarding the confidentiality of collected data, and upholding the principles of responsible research conduct. Ethical guidelines were respected at every stage of the project, and the necessary approval was granted by the relevant institutional review boards. To guarantee cultural adaptation, questionnaires were established in both English and French, since French is the second language in Morocco. To ensure precise translation and

prevent potential linguistic ambiguities for non-English speaking managers, the parallel translation method was utilized (Kalay & Lynn, 2015).

4.5. Sample and Data Collection

This study was conducted on Moroccan SMEs. According to the Annual report prepared by the Moroccan Observatory of SMEs (OMTPME, 2024), the large share of SMEs is concentrated in the three regions of Casablanca-Settat, Rabat-Salé-Kénitra and Tangier-Tétouan-Al Hoceima with a share of respectively (38%, 14.2%, 12.5%) from the total of SMEs in Morocco.

The target population included SMEs operating in these three leading regions, which provides broad representation of the Moroccan SME landscape and supports the generalizability of the findings. An SME was deemed eligible if : 1) It is qualified as an SME under the turnover-based segmentation applied by Bank Al-Maghrib and the Moroccan Observatory of SMEs which is an annual turnover not exceeding MAD 175 million, the threshold separating SMEs from large enterprises (with very small enterprises defined by a turnover of MAD 10 million or less) (OMTPME, 2021); 2) was formally registered and active at the time of the survey; and having undertaken at least one digital initiative. The sample of Moroccan SMEs is operating in both manufacturing and non-manufacturing activities (services, trade, and other sectors), reflecting the structure of the national SME population. The sampling frame included data from the commercial register and the regional company directories of regional investment centers, filtered to retain only firms meeting these criteria.

Firms were then drawn from this frame using systematic random sampling (Cochran, 1977): the eligible firms were ordered by alphabetical name, then a random start was selected between 1 and the sampling interval k , and every k -th firm was selected thereafter. The target sample of 300 firms was determined through a sample-size calculation to ensure sufficient precision and power for the structural model and to support generalization to the wider SME population (Cochran, 1977). Each selected firm was contacted by telephone followed by emailed questionnaire, with the questionnaire addressed to a single key informant (the owner, managing director, or a senior manager), and follow-up reminders were sent to non-respondents. This procedure yielded 236 returned questionnaires, of which 204 were complete and usable.

The unit of analysis in this study is the firm. Because DT, DI, DC, DL are firm-level constructs, the data were collected through a single key respondent for each firm rather. For every sampled SME, the questionnaire was addressed to the owner, managing director, or senior manager occupying organizational positions with the broadest knowledge of the firm's strategy, digital activities, and performance. The key respondent approach is well established for investigating organizational-level phenomena and provides reliable and valid data when respondents are selected on the basis of their knowledge and involvement in the study subject (Phillips, 1981; Kumar et al., 1993), and senior managers are widely regarded as

appropriate informants for strategic, firm-level constructs (Huber & Power, 1985). This design is especially appropriate in the SME context, where strategic information and decision-making authority are concentrated in the owner and top manager who are the most knowledgeable respondents on firm-level matters (Lyon et al., 2000; Wiklund & Shepherd, 2005). Therefore, all constructs were measured and modeled at the SME level, each usable questionnaire corresponds to one distinct SME, and the 204 usable responses represent 204 unique SMEs (one respondent per firm). Because we have single informant per SME, no within-firm aggregation of responses was necessary.

The questionnaire contains two sections: the first section is to collect data of the participant's information (Gender, Age, Job position) and its company's information (company size, industry type). The second section included the five constructs from our theoretical model. 300 questionnaires were sent to the selected SMEs. We received 236 answers from the participants, and after cleaning data to remove irrelevant and short answers, 32 questionnaires were incomplete, and 204 questionnaires were retained for further analysis, yielding a response rate of 78% and a validity rate of 86%.

4.6. Common Method and Non-Response Bias

Common method and non-response bias were assessed in this study following the recommendations of Podsakoff et al. (2003). To reduce the likelihood of common method bias, several procedural remedies were applied during the design of the questionnaire and the data collection process. First, clear definitions and explanations were provided for each construct in order to minimize respondents' misunderstanding and interpretation bias. Second, the questionnaire items were refined based on expert feedback to improve clarity, relevance, and overall accuracy. In addition, common method bias was statistically examined using Harman's one-factor test, as suggested in prior studies (Wang & Esperança, 2023; Wang & Zhang, 2025). The result showed that the first unrotated common factor accounted for 36.20% of the total variance, which is below the recommended threshold of 50%. This indicates that common method bias did not pose a substantial issue in this study. Regarding non-response bias, although detailed information on non-respondents was not available for direct comparison, no unusual response patterns or evidence of systematic distortion were observed in the dataset. Therefore, non-response bias is not expected to have materially influenced the findings, although it cannot be completely ruled out.

5. Statistical Analysis and Results

5.1. Research Subjects' Profiles

31.37% of the respondents were top managers, 44.12% mid-level managers and 24.51% were low-level managers. Most respondents are aged more than 45 years old (51.47%). Company profiles data show that the Moroccan manufacturing SMEs in our sample count for 52.94% and non-manufacturing ones count for

47.06%. The predominant proportion of SMEs is medium-sized (50 - 249 employees) (48.53%), while small-sized ones with 10 - 49 employees presented 32.84% and micro-sized enterprises with less than 10 employees were 18.63% of the total sample. The sample of this study was drawn from multiple industries and included respondents with adequate experience backgrounds, thereby allowing respondents to answer effectively (**Table 2**).

