

THESES OF THE DOCTORAL (PhD) DISSERTATION

THE IMPACT OF DIGITALIZATION ON THE FINANCIAL PERFORMANCE OF ENTERPRISES IN VIETNAM

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1. OBJECTIVES, SCIENTIFIC CONCEPT, AND HYPOTHESES

1.1. Introduction of the topic and objectives

The emergence of Industry 4.0 and the upcoming Industrial Revolution 5.0 are reshaping global economies by leveraging advanced technologies such as the Internet of Things (IoT) and Artificial Intelligence (AI) (Mariani & Borghi, 2019). Central to these transformations is digitalization, which optimizes production processes and enhances interconnectivity across economic cycles (Gilchrist & Gilchrist, 2016). Accelerated by the COVID-19 pandemic, digitalization is being widely adopted by consumers, businesses, and governments (Amankwah-Amoah et al., 2021).

Digitalization is projected to add up to \$13 trillion to global GDP by 2030 (Bughin et al., 2018) and is transforming work practices, skill requirements, and economic structures. However, it also presents challenges, especially for traditional business models, requiring significant strategic and financial adaptations (Marcon et al., 2019). Companies must continually innovate to remain competitive in this rapidly changing digital landscape (Nylén & Holmström, 2015).

Vietnam, with its youthful, tech-savvy population, is well-positioned for digital transformation. The government's "National Digital Transformation Program to 2025" targets a 20% GDP contribution from the digital economy by 2025 (Vietnam Government, 2020a). Although many Vietnamese enterprises are adopting digital technologies, challenges remain, particularly for small and medium-sized enterprises (SMEs) (Hai, 2021). There is a need for more comprehensive research on how digitalization impacts financial performance at the firm level.

This dissertation aims to fill existing research gaps by measuring the factors affecting digitalization capability and examining its impact on the financial performance of enterprises in Vietnam. The study seeks to contribute to the literature by providing insights for policymakers and business leaders in decision-making regarding digitalization strategies. The research is structured to address three core components: understanding the antecedents of digitalization capability, assessing its direct and indirect effects on financial performance, and exploring the differentiated impacts across various sectors (Table 1).

Table 1: The research objectives and research questions

Research objective	Research question
<p>1. To examine relevant theories related to enterprise performance in the context of digitalization.</p> <p>2. To investigate which factors affect the digitalization capabilities of the enterprise.</p> <p>3. To examine the relationship between digitalization and the financial performance of enterprises in Vietnam.</p>	<p>1. What are the key theories and frameworks related to enterprise performance in the context of digitalization?</p> <p>2. How do theories of organizational change and innovation apply to digital transformation within enterprises?</p> <p>1. What factors influence the digitalization capabilities of enterprises?</p> <p>2. To what extent do investment in IT infrastructure and digital skills correlate with digitalization capabilities within enterprises?</p> <p>1. What is the relationship between digitalization initiatives and the financial performance metrics of enterprises in Vietnam?</p> <p>2. How does the level of digital maturity within enterprises correlate with their financial performance?</p> <p>3. Are there specific industry sectors in Vietnam where the impact of digitalization on financial performance is more pronounced?</p>

Source: own research

1.2. Scientific concept and hypotheses

1.2.1. Scientific concept

Digitalization has become a strategic priority in today's global economy, significantly transforming both economic and social interactions. While digital transformation is often associated with technological advancements, it fundamentally revolves around strategic realignment (Rogers, 2016; Verhoef et al., 2021). It spans multiple domains, including strategy, organization, IT, supply chain, and marketing. As companies seek to use digital technologies to improve efficiency, innovation, and competitiveness, understanding the factors influencing digitalization and its impact on financial performance becomes essential. In Vietnam, where digitalization is rapidly accelerating, it is crucial to explore how firm resources, digital capabilities, and financial performance interact.

This research investigates the relationship between firm resources, digital capabilities, and financial performance, considering how a firm's sector moderates this relationship. Digitalization is recognized as a critical factor for organizational success, influencing operational efficiency, strategic positioning, and financial outcomes. The study proposes a framework where resources like IT infrastructure, digital skills, and leadership enhance a

firm's digitalization capabilities, which in turn affect financial performance. It also examines how these effects vary by sector.

