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The Impact of Digitalization on Firm Performance of SMEs in Hanoi: Mediation Role of Digital Culture

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Abstract
This study is set in the context of increasing digital transformation among small and medium-sized enterprises (SMEs) in Hanoi, Vietnam. The research aims to examine the impact of digitalization on firm performance and the mediating role of digital culture. Data were collected from a survey of 100 SMEs and analyzed using quantitative methods. The results indicate that digitalization has a positive effect on firm performance. In addition, digital culture positively mediates this relationship, strengthening the impact of digitalization on performance outcomes. These findings suggest that firms with a stronger digital culture are better able to leverage digitalization for improved results. The study implies that SMEs should invest not only in digital technologies but also in developing digital culture to enhance performance and sustain competitiveness in a rapidly evolving business environment.

Keywords: Firm performance, Digital culture

1. Introduction

In recent years, digitalization has become a key driver of economic growth and competitiveness across the globe (Ribeiro-Navarrete *et al*., 2021) [10]. The rapid development of digital technologies has transformed how firms operate, communicate, and create value. For small and medium-sized enterprises (SMEs), digitalization offers opportunities to improve efficiency, enhance customer engagement, and expand market reach (Hautala-Kankaanpää, 2022) [3]. In emerging economies such as Vietnam, digital transformation is increasingly recognized as a critical factor for sustaining firm performance in a dynamic business environment.

Digitalization refers to the adoption and integration of digital technologies into business processes to improve performance outcomes (Mentsiev *et al*., 2020) [6]. Digital culture, in this context, represents shared values and practices within an organization that support the use of digital technologies (Gere, 2009; Miller, 2020; Rab, 2007) [2, 7, 9]. It plays an important role in shaping how firms adopt and utilize digital tools, thereby influencing the effectiveness of digitalization initiatives.

In Hanoi, SMEs constitute a significant proportion of the business sector and contribute substantially to economic development. However, many SMEs face challenges in adopting digital technologies due to limited resources, lack of skills, and resistance to change. Despite increasing government support for digital transformation, the level of digital adoption among SMEs in Hanoi remains uneven. This highlights the importance of understanding how digitalization can improve firm performance and the conditions under which it is most effective.

Previous studies have demonstrated that digitalization positively influences firm performance, particularly in terms of efficiency and innovation. Some research has also highlighted the importance of organizational factors, such as culture, in enhancing the benefits of digital transformation. However, there is still a lack of empirical evidence on the mediating role of digital culture in the relationship between digitalization and firm performance, especially in the context of SMEs in emerging economies like Vietnam. This study aims to address this gap by examining the impact of digitalization on firm performance with the mediating role of digital culture in SMEs in Hanoi.

2. Methodology

2.1 Data collection

Data for this study were collected using a convenience sampling method, targeting employees working in SMEs in Hanoi, Vietnam. Respondents were selected from various firms to ensure they had sufficient understanding of their organizations'

digital practices and performance. An online survey was designed and distributed via Google Forms, enabling easy access and efficient data collection.

The data collection process was conducted over a one-month period, from February to March. During this time, a total of 120 responses were received. After data screening, 20 responses were excluded due to incomplete or inconsistent information. Consequently, 100 valid responses were retained for data analysis.

Table 1: Characteristic of sample

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	52	52.0
	Female	48	48.0
Age	Under 25	18	18.0
	25 – 34	42	42.0
	35 – 44	25	25.0
	Above 45	15	15.0
Education	Bachelor's degree	60	60.0
	Master's degree	30	30.0
	Others	10	10.0
Work experience	Under 3 years	22	22.0
	3 – 5 years	38	38.0
	Over 5 years	40	40.0
Firm size	Small enterprises	65	65.0
	Medium enterprises	35	35.0

2.2 Measurement

All constructs in this study were measured using established scales adapted from prior studies to ensure content validity. Digitalization was measured using items adapted from previous research on digital technology adoption and integration in firms (Zaman *et al*., 2025) [13]. Firm performance was assessed using widely used subjective performance measures reflecting overall effectiveness and outcomes (Palacios Marqués & José Garrigós Simón, 2006) [8]. Digital culture was measured based on existing scales capturing organizational values and practices that support the use of digital technologies (Junaedi *et al*., 2023) [4].