Table 2. Pilot study's sample characteristics.

Information	Form	Number	Percentage
Gender	Male	119	58.33%
	Female	85	41.67%
Age	<25	19	9.31%
	26 - 45	80	39.22%
	45+	105	51.47%
Job position	Top managers	64	31.37%
	Mid-level managers	90	44.12%
	Low-level managers	50	24.51%
Company size	Micro > 10 employees	38	18.63%
	Small 10 - 49 employees	67	32.84%
	Medium 50 - 249 employees	99	48.53%
Industry type	Manufacturing	108	52.94%
	Non-manufacturing	96	47.06%

5.2. Study's Measurement Model Assessment

5.2.1. PLS-SEM Outer Model

Partial least squares (PLS) based-structural equation modelling method was used to proceed with the data analysis of the quantitative study (Hair et al., 2017). All outer loadings are statistically significant ($p < 0.001$) and are between 0.530 and 0.926 (**Table 3**). Loadings of all constructs are above 0.70, which is consistent with the conventional retention threshold. Hair et al. (2017) suggest that PLS indicators with loadings in the range between 0.40 and 0.70 may be retained when their removal does not improve composite reliability or average variance extracted (AVE). Therefore, all the items were retained for the next analysis.

Table 3. PLS-SEM measurement model: Outer loadings.

Construct	Item	Outer Loading (λ)
DT	DT 1	0.884
	DT 2	0.917
	DT 3	0.926
	DT 4	0.798
	DT 5	0.798

Continued

DC	DC 1	0.817
	DC 2	0.763
	DC 3	0.842
	DC 4	0.804
	DC 5	0.697
DI	DI 1	0.798
	DI 2	0.778
	DI 3	0.780
	DI 4	0.778
	DI 5	0.792
	DI 6	0.771
FP	FP 1	0.813
	FP 2	0.713
	FP 3	0.713
	FP 4	0.828
DL	DL 1	0.818
	DL 2	0.659
	DL 3	0.619
	DL 4	0.815
	DL 5	0.693
	DL 6	0.530

5.2.2. Construct Reliability and Convergent Validity

The results indicated satisfactory reliability for all constructs. Composite reliabilities range from 0.847 to 0.937, which exceeds the 0.70 threshold. Cronbach's α values for all constructs range between 0.764 and 0.917, and composite reliability values were between 0.847 and 0.937, which exceeds the acceptable threshold of 0.60, and confirm the reliability of the constructs (Bagozzi & Yi, 1988).

Convergent validity of the variables was assessed by calculating the average variance extracted (AVE) for each construct. AVE exceeds 0.50 for DT, DC, DI and FP, demonstrating convergent validity for the main constructs (Hair et al., 2019). The AVE value for the construct DL is 0.486, which is just below the 0.50 thresholds. Thus, DL was retained on substantive grounds since its AVE is 0.486 just below 0.5 and its CR = 0.847, following the suggestions of Fornell & Larcker (1981) to accept AVE < 0.5 if CR > 0.6 because the convergent validity of the construct is still adequate (Table 4).

Table 4. Constructs' reliability and convergent validity.

Construct	Cronbach's α	Composite reliability (CR)	AVE
DT	0.917	0.937	0.750
DC	0.845	0.890	0.618
DI	0.872	0.905	0.613
FP	0.764	0.852	0.591
DL	0.808	0.847	0.486

5.3. Discriminant Validity

Discriminant validity was assessed with the Heterotrait-Monotrait ratio of correlations (HTMT), which is the criterion recommended for PLS-SEM (Henseler et al., 2015). All HTMT values were below the conservative 0.85 threshold (maximum = 0.833 for DC-DI), confirming that the constructs are empirically distinct (Table 5).

Table 5. Heterotrait-Monotrait ratios (HTMT).

Construct	Items	1	2	3	4	5
Digital Transformation	5	-				
Digital Capability	5	0.821	-			
Digital Innovation	6	0.820	0.833	-		
Firm Performance	4	0.732	0.717	0.700	-	
Digital Leadership	6	0.121	0.268	0.255	0.220	-

5.4. Hypothesis Testing

The structural model was estimated within the partial least squares' structural equation modeling (PLS-SEM) framework, and the significance of all path coefficients, indirect effects, and interaction terms was assessed using bootstrapping with 5000 resamples (Hair et al., 2017).

Reporting the direct, mediating, and moderating effects from this single bootstrapped model ensures that all structural estimates are mutually consistent. DT had a significant positive effect on DC ($\beta = 0.722$, $SE = 0.039$, $t = 18.343$, $p < 0.001$), supporting H1, and a significant positive effect on DI ($\beta = 0.723$, $SE = 0.041$, $t = 17.463$, $p < 0.001$), supporting H3. The model explained 61.3% of the variance in DC ($R^2 = 0.613$) and 63.8% of the variance in DI ($R^2 = 0.638$).