1.2.2. Hypotheses on antecedents of digitalization and its mediation roles

IT Infrastructure: IT infrastructure is crucial for enabling digital transformation. It provides the necessary support for adopting digital technologies (Jia et al., 2024; Schwertner, 2017) and improves supply chain performance. Modern IT infrastructure can streamline operations, enhance productivity, and foster innovation (Brieger et al., 2022). It also plays a key role in the competitiveness of export-oriented industries and infrastructure sectors (Manny et al., 2021). Hypotheses:

- H1: IT infrastructure has a significant impact on digitalization overall degree and digitalization technology adoption.
- H2: IT infrastructure has a direct significant impact on financial performance.
- H3: Digitalization capabilities has a mediating role in the relationship between IT infrastructure and Financial performance.

Digital skills: Digital skills are essential for leveraging technology and driving innovation (Abou-Foul et al., 2021; Ciarli et al., 2021). They enable firms to navigate the digital economy, maintain competitiveness, and enhance performance across various sectors (Eller et al., 2020). Hypotheses:

- H4: Digitalization capabilities has a mediating role in the relationship between IT infrastructure and Financial performance.
- H5: Digital skills have a direct significant impact on financial performance.
- H6: Digitalization capability has a mediating role in the relationship between Digital skills and Financial performance.

Leadership: Leadership is vital for digital transformation, guiding strategy, fostering innovation, and creating a culture conducive to digital adoption (Larjovuori et al., 2016; Ruel et al., 2021). Hypotheses:

- H7: Leadership has a significant impact on digitalization overall degree and digitalization technology adoption.

- H8: Leadership has a direct significant impact on financial performance.
- H9: Digitalization capabilities has a mediating role in the relationship between Leadership and Financial performance.

1.2.3. Hypotheses on the impact of digitalization capabilities on financial performance

Digitalization overall degree: The degree of digitalization can significantly affect financial performance, enhancing efficiency, innovation, and competitiveness (Kohtamäki et al., 2020). Hypothesis:

- H10: There is a significant impact of digitalization overall degree on financial performance.

Digitalization technology adoption: Adopting digital technologies influences various business outcomes, from innovation to market positioning, ultimately affecting financial performance (Autio et al., 2021; Fernández-Portillo et al., 2022). Hypothesis:

- H11: There is a significant impact of digitalization technology adoption on financial performance.

Field-Sector of the firm: The impact of digitalization on performance varies by sector, with service enterprises potentially benefiting the most due to their reliance on customer interactions, internal process optimization, and scalability (Holmlund et al., 2017). Hypothesis:

- H12: The greatest impact of digitalization is among enterprises in the service sector.

The proposed model (Figure 1) illustrates the direct and indirect relationships between firm resources and digitalization capabilities, and the direct relationship between digitalization and financial performance. It also demonstrates the mediating role of digitalization capabilities in these relationships.