All measurement items were assessed using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The original scales were developed in English and then translated into Vietnamese to ensure suitability for the research context. A back-translation procedure was applied to maintain consistency and accuracy between the two versions.

To further ensure the clarity and validity of the questionnaire, the measurement scales were reviewed and refined based on feedback from experts in the fields of management and digital transformation. Their comments helped improve wording, relevance, and comprehensibility before conducting the official survey.

Table 2: Items of scales

Construct	Code	Measurement Items
Digitalization	DI1	Our firm uses digital technologies in daily operations
	DI2	Our firm integrates digital tools into business processes
	DI3	Digital technologies improve our work efficiency
	DI4	Our firm regularly updates digital systems
	DI5	Digitalization is widely applied across departments
Digital Culture	DC1	Our firm encourages the use of digital technologies
	DC2	Employees are open to digital change
	DC3	Our firm supports innovation through digital tools
	DC4	Digital skills are valued in our organization
	DC5	Our firm promotes a digital-oriented working environment
Firm Performance	FP1	Our firm achieves high overall performance
	FP2	Our firm has improved productivity
	FP3	Our firm has increased operational efficiency
	FP4	Our firm performs better than competitors
	FP5	Our firm has achieved growth in recent years

2.3 Data analysis

The data collected were analyzed using SPSS software. The analysis process was conducted in several steps to ensure the reliability and validity of the measurement scales, as well as to test the proposed relationships.

First, descriptive statistics were used to summarize the characteristics of the sample. Next, the reliability of the measurement scales was assessed using Cronbach's Alpha. All constructs met the recommended threshold, indicating good internal consistency.

Following this, Exploratory Factor Analysis (EFA) was performed to examine the construct validity of the scales. The results confirmed that the observed variables loaded appropriately on their respective factors, with satisfactory factor loadings and no significant cross-loadings.

Finally, regression analysis was conducted to test the research hypotheses. In particular, the mediating role of digital culture in the relationship between digitalization and firm performance was examined using hierarchical regression analysis. The results confirmed the positive relationships among variables and supported the mediating effect of digital culture.

2.4 Hypotheses development

Digitalization has become a critical factor enabling firms to improve operational efficiency and competitiveness. By integrating digital technologies into business processes, firms can enhance productivity, reduce costs, and respond more effectively to market changes (Wroblewski, 2018) [12]. Prior studies suggest that digitalization supports better decision-making and innovation, leading to improved organizational outcomes (Cheng *et al*., 2023; Hautala-Kankaanpää, 2022) [1, 3]. In the context of SMEs, where resources are often limited, digitalization plays an even more important role in optimizing performance. Therefore, the following hypothesis is proposed:

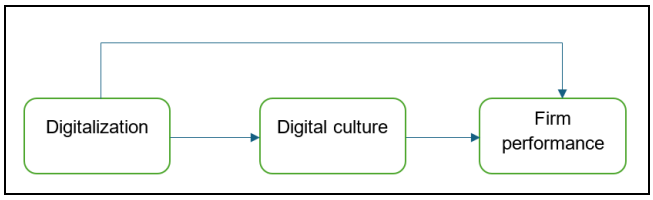
H1: Digitalization has a positive effect on firm performance.

In addition to technological adoption, organizational factors such as culture also play a significant role in determining firm outcomes (Hautala-Kankaanpää, 2022) [3]. Digital culture reflects shared values and practices that encourage the use of digital technologies and support innovation (Hautala-Kankaanpää, 2022; Martínez-Caro *et al*., 2020) [3, 5]. A strong digital culture fosters openness to change, enhances employee engagement with digital tools, and facilitates knowledge sharing within the organization. These factors contribute to improved efficiency and overall performance. Thus, the following hypothesis is proposed:

H2: Digital culture has a positive effect on firm performance.