In the firm-performance equation, DT, DC, and DI were entered simultaneously, and firm sector was included as a control variable. DT had a significant direct positive effect on FP ($\beta = 0.315$, $SE = 0.095$, $t = 3.305$, $p < 0.001$), supporting H2. DC had a significant positive effect on FP ($\beta = 0.225$, $SE = 0.083$, $t = 2.720$, $p = 0.007$), supporting H4, and DI had a significant positive effect on FP ($\beta = 0.182$, $SE = 0.080$, $t = 2.259$, $p = 0.024$), supporting H5. The control variable, firm sector,

was not significantly related to FP ($\beta = 0.016$, $SE = 0.054$, $t = 0.303$, $p = 0.762$), indicating that performance differences were not driven by whether a firm operated in the manufacturing or non-manufacturing sector.

Together, the predictors of firm performance explained 43.1% of its variance ($R^2 = 0.431$). This pattern indicates that both mediators, DC and DI, contribute to explaining firm performance while the direct effect of DT remains significant, which is consistent with a partially mediated structure (Table 6).

Table 6. Hypothesis testing summary.

Hypothesis	Proposed relationship	β	SE	t	p	R^2	Decision
H1	DT $\rightarrow$ DC	0.722	0.039	18.343	<0.001	0.613	Supported
H2	DT $\rightarrow$ FP	0.315	0.095	3.305	<0.001	0.431	Supported
H3	DT $\rightarrow$ DI	0.723	0.041	17.463	<0.001	0.638	Supported
H4	DC $\rightarrow$ FP	0.225	0.083	2.720	0.007	0.431	Supported
H5	DI $\rightarrow$ FP	0.182	0.080	2.259	0.024	0.431	Supported
H1	DT $\rightarrow$ DC	0.722	0.039	18.343	<0.001	0.613	Supported

Note. β = standardized path coefficient; SE = bootstrap standard error; t = bootstrap t-statistic; p = bootstrap two-tailed p-value; R^2 = coefficient of determination. Firm sector was included as a control variable in the firm-performance equation ($\beta = 0.016$, $p = 0.762$).

5.5. Coefficient of Determination (R^2)

The explanatory power of the structural model was assessed using the coefficient of determination (R^2) for the endogenous constructs. The results showed that the model explains 59.4% of the variance in DC, 63.8% of the variance in DI, and 43.1% of the variance in FP. Based on commonly used Cohen-style benchmark values, these results indicate substantial explanatory power for all three endogenous constructs. In particular, the model demonstrates especially strong explanatory power for DI and DC, while also showing a strong and meaningful level of explanatory power for FP. These findings suggest that the proposed model has solid predictive strength and is able to explain a considerable proportion of variation in the key outcome variables. Overall, the R^2 values provide further support for the empirical adequacy of the model and strengthen confidence in the interpretation of the direct, mediating, and moderating relationships identified in this study (Table 7).

Table 7. Coefficient of determination (R^2) and magnitude of explanatory power.

Endogenous Construct	R^2	Cohen Magnitude
Digital Capability	0.613	Substantial
Digital Innovation	0.638	Substantial
Firm Performance	0.431	Substantial

Moreover, these R^2 values show that the independent variables included in the model explain a meaningful share of the variance in each endogenous construct. The result for DC indicates that DT, DL, and their interaction jointly provide a strong explanation for capability development. Similarly, the R^2 for DI suggests that the same predictors strongly explain firms' innovation outcomes. Finally, the R^2 for FP shows that DT, DC, and DI together account for a substantial proportion of FP differences across the sample. Therefore, the model can be considered to have strong explanatory relevance in the context of this study.

5.6. Mediation Analysis

5.6.1. Mediating Role of Digital Capability

The mediating role of DC in the relationship between DT and FP was examined within the same PLS-SEM model, and the indirect effect was tested using 5000 bootstrap resamples with bias-corrected 95% confidence intervals (Hair et al., 2017). The total effect of DT on FP was positive and statistically significant ($\beta = 0.609$, $SE = 0.062$, $t = 9.808$, $p < 0.001$), indicating that firms with higher levels of DT tend to achieve higher FP. DT had a strong positive effect on DC (a path: $\beta = 0.722$, $SE = 0.039$, $t = 18.343$, $p < 0.001$), and DC in turn had a significant positive effect on FP while controlling for DT and DI (b path: $\beta = 0.225$, $SE = 0.083$, $t = 2.720$, $p = 0.007$).

The first condition for mediation was also satisfied, as DT has a significant positive effect on DC (a path: $\beta = 0.6042$, $SE = 0.0405$, $t = 14.9269$, $p < 0.001$). This result demonstrates that DT contributes strongly to the development of DC within the firm. The second condition was also satisfied, as DC positively affected FP while controlling for DT (b path: $\beta = 0.2336$, $SE = 0.0651$, $t = 3.5894$, $p = 0.0004$). This shows that firms with stronger DC achieve higher levels of performance, even after considering the direct influence of DT.

The specific indirect effect of DT on FP through DC was 0.162 ($SE = 0.059$, $t = 2.735$, $p = 0.006$), with a bias-corrected 95% bootstrap confidence interval of [0.047, 0.283]. Because the interval does not include zero, the mediating effect of DC is statistically significant. At the same time, the direct effect of DT on FP remained significant in the full model ($\beta = 0.315$, $SE = 0.095$, $t = 3.305$, $p < 0.001$), indicating partial rather than full mediation (Table 8).

Table 8. Mediation of digital capability between digital transformation and firm performance.