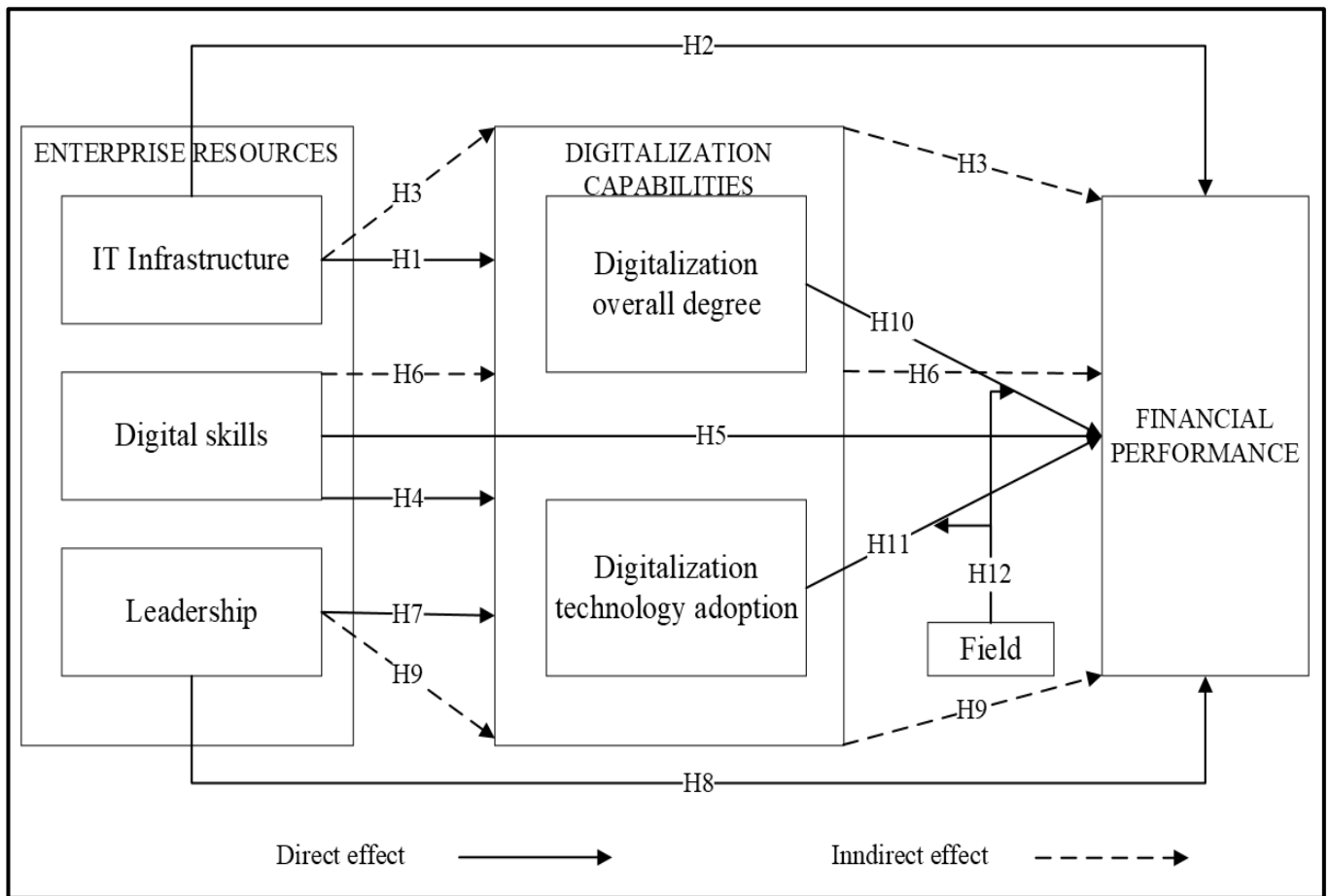


Figure 1: The research model

Source: own research

2. MATERIAL AND METHODS

Two methods are used in the thesis:

- Partial Least Squares Structural Equation Modeling (PLS-SEM) using primary data from survey questionnaires to effectively address the complexities associated with digitalization and its impact on organizational performance.
- Semi-structured interviews with experts to understand how digitalization affects financial performance, capturing stakeholder views on technology adoption, organizational change, and process innovation and its outcome.

2.1. The empirical research

2.1.1. Partial Least Squares SEM (PLS-SEM)

The evolution of digital technologies has transformed organizational operations, leading to the use of Structural Equation Modeling (SEM) to examine the relationship between digitalization and firm performance. Two key SEM methods are Covariance-Based SEM (CB-SEM), which is suited for large samples with normal data but limited in dynamic digital contexts, and Partial Least Squares SEM (PLS-SEM), which is flexible for exploratory research and non-normal data (Hair et al., 2017). This study employs PLS-SEM to effectively analyze digitalization's impact on financial performance, offering insights for academics and practitioners.

2.1.2. Survey questionnaires

Recent research has demonstrated that the survey research approach is effective for examining the complex relationships between firm resources, digitalization, and financial performance. This methodology involves systematically collecting data from a diverse sample of enterprises through structured questionnaires or interviews, followed by quantitative analysis (Hair et al., 2017). The survey method offers comprehensive data collection, quantitative rigor, and scalability, making it ideal for analyzing digital transformation's impact on firm performance. It allows researchers to capture multiple dimensions of digitalization and financial metrics, providing insights into how digital strategies interact with firm resources to shape outcomes. The survey design for this study

includes sections on research objectives, demographic data, and key variables measured using a 5-point Likert scale, ensuring robust statistical analysis and reliable results.