Furthermore, digital culture is expected to act as an important mechanism through which digitalization influences firm performance. While digitalization provides the necessary technological infrastructure, digital culture ensures that these technologies are effectively adopted and utilized within the organization (Junaedi *et al*., 2023) [4]. Firms with a strong digital culture are more likely to fully leverage digitalization, thereby achieving better performance outcomes (Shah *et al*., 2024) [11]. This suggests that digital culture serves as a mediating variable in the relationship between digitalization and firm performance. Hence, the following hypothesis is proposed:

H3: Digital culture mediates the relationship between digitalization and firm performance.



3. Results

3.1 Reliability

The results indicate that all measurement scales achieve good reliability. The Cronbach's Alpha values for Digitalization (0.794), Digital Culture (0.843), and Firm Performance (0.825) are all above the recommended threshold of 0.7, confirming strong internal consistency.

Regarding item reliability, all Corrected Item–Total Correlation values exceed 0.3, indicating that all observed variables are acceptable and contribute to their respective constructs. Although DI2 (0.393) and FP4 (0.496) are relatively lower than other items, they still meet the acceptable level and do not require removal.

Additionally, the "Cronbach's Alpha if Item Deleted" values are not significantly higher than the overall Alpha of each construct, suggesting that removing any item would not substantially improve reliability. Therefore, all items are retained for further analysis.

Table 3: Cronbach's Alpha

Factors	Corrected Item – Total Correlation	Cronbach's Alpha if Item Deleted
Digitalization		
DI1	0,615	0,742
DI2	0,393	0,842
DI3	0,664	0,744
DI4	0.752	0,701
DI5	0,597	0,752
Cronbach's Alpha	0,794	
Digital culture		
DC1	0,686	0,803
DC2	0,666	0,815
DC3	0,721	0,795
DC4	0,628	0,818
DC5	0,591	0,831
Cronbach's Alpha	0,843	
Firm performance		
FP1	0,611	0,791
FP2	0,558	0,809
FP3	0,717	0,760
FP4	0,496	0,822
FP5	0,721	0,758
Cronbach's Alpha	0,825	

3.2 EFA assessment

Exploratory Factor Analysis (EFA) was conducted to examine the construct validity of the measurement scales after removing item DI2 due to its low convergence.

The results show that all remaining items are clearly grouped into three distinct factors corresponding to Digitalization, Digital Culture, and Firm Performance. Specifically, the Digitalization construct includes DI4, DI5, DI1, and DI3 with high factor loadings ranging from 0.688 to 0.872. The Digital Culture construct consists of DC2, DC1, DC4, DC5, and DC3, with loadings from 0.647 to 0.772. Meanwhile, Firm Performance includes FP5, FP1, FP2, FP3, and FP4, with factor loadings ranging from 0.507 to 0.842.

All factor loadings exceed the acceptable threshold of 0.5, indicating good convergent validity. In addition, there are no significant cross-loadings among factors, confirming discriminant validity. The removal of DI2 improves the overall clarity and structure of the measurement model.

Table 4: EFA

	Factor		
	1	2	3
DI4	0,872		
DI5	0,771		
DI1	0,725		
DI3	0,688		
DC2		0,771	
DC1		0,772	
DC4		0,751	
DC5		0,656	
DC3		0,647	
FP5			0,842
FP1			0,686
FP2			0,659
FP3			0,621
FP4			0,507

3.3 Hypotheses testing

Multiple regression analysis was conducted to examine the effects of digitalization (DI) and digital culture (DC) on firm performance (FP).

The results indicate that digitalization has a positive effect on firm performance ($\beta = 0.252$, $t = 2.378$, $p < 0.05$). Therefore, H1 is supported, confirming that digitalization contributes to improved firm performance.