Effect	β	SE	t	p
Total effect c DT $\rightarrow$ FP	0.609	0.062	9.808	<0.001
Path a DT $\rightarrow$ DC	0.722	0.039	18.343	<0.001
Path b DC $\rightarrow$ FP (controlling DT, DI)	0.225	0.083	2.720	0.007
Direct effect c' DT $\rightarrow$ FP (controlling DC, DI)	0.315	0.095	3.305	<0.001
Indirect effect axb	0.162	0.059	2.735	0.006

5.6.2. Mediating Role of Digital Innovation

The mediating role of DI was examined in the same way. The total effect of DT on FP was positive and significant ($\beta = 0.609$, $SE = 0.062$, $t = 9.808$, $p < 0.001$). DT had a strong positive effect on DI (a path: $\beta = 0.723$, $SE = 0.041$, $t = 17.463$, $p < 0.001$), and DI had a significant positive effect on FP while controlling for DT and DC (b path: $\beta = 0.182$, $SE = 0.080$, $t = 2.259$, $p = 0.024$). The specific indirect effect of DT on FP through DI was 0.131 ($SE = 0.060$, $t = 2.197$, $p = 0.028$), with a bias-corrected 95% bootstrap confidence interval of [0.024, 0.262] that excludes zero. Because the direct effect of DT on FP remained significant ($\beta = 0.315$, $SE = 0.095$, $t = 3.305$, $p < 0.001$), DI also operates as a partial mediator (Table 9).

Table 9. Mediation of digital innovation between digital transformation and firm performance.

Effect	β	SE	t	p
Total effect c DT $\rightarrow$ FP	0.609	0.062	9.808	<0.001
Path a DT $\rightarrow$ DI	0.723	0.041	17.463	<0.001
Path b DI $\rightarrow$ FP (controlling DT, DC)	0.182	0.080	2.259	0.024
Direct effect c' DT $\rightarrow$ FP (controlling DC, DI)	0.315	0.095	3.305	<0.001
Indirect effect axb	0.131	0.060	2.197	0.028

These results show that DI is another key pathway through which DT improves FP. Firms with stronger DT are able to generate innovative processes, services, products, or digital improvements, and these innovation outcomes contribute positively to their performance. However, because the direct effect of DT remained significant after including DI, the mediation is partial rather than full. This means that DT enhances FP not only by increasing DI, but also through additional direct mechanisms.

5.6.3. Summary of the Mediation Results

Taken together, the mediation analysis demonstrates that both DC and DI significantly mediate the relationship between DT and FP. The indirect effect through DC (0.162) was slightly larger than the indirect effect through DI (0.131), although both were statistically significant and meaningful (Table 10). This suggests that DT contributes to FP partly by strengthening firms' internal digital competencies and partly by enhancing their innovative capacity. Because the direct effect of DT remained significant in both mediation models, the findings support partial mediation in both cases.

Table 10. Summary of mediation effects.

Mediator	Indirect effect	95% Bootstrap CI	Conclusion
Digital capability	0.162	[0.047, 0.283]	Partial mediation
Digital innovation	0.131	[0.024, 0.262]	Partial mediation

5.7. Moderation Analysis

5.7.1. Moderating Role of Digital Leadership on the Relationship between Digital Transformation and Digital Capability

The moderating effect of DL on the relationship between DT and DC was tested by adding the $DT \times DL$ interaction term to the model using the two-stage approach (Hair et al., 2017). The interaction effect was positive but did not reach statistical significance ($\beta = 0.109$, $SE = 0.059$, $t = 1.858$, $p = 0.063$); H8 was therefore not supported. The model explained 61.3% of the variance in DC ($R^2 = 0.613$) (Table 11).

Table 11. Moderating effect of digital leadership on the relationship between digital transformation and digital capability.

Effect	β	SE	t	p	R^2	Conclusion
DT $\rightarrow$ DC	0.722	0.039	18.343	<0.001		Significant
DL $\rightarrow$ DC	0.268	0.048	5.637	<0.001		Significant
DT $\times$ DL $\rightarrow$ DC	0.109	0.059	1.858	0.063	0.613	Not supported

5.7.2. Moderating Role of Digital Leadership on the Relationship between Digital Transformation and Digital Innovation

The moderating role of DL on the relationship between DT and DI was tested in the same way. The interaction effect was positive and significant ($\beta = 0.175$, $SE = 0.038$, $t = 4.563$, $p < 0.001$), showing that DL significantly strengthens the positive effect of DT on DI; H9 was supported. The model explained 63.8% of the variance in DI ($R^2 = 0.638$). The simple slopes confirmed this pattern: the effect of DT on DI was weakest at low DL ($\beta = 0.548$), moderate at the mean ($\beta = 0.723$), and strongest at high DL ($\beta = 0.898$) (Table 12).

Table 12. Moderation effect of digital leadership.

Effect	β	SE	t	p	R^2	Conclusion
DT $\rightarrow$ DI	0.723	0.041	17.463	<0.001		Significant
DL $\rightarrow$ DI	0.273	0.043	6.291	<0.001		Significant
DT $\times$ DL $\rightarrow$ DI	0.175	0.038	4.563	<0.001	0.638	Supported

Figure 2 shows that strong leadership likely provides strategic direction, encourages experimentation, reduces resistance to change, and helps allocate resources to innovation-related activities. As a result, DT has a more powerful effect on DI when DL is high. The steeper slope for the high-leadership condition visually confirms this strengthening effect.