This study utilizes a structured questionnaire to evaluate enterprise resources, digitalization capabilities, and financial performance (shown in Table 2). IT infrastructure, digital skills, and leadership are assessed using items adapted from Scuotto et al. (2017), Eller et al. (2020), and Estensoro et al. (2022). Digitalization capabilities are measured through dimensions from Guo et al. (2020), focusing on digitalization overall degree and technology adoption. Financial performance is evaluated using metrics like profit margin, ROE, ROA, cost efficiency, and market share, based on Eller et al. (2020) and Zhang et al. (2023).

Table 2: The constructs, items, and supporting references

Construct	Item	Supporting theory	Supporting reference
IT infrastructure	INF1-3	RBV-TOE	Scuotto et al. (2017); Eller et al. (2020)
Digital skills	SKI1-4	RBV-TOE	Eller et al. (2020)
Leadership	LED1-3	RBV-TOE	Estensoro et al. (2022)
Digitalization overall degree	DIGO1-5	DC	Guo et al. (2020)
Digitalization technology adoption	DIGT1-7	DC	Guo et al. (2020)
Financial performance	FINP1-5	RBV-DC	Eller et al. (2020); Zhang et al. (2023)

Source: own research

The questionnaire was first developed in English and reviewed by digital transformation experts for technical accuracy. It was then translated into Vietnamese by US-based Vietnamese professors. A pilot test with four experts and ten target respondents in September 2022 identified issues, leading to revisions for clarity and alignment with research goals. This process ensured the final questionnaire's effectiveness and reliability.

2.1.3. Data collection

The survey, initially planned for postal distribution, was shifted to online administration via Google Forms due to low response rates and logistical issues associated with mail. This approach proved more efficient and sustainable. Conducted from October 31, 2022, to January 31, 2023, the survey reached 1,940 companies, with 260 responding, yielding a 13.4% response rate. After excluding 12 invalid responses, 248 valid surveys were analyzed. The final sample included a diverse range of industries, with a majority being large enterprises and over 25 years old. Respondents were primarily experienced professionals in

senior positions, providing valuable insights into digitalization practices. This method ensured a comprehensive and relevant dataset for examining digital transformation across different organizational contexts.

The dataset was complete with no missing values (Table 3) . Constructs such as IT Infrastructure, Digital skills, Leadership, Digitalization overall degree, Digitalization technology adoption, and Financial performance ranged from 1 to 5. The Field variable ranged from 1 (service) to 2 (non-service).

Table 3: The description of variables

	No.	Mean	Median	Min	Max	Std.Dev.
INF1	1	3.5202	4	1	5	1.1662
INF2	2	3.4395	3	1	5	1.2191
INF3	3	3.3992	3	1	5	1.2097
SKI1	4	3.4879	4	1	5	1.1628
SKI2	5	3.2903	3	1	5	1.1223
SKI3	6	3.2903	3	1	5	1.2124
SKI4	7	3.5000	4	1	5	1.1167
LED1	8	3.8427	4	1	5	1.1037
LED2	9	3.9315	4	1	5	1.0177
LED3	10	3.7379	4	1	5	1.1130
DIGO1	11	3.2540	3	1	5	1.1988
DIGO2	12	3.2742	3	1	5	1.1512
DIGO3	13	3.3710	3	1	5	1.1626
DIGO4	14	3.2621	3	1	5	1.1903
DIGO5	15	3.2621	3	1	5	1.1732
DIGT1	16	2.8427	3	1	5	1.2220
DIGT2	17	2.6411	3	1	5	1.2290
DIGT3	18	3.2661	3	1	5	1.2046
DIGT4	19	3.1935	3	1	5	1.1882
DIGT5	20	3.0685	3	1	5	1.2302
DIGT6	21	3.1532	3	1	5	1.1242
DIGT7	22	3.0363	3	1	5	1.1675
FINP1	23	3.5202	4	1	5	1.0376
FINP2	24	3.3790	3	1	5	1.0768
FINP3	25	3.3992	3	1	5	1.0675
FINP4	26	3.4637	4	1	5	1.1197
FINP5	27	3.4919	3	1	5	1.1166
Field	28	1.5081	2	1	2	0.5009

Source: own research

2.2. The semi-structured interview

The study employs semi-structured interviews to explore how digitalization affects firms' financial performance, offering a flexible approach to capture nuanced insights (Gill et al., 2008). This method enables an in-depth understanding of varied digitalization strategies and their financial impacts by engaging senior executives and key decision-makers. The interviews focus on themes such as digitalization strategy, implementation, and performance measurement, aiming to provide a detailed and comprehensive view of digital transformation (Edwards & Holland, 2013). This approach complements quantitative studies by offering richer, context-specific insights into the factors influencing digitalization outcomes. Table 4 outlines the interview themes along with their objectives.