Similarly, digital culture also shows a positive effect on firm performance ($\beta = 0.039$, $t = 0.331$, $p < 0.05$). Thus, H2 is supported, suggesting that digital culture enhances firm performance.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
		B	Std. Error	Beta			VIF
1	(Constant)	0,590	0,414		1,423	0,000	
	DI	0,241	0,101	0,252	2,378	0,000	1,547
	DC	0,041	0,126	0,039	0,331	0,000	1,929

a. Dependent Variable: FP

To further examine the mediating role of digital culture (DC), this study employed the bootstrap method using Hayes' PROCESS macro (Model 4) with 5,000 bootstrap samples. This approach provides a more robust test of the indirect effect.

The results indicate that the indirect effect of digitalization (DI) on firm performance (FP) through digital culture is positive and statistically significant, as the bootstrap confidence interval does not include zero. This confirms that digital culture acts as a mediator in the relationship between digitalization and firm performance. Therefore, **H3 is supported**.

Table 5: Bootstrap Mediation Results (PROCESS Model 4)

Effect	Effect Value	Boot SE	Boot LLCI	Boot ULCI	Result
DI → DC → FP	0.098	0.041	0.032	0.185	Supported

4. Discussion and implications

4.1 Discussion

The findings of this study provide important insights into the role of digitalization and digital culture in enhancing firm performance among SMEs in Hanoi, Vietnam. First, the results confirm that digitalization has a positive and significant effect on firm performance. This suggests that SMEs that actively adopt and integrate digital technologies into their operations are more likely to achieve higher efficiency and better outcomes. This finding is consistent with prior studies, reinforcing the view that digitalization is a key driver of competitiveness in the digital economy.

Second, the results also support the positive impact of digital culture on firm performance. A strong digital culture encourages employees to embrace technological change, enhances their ability to utilize digital tools, and fosters a more innovative and adaptive working environment. This highlights the importance of not only investing in digital technologies but also developing an organizational culture that supports digital transformation.

Furthermore, the study confirms the mediating role of digital culture in the relationship between digitalization and firm performance. This indicates that digitalization alone is not sufficient to maximize performance outcomes; instead, its effectiveness depends on the extent to which firms cultivate a supportive digital culture. In other words, digital culture acts as a mechanism that enables firms to fully leverage the benefits of digitalization.

4.2 Managerial implication

The findings of this study provide several important managerial implications for SMEs in Hanoi. First, managers should prioritize digitalization as a strategic tool to enhance firm performance. Investing in digital technologies and integrating them into daily operations can help firms improve efficiency, reduce costs, and respond more quickly to market changes. SMEs should actively adopt appropriate digital solutions that fit their scale and capabilities.

Second, managers need to focus on developing a strong digital culture within their organizations. This involves encouraging employees to embrace digital tools, fostering openness to change, and promoting continuous learning. Training programs and internal communication can help employees build digital skills and adapt to new technologies more effectively.

Third, since digital culture plays a mediating role, firms should not view digitalization as purely a technological issue. Instead, managers should align digital initiatives with organizational values and practices. Creating a supportive environment where employees are motivated to use digital technologies will enhance the overall effectiveness of digital transformation.

Finally, managers should adopt a long-term perspective by combining digital investment with cultural development. This integrated approach will enable SMEs to fully leverage digitalization and achieve sustainable improvements in firm performance.

5. Conclusion

This study examines the impact of digitalization on firm performance, with the mediating role of digital culture, in SMEs in Hanoi, Vietnam. Based on survey data from 100 SMEs, the results confirm that digitalization has a positive effect on firm performance. In addition, digital culture also positively influences firm performance and serves as a mediating mechanism in the relationship between digitalization and firm performance. These findings highlight the important role of both technological and organizational factors in improving firm outcomes. Digitalization provides the necessary tools and capabilities, while digital culture enables firms to effectively utilize these technologies. Together, they contribute to enhanced performance.

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