These results indicate that DL strengthens the capacity of DT to generate DI. Firms with high DL appear more able to translate DT initiatives into innovative products, services, processes, and digital improvements. Strong DL creates a sup-

portive environment for experimentation, strategic alignment, knowledge sharing, and innovation-oriented change. Therefore, even though DT positively affects innovation in general, its impact becomes substantially stronger when DL is high. Compared with the previous moderation result, the interaction effect is somewhat stronger, suggesting that DL may be particularly important for translating DT efforts into innovation outcomes.

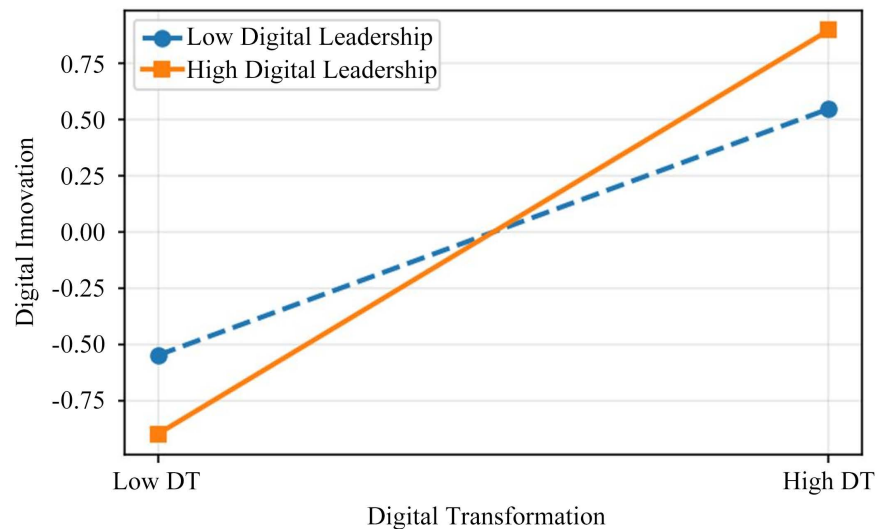


Figure 2. Moderating effect of digital leadership on the relationship between digital transformation and digital innovation.

5.7.3. Overall Interpretation of the Moderation Results

The moderating role of DL was assessed using the two-stage interaction approach within the PLS-SEM model. The interaction between DT and DL did not significantly predict DC ($\beta = 0.109$, $p = 0.063$), so H8 was not supported; the strengthening of the DT-DC relationship by DL was not statistically reliable in this sample. By contrast, the interaction significantly predicted DI ($\beta = 0.175$, $p < 0.001$), supporting H9 and indicating that DL strengthens the effect of DT on DI. The simple slopes for the DT-DI relationship rose from 0.548 at low DL to 0.898 at high DL, whereas the corresponding slopes for DT-DC (0.613 to 0.832) reflected a non-significant interaction (Table 13).

Table 13. Moderation results.

Hyp.	Interaction	β	SE	t	p	Simple slope at low DL	Simple slope at high DL	R ²	Decision
H8	DT $\times$ DL $\rightarrow$ DC	0.109	0.059	1.858	0.063	0.613	0.832	0.613	Not supported
H9	DT $\times$ DL $\rightarrow$ DI	0.175	0.038	4.563	<0.001	0.548	0.898	0.638	Supported

5.8. Robustness Check: Controlling for Firm Sector

To assess whether the structural relationships were sensitive to industry membership, firm sector (manufacturing vs. non-manufacturing) was added to the firm-

performance equation as a control variable and the model was re-estimated. The path from firm sector to FP was small and non-significant ($\beta = 0.016$, $SE = 0.054$, $t = 0.303$, $p = 0.762$), and the variance explained in FP was virtually unchanged ($R^2 = 0.431$ with the control vs. 0.431 without it). As shown in **Table 14**, the focal path coefficients were almost identical whether or not the control was included (DT $\rightarrow$ FP = 0.315 vs. 0.316; DC $\rightarrow$ FP = 0.225 vs. 0.223; DI $\rightarrow$ FP = 0.182 vs. 0.184). These results indicate that the findings are robust to differences in firm sector and are not driven by industry composition.

Table 14. Robustness check: firm-performance model with and without the firm-sector control.

Path	With sector control (β)	Without control (β)
DT $\rightarrow$ FP	0.315	0.316
DC $\rightarrow$ FP	0.225	0.223
DI $\rightarrow$ FP	0.182	0.184
Firm sector $\rightarrow$ FP (control)	0.016 ($p = 0.762$)	-
R^2 (firm performance)	0.431	0.431

5.9. Summary of Hypothesis Testing

The findings show that eight of the nine hypotheses of this study were supported; only the moderating effect of digital leadership on the digital transformation–digital capability relationship (H8) was not supported. This confirms that the proposed model is strongly supported by the empirical evidence. The results suggest that DT improves FP not only through a direct path, but also by building DC and stimulating DI. At the same time, DL strengthens the effect of DT on digital innovation, although it did not significantly moderate the effect of DT on digital capability. Therefore, the overall model provides a comprehensive explanation of how DT, DC, DI, and DL interact to shape FP (**Table 15**).

Table 15. Summary of hypotheses.