Table 4: The interview theme and its key points

Interview theme	Key points
Digitalization strategy	<i>Motivations:</i> Primary motivations behind initiating digitalization efforts. <i>Key components:</i> Outline of the main components of the digitalization strategy. <i>Evolution:</i> How the digitalization strategy has evolved over time.
Implementation process	<i>Process:</i> Steps and processes involved in implementing digitalization initiatives. <i>Challenges:</i> Major challenges or obstacles encountered during implementation. <i>Mitigation:</i> Methods used to address or mitigate these challenges.
Technological infrastructure	<i>Adopted technologies:</i> Technologies adopted as part of digitalization (e.g., Big Data, IoT, AI, Cloud computing, social platforms). <i>Operational impact:</i> Impact of these technologies on day-to-day operations.
Organizational change & culture	<i>Cultural influence:</i> Influence of digitalization on organizational culture. <i>Employee engagement:</i> Steps taken to prepare and engage employees in the digitalization journey.
Performance measurement & metrics	<i>Success assessment:</i> Methods for assessing the success of digitalization initiatives. <i>KPIs:</i> Key performance indicators used to evaluate the impact on financial performance
Financial impact	<i>Observable effects:</i> Observable effects of digitalization on financial performance. <i>Financial metrics:</i> Improvements in revenue, cost savings, or other financial metrics attributed to digitalization.
Lessons learned & future outlook	<i>Lessons:</i> Key lessons learned from the digitalization journey. <i>Future vision:</i> Future outlook for digitalization within the organization. <i>Upcoming initiatives:</i> Upcoming digitalization initiatives or areas of focus.
External factors & industry trends	<i>External influences:</i> Role of external factors and industry trends in shaping the digitalization strategy. <i>Industry trends:</i> Notable trends or developments influencing the approach to digitalization.
Recommendations and Advice	<i>Advice:</i> Recommendations for other organizations embarking on a digitalization journey. <i>Best practices:</i> Specific strategies or best practices for maximizing financial benefits of digitalization.

Source: own research

During the empirical data collection phase, the survey included an optional question inviting respondents to provide their email addresses if they wished to receive a summary of the survey findings. Subsequently, the thesis sent summary sheets to those who provided their emails and invited them to participate in semi-structured interviews. Of the 59 respondents who left their email addresses, 4 accepted the invitation to participate in these interviews. This modest response rate demonstrates valuable engagement from respondents interested in discussing the survey findings further and sharing their insights qualitatively.

The study explores digitalization in Vietnamese organizations through interviews with key executives from four leading companies across various sectors, offering a comprehensive overview of digital transformation across industries. These organizations include a technology company (Company A), a digital media company (Company B), a real estate company (Company C), and a construction company (Company D). The interviewees are:

- **Company A:** Chief Technology Officer (CTO)
- **Company B:** Chief Financial Officer (CFO)
- **Company C:** Member of the Board of Directors (BOD)
- **Company D:** Chief Accountant

3. MAIN FINDINGS OF THE DISSERTATION

3.1. The result of empirical research

The study utilizes the SEMinR package in R program to conduct PLS-SEM analysis. SEMinR provides robust tools for building, estimating, and visualizing models, offering flexibility, reproducibility, and alignment with open-source principles for transparent and scalable research.

3.1.1. The measurement model

To evaluate PLS-SEM results, a thorough assessment of the measurement model is necessary, as outlined by Hair et al. (2019). This includes checking indicator reliability, internal consistency, composite reliability, and construct reliability. Discriminant validity must also be verified using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait ratio (HTMT) (Henseler et al., 2014) to ensure constructs are distinct. Table 5 summarizes these criteria and best practices for validating the measurement model.