Hyp.	Relationship	Decision
H1	DT $\rightarrow$ DC	Supported
H2	DT $\rightarrow$ FP	Supported
H3	DT $\rightarrow$ DI	Supported
H4	DC $\rightarrow$ FP	Supported
H5	DI $\rightarrow$ FP	Supported
H6	DT $\rightarrow$ DC $\rightarrow$ FP (mediation)	Supported
H7	DT $\rightarrow$ DI $\rightarrow$ FP (mediation)	Supported
H8	DT $\times$ DL $\rightarrow$ DC	Not supported
H9	DT $\times$ DL $\rightarrow$ DI	Supported

Figure 3 presents the relationship path of the conceptual model tested in this study. The model illustrates the direct effect of DT on FP, the mediating roles of DC and DI, and the moderating role of DL on the relationships between DT and both DC and DI.

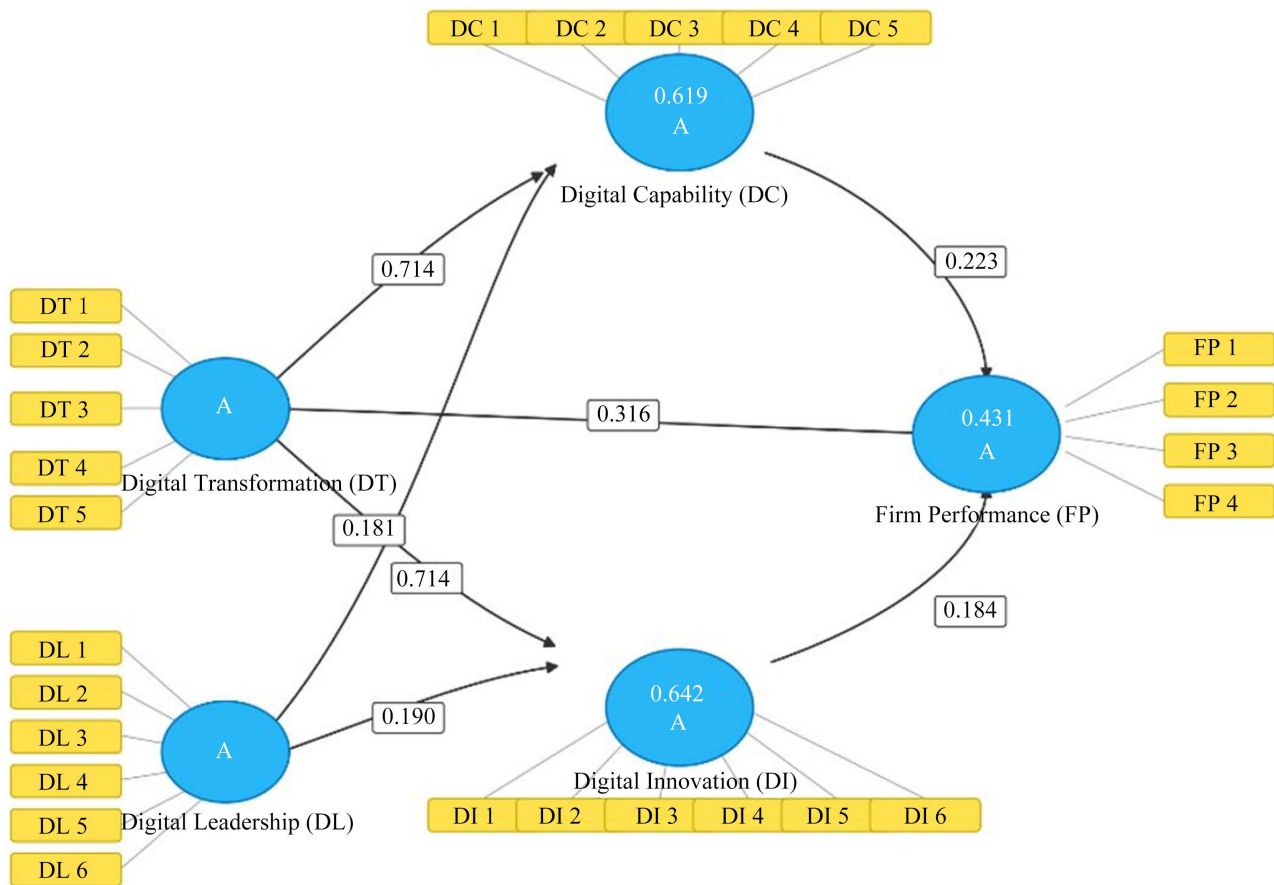


Figure 3. Relationship path of the conceptual model.

6. Discussion

The results of this study support the proposed model and show that DT is an important driver of FP in SMEs both directly and indirectly through their DC and their DI. The positive effect of DT on DC and DI suggests that SMEs engaging in DT are able to build internal competencies and innovation-oriented routines needed to compete in increasingly competitive digital environments. This is consistent with the broader DT literature, which considers DT as not only a technology adoption but as a process of organizational change that reshapes structures, processes, and value creation mechanisms (Nadkarni & Prügl, 2021). It also aligns with systematic reviews that frame DT driver of capability development and organizational adaptation (Gong & Ribiere, 2021). Furthermore, the findings that DT positively affects DC supports the idea that DT efforts help SMEs develop operational, strategic, and learning capabilities needed to effectively leverage digital technologies. More precisely, SMEs do not benefit from DT simply because they

introduce new digital solutions, but because those solutions become embedded in their organizational capabilities. This aligns with DCT, which suggest that competitive advantage depends on a firm's ability to integrate, build, and reconfigure resources in dynamic environments (Teece et al., 1997). Similarly, recent literature on DT emphasizes that organizational capabilities are central to convert digital initiatives into performance outcomes (Warner & Wäger, 2019). Thus, the strong positive relationship between DT and DC in this study is theoretically consistent and empirically meaningful.