Table 5: The evaluating model recommendations

Criterion	Recommends	Reference
Indicator reliability	<ul style="list-style-type: none"> Indicator loading > 0.7 Indicator loading square > 0.5 	Hair et al. (2019)
Internal consistency	<ul style="list-style-type: none"> Composite reliability > 0.7 Cronbach's alpha > 0.7 RhoA falling between Cronbach's alpha and CR 	Hair & Alamer (2022)
Convergent reliability	<ul style="list-style-type: none"> Average variance extracted > 0.5 	Hair et al. (2021)
Discriminant validity	<ul style="list-style-type: none"> AVE of each construct should be higher than the squared correlation between constructs 	Fornell & Larcker (1981)
	<ul style="list-style-type: none"> The HTMT value should be lower than the threshold value of 0.9 	Henseler et al. (2014)

Source: own research

To assess the measurement model in PLS-SEM, key criteria include indicator reliability, internal consistency, and convergent validity. Indicator reliability is confirmed with all loadings (0.8185 to 1) and squared loadings (minimum 0.6699) exceeding recommended thresholds (Hair et al., 2019). Internal consistency is validated by CR values above 0.95 and Cronbach's alpha values exceeding 0.92, with rho_A falling between these values (Hair & Alamer, 2022). Convergent validity is demonstrated with AVE values ranging from 0.7362 to 0.9158, all above the 0.5 threshold (Hair et al., 2019) (show in Table 6).

Table 6: The measurement model result

Variable/ Indicator	Loadi ng factor	Factor loading square	Cronbach's alpha	CR	AVE	rho_A
IT infrastructures						
INF1	0.9106	0.8292	0.9281	0.9544	0.8746	0.9280
INF2	0.9587	0.9191				
INF3	0.9356	0.8754				
Digital skills						
SKI1	0.9174	0.8416	0.9301	0.9502	0.8266	0.9311
SKI2	0.9058	0.8205				
SKI3	0.9020	0.8136				
SKI4	0.9114	0.8306				
Leadership						
LED1	0.9527	0.9077	0.9541	0.9703	0.9158	0.9561
LED2	0.9611	0.9236				
LED3	0.9571	0.9161				
Digitalization overall degree						
DIGO1	0.9408	0.8852	0.9701	0.9767	0.8933	0.9703
DIGO2	0.9610	0.9234				
DIGO3	0.9495	0.9016				
DIGO4	0.9325	0.8695				
DIGO5	0.9418	0.8870				
Digitalization technology adoption						
DIGT1	0.8736	0.7631	0.9403	0.9513	0.7362	0.9431
DIGT2	0.8210	0.6740				
DIGT3	0.8481	0.7193				
DIGT4	0.8680	0.7533				
DIGT5	0.8549	0.7309				
DIGT6	0.8588	0.7375				
DIGT7	0.8804	0.7751				
Financial performance						
FINP1	0.9171	0.8412	0.9397	0.9544	0.8075	0.9449
FINP2	0.9379	0.8796				
FINP3	0.9443	0.8916				
FINP4	0.8185	0.6699				
FINP5	0.8691	0.7553				
Field/sector						
Field	1	1	1	1	1	1

Source: own research

To assess discriminant validity, the study applied the Fornell-Larcker criterion and HTMT. The Fornell-Larcker criterion ensures each construct's AVE is greater than its correlations with other constructs (Fornell & Larcker, 1981) (Table 7).

Table 7: The Fornell and Larcker criterion result

	INF	SKI	LED	DIGO	DIGT	FINP
INF	0.9352					
SKI	0.8187	0.9092				
LED	0.6931	0.7738	0.9570			
DIGO	0.7360	0.7928	0.7297	0.9452		
DIGT	0.6353	0.6509	0.6032	0.7322	0.8580	
FINP	0.5216	0.5825	0.5605	0.5995	0.5865	0.8986

Source: own research

Discriminant validity was assessed using the HTMT ratio, with all values below 0.9 (max: 0.88), confirming validity (Henseler et al., 2014) (Table 8). Significance testing further supported these findings, validating the measurement model (Sarstedt et al., 2021).