The results also show that DT has a strong positive effect on DI, suggesting that DT creates favorable conditions for new products, services, processes, and business models. This result is consistent with prior researches arguing that digitalization extends firms' opportunity for experimentation, agility, and innovation (Nambisan et al., 2019). It also aligns with Usai et al. (2021) showing that the innovation capabilities enabled by digitalization play a critical role in shaping business outcomes. Therefore, the present findings reinforce the view that DT should not be treated as a purely technological initiative, but rather as a strategic process that can stimulate broader innovative capacity within the SMEs. In addition, the study further showed that DC and DI both positively influence FP, which suggests that these two constructs are key mechanisms through which DT generates value. This is consistent with previous work emphasizing that DC and IT-enabled competencies help firms improve adaptability, efficiency, and strategic responsiveness, which eventually support performance (Warner & Wäger, 2019). Similarly, evidence suggests that innovation capability is closely related to business growth and competitive outcomes in digitally evolving firms (Usai et al., 2021). From this perspective, the current findings support the argument that performance benefits from DT are not direct. Instead, SMEs appear to reach those benefits when DT contributes to internal capability building and innovation outcomes. Besides, the mediation results show that DT improves FP partly by increasing DC and partly by increasing DI. These findings are consistent with recent studies of digital innovation capability literature suggesting the importance of capability sets that support innovation and adaptation in dynamic contexts (Fan et al., 2026). Practically, this means that SMEs should not assess DT success only by the extent of technology deployment, but also by whether those efforts are translated into stronger capabilities and actual innovation outputs. In addition, this study found that DL significantly moderated the relationship between DT and DI, but did not significantly moderate the relationship between DT and DC. This indicates that the positive influence of DT on digital innovation becomes stronger when DL is higher, whereas the comparable strengthening of digital capability was not statistically supported. These moderation effects are important because they show that leadership is not merely a background factor but an enabling condition that determines how effectively DT efforts concert into organizational outcomes. This result aligns with recent literature showing that leadership behaviors are crucial to the success of DT, especially in fostering digital competence, acceptance, and innova-

tion-oriented performance (Orkamo et al., 2025). It is also consistent with (Benitez et al., 2022) research emphasizing the role of DL capability in enhancing innovation performance and enabling digital platform development and organizational adaptation.

Overall, the discussion of the study results suggests that the findings are aligned with existing literature while also making a useful empirical contribution. The study supports that DT improves FP, but it goes further by showing how that happens through capability and innovation, and when it becomes stronger through DL. In that sense, the results of this study contribute to a clear understanding of DT as an organizational and leadership-driven process rather than a purely technological one. Therefore, the results reinforce the importance of integrating DT, capability development, innovation, and leadership into a single explanatory framework for understanding FP in SMEs in digital environments.

7. Implications of the Study

This study has meaningful theoretical and managerial implications. Theoretically, it advances dynamic capabilities theory (Teece, 2007) and the TOE framework (Tornatzky & Fleischer, 1990) by clarifying the dual mediating pathway of DC and DI, through which DT translates into FP, and by positioning DL as a critical contingency that enhances these effects in resource-constrained SME settings (Al-Nuaimi et al., 2022; Warner & Wäger, 2019). Moreover, the results imply that contingency is embedded in the transformation-innovation pathway (H9) rather than the capability pathway (H8).

Managerially, the results urge Moroccan SME owners and managers to move beyond viewing DT as a mere technological upgrade and instead treat it as a strategic reconfiguration process that demands parallel investment in building DC and fostering innovation outcomes (Khin & Ho, 2019; Matarazzo et al., 2021). Moreover, the findings emphasize the importance of cultivating DL through executive digital upskilling, the recruitment of digitally fluent managers, and the articulation of a clear digital vision, as a key driver for converting DT efforts into tangible performance gains. From a policy standpoint, the findings suggest that public programs supporting SME digitalization in Morocco, such as those aligned with the Morocco Digital 2030 strategy, should broaden their focus beyond infrastructure financing to include managerial capacity-building, innovation incentives, and leadership development mechanisms tailored to the realities of SMEs.

8. Limitations of the Study

This study makes an important contribution by explaining how DT affects FP through DC and DI, while also considering the moderating role of DL. However, several limitations should be acknowledged. First, the study used a cross-sectional research design, meaning that the data were collected at one point in time. Although the findings support the proposed relationships, this design does not allow strong conclusions about causality. It is therefore difficult to confirm whether DT

leads to higher FP, or whether better-performing firms are more likely to invest in DT, capability building, and innovation activities. Second, this study relied on self-reported survey data collected, which may raise concerns about common method bias. To address this issue, several procedural remedies were applied during the design of the questionnaire and data collection process. Clear definitions and explanations were provided for each construct in order to reduce misunderstanding and interpretation bias, and the questionnaire items were refined based on expert feedback to improve clarity, relevance, and overall accuracy. With respect to non-response bias, detailed information on non-respondents was not available for direct comparison. However, no unusual response patterns or evidence of systematic distortion were observed in the dataset, suggesting that non-response bias is unlikely to have materially influenced the findings, although it cannot be fully ruled out. Third, the analysis uses a full PLS-SEM model with bootstrapped inference and discriminant validity (HTMT), where DL's AVE is marginally below 0.50, therefore, its measurement should be strengthened in future work. Fourth limitation relates to the generalizability of the findings. Although the sample size of 204 responses was adequate for the analyses performed, the extent to which the results can be generalized to other firm sizes, or national contexts remains uncertain. Differences in sector characteristics, market dynamics, and digital maturity levels may influence the strength of the observed relationships. Finally, FP was measured using perceptual indicators rather than objective financial or operational data. Although perceptual measures are common in management and organizational research, they may not fully capture actual organizational outcomes and may be influenced by respondent subjectivity. For this reason, the findings should be interpreted with appropriate caution.

9. Directions for Future Research

Future research can extend this study in several ways. First, researchers should consider using a longitudinal design to examine how DT, DC, and DI evolve over time and how these changes influence FP. Such an approach would provide stronger evidence regarding causal relationships and the temporal sequence among the variables. Second, future research should incorporate objective measures of firm performance, such as revenue growth, profitability, productivity, market share, or return on assets, alongside perceptual measures. Combining subjective and objective indicators would strengthen the robustness of the findings and reduce the limitations associated with single-source data. Third, a valuable direction would be to test the model across different industries and institutional contexts. The role of DT may vary significantly between small and large organizations, and across countries with different levels of digital infrastructure and technological development. Comparative studies could therefore provide a deeper understanding of the boundary conditions of the proposed model. Fourth, future research could also examine additional mediators and moderators that may shape the relationship between DT and FP. For example, organizational agility, innovation culture, em-

employee digital competence, knowledge management capability, strategic flexibility, and environmental uncertainty may offer further insight into how and when DT creates value. Finally, qualitative or mixed-methods research would complement this study's findings by exploring how DT is implemented in practice. Case studies and interviews with managers could provide richer insight into the organizational processes, leadership behaviors, and contextual challenges that influence the success of DT initiatives. Such work would deepen the understanding of the mechanisms identified in this study and help bridge the gap between statistical findings and managerial practice.

10. Conclusion

This study builds on the dynamic capabilities' theory (Teece, 2007) and the TOE framework (Tornatzky & Fleischer, 1990) to investigate how DT shapes FP among Moroccan SMEs operating across both manufacturing and non-manufacturing sectors. Using partial least squares structural equation modeling (PLS-SEM), it empirically examined the mediating roles of DC and DI in the relationship between DT and FP, as well as the moderating effect of DL on the influence of DT on each mediator. Accordingly, this research extends the empirical literature on DT in North African emerging economies and offers actionable insights for SMEs operating under resource constraints, institutional voids, and accelerating competitive pressures characteristic of their business environment.

In this endeavor, the data analysis reveals that the effect of DT on performance is conveyed through the development of DC and the generation of DI, both of which were confirmed as significant partial mediators. This finding reinforces the dynamic capabilities perspective by demonstrating that DT operates as a higher-order process of sensing, seizing, and reconfiguring whose performance outcomes are realized only when firms successfully build the assets and innovation outcomes that allow them to exploit digital opportunities (Vial, 2019; Warner & Wäger, 2019). Aligning with prior work positioning DC as a critical driver of competitiveness in SMEs (Cenamor et al., 2019; Khin & Ho, 2019), the results show that without an underlying capability base, DT investments have limited bottom-line impact. Similarly, DI emerges as a key conversion mechanism through which DT efforts are turned into new products, services, and business processes that customers value (Nambisan et al., 2017; Verhoef et al., 2021).

Beyond these mediation effects, the role of DL proved to be both important and more nuanced than a uniform amplifying effect. DL exerted a strong, significant direct effect on both DC and DI, indicating that digitally capable leadership is itself a driver of capability building and innovation. As a moderator, however, its effect was selective: DL significantly strengthened the influence of DT on DI, but its moderation of the DT-DC relationship was not statistically supported in the bootstrapped PLS-SEM model. In other words, leadership matters most for amplifying the pathway through which transformation is translated into innovation, rather than uniformly intensifying every transformation effect. This pattern is

particularly meaningful in the Moroccan SME context, where managers play a central role, making their digital vision, resource orchestration, and cultivation of a digitally oriented culture essential for ensuring that technological investments are converted into innovation rather than remaining underused (AlNuaimi et al., 2022; Westerman et al., 2014).

In global, this study enriches capability-based explanations of digitalization by clarifying the dual pathway of capability building and innovation generation through which DT is converted into performance. It also integrates the TOE framework to show how the technological push of digitalization interacts with organizational leadership and the wider environmental conditions facing SMEs in emerging markets (Matarazzo et al., 2021; Religia et al., 2025). Furthermore, this study contributes to the literature on DC, DI, and SMEs' DT in developing countries by offering an integrated model that jointly captures mediating and moderating mechanisms, an approach that prior studies on DT in SMEs have rarely combined (Li et al., 2018). A robustness check controlling for firm sector confirmed that these relationships hold across both manufacturing and non-manufacturing SMEs. For practitioners and policymakers in Morocco, the implications are to approach DT as a strategic reconfiguration effort that must be paired with planned investments in DC building and with clear innovation outcomes in mind, and that is led by managers with the digital competences to orchestrate human resources, processes, and technologies, especially toward innovation, where leadership makes the greatest difference. Moreover, public government initiatives and SME accelerator programs are likely to yield stronger performance outcomes when they go beyond infrastructure subsidies to fund managerial digital upskilling, innovation experimentation, and the strengthening of internal digital routines within SMEs.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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