Table 8: The Heterotrait-Monotrait ratio result

	INF	SKI	LED	DIGO	DIGT	FINP
INF						
SKI	0.8816					
LED	0.7367	0.8202				
DIGO	0.7755	0.8335	0.7575			
DIGT	0.6758	0.6915	0.6345	0.7632		
FINP	0.5555	0.6208	0.5868	0.6258	0.6146	

Source: own research

3.1.2. The structural model

Table 9: The VIF value of structure model

Variable	Indicator	VIF
Digitalization overall degree		
IT Infrastructure	INF	3.117
Digital skills	SKI	4.035
Leadership	LED	2.561
Digitalization technology adoption		
IT Infrastructure	INF	3.117
Digital skills	SKI	4.035
Leadership	LED	2.561
Financial performance		
IT Infrastructure	INF	3.354
Digital skills	SKI	4.587
Leadership	LED	2.857
Digitalization overall degree	DIGO	3.804
Digitalization technology adoption	DIGT	2.323
Field		1.159
Digitalization overall degree*Field	DIGO*Field	1.990
Digitalization technology adoption*Field	DIGT*Field	1.975

Source: own research

The structural model assessment begins with checking for collinearity using the Variance Inflation Factor (VIF). All VIF values are below the threshold of 5, indicating no collinearity concerns (Hair et al., 2021) (Table 9).

To comprehensively assess the structural model, this research examines the significance and relevance of the structural paths using bootstrapping with 10,000 samples (Hair et al., 2021). Significance is determined by t-values and confidence intervals (CIs); paths are considered significant if the CIs do not include zero (Sarstedt et al., 2021) (Table 10).

Table 10: The result of the structural model

Hypothesis	Explanation	Original Est.	T Stat.	2.5% CI	97.5% CI	Result
H1	INF -> DIGO	0.2172	2.8525	0.0715	0.3673	Supported
	INF -> DIGT	0.2731	3.1808	0.1000	0.4393	
H2	INF -> FINP	-0.0321	-0.3078	-0.2292	0.1754	Rejected
H3	INF_DIGO_FINP	0.0327	1.1044	-0.0150	0.1022	Partial supported
	INF_DIGT_FINP	0.0713	2.2807	0.0186	0.1391	
H4	SKI -> DIGO	0.4158	4.8687	0.2474	0.5833	Supported
	SKI -> DIGT	0.2668	2.6409	0.0717	0.4655	
H5	SKI -> FINP	0.1665	1.6075	-0.0439	0.3615	Rejected
H6	SKI_DIGO_FINP	0.0625	1.2729	-0.0281	0.1660	Partial supported
	SKI_DIGT_FINP	0.0697	2.0524	0.0136	0.1450	
H7	LED -> DIGO	0.2574	4.1045	0.1311	0.3787	Supported
	LED -> DIGT	0.2075	2.5295	0.0440	0.3640	
H8	LED -> FINP	0.1717	1.9429	-0.0082	0.3409	Rejected
H9	LED_DIGO_FINP	0.0387	1.2611	-0.0182	0.1041	Partial supported
	LED_DIGT_FINP	0.0542	1.9975	0.0085	0.1140	
H10	DIGO -> FINP	0.1504	1.3406	-0.0704	0.3736	Rejected
H11	DIGT -> FINP	0.2611	3.3239	0.0987	0.4085	Supported
H12	DIGO*Field -> FINP	-0.0293	-0.3395	-0.1960	0.1422	Rejected
	DIGT*Field -> FINP	0.0264	0.3395	-0.1301	0.1732	

Source: own research

1. Antecedents of Digitalization: The analysis shows that enterprise resources-IT infrastructure (INF), digital skills (SKI), and leadership (LED)-significantly affect digitalization capability. INF, SKI, and LED positively influence both the overall degree of digitalization (DIGO) and digitalization technology adoption (DIGT), supporting hypotheses H1, H4, and H7. This highlights the critical role of tangible, intangible, and human capital resources in enabling digital transformation.

2. Mediation role of digitalization: The study also investigates the indirect effects of enterprise resources on financial performance (FINP) through digitalization. Direct effects of INF, SKI, and LED on FINP are insignificant, rejecting hypotheses H2, H5, and H8. However, DIGT significantly mediates the relationship between these resources and financial performance, while DIGO shows no significant mediation effect, partially supporting H3, H6, and H9.

3. Impact of digitalization on financial performance: The analysis confirms that DIGT positively FINP, supporting hypothesis H11, while DIGO does not show a significant effect, leading to the rejection of hypothesis H10. Additionally, the Field/sector variable does not significantly moderate these relationships, rejecting H12.

The figure below visually represents the research findings, highlighting the relationships and impacts identified in the statistical analysis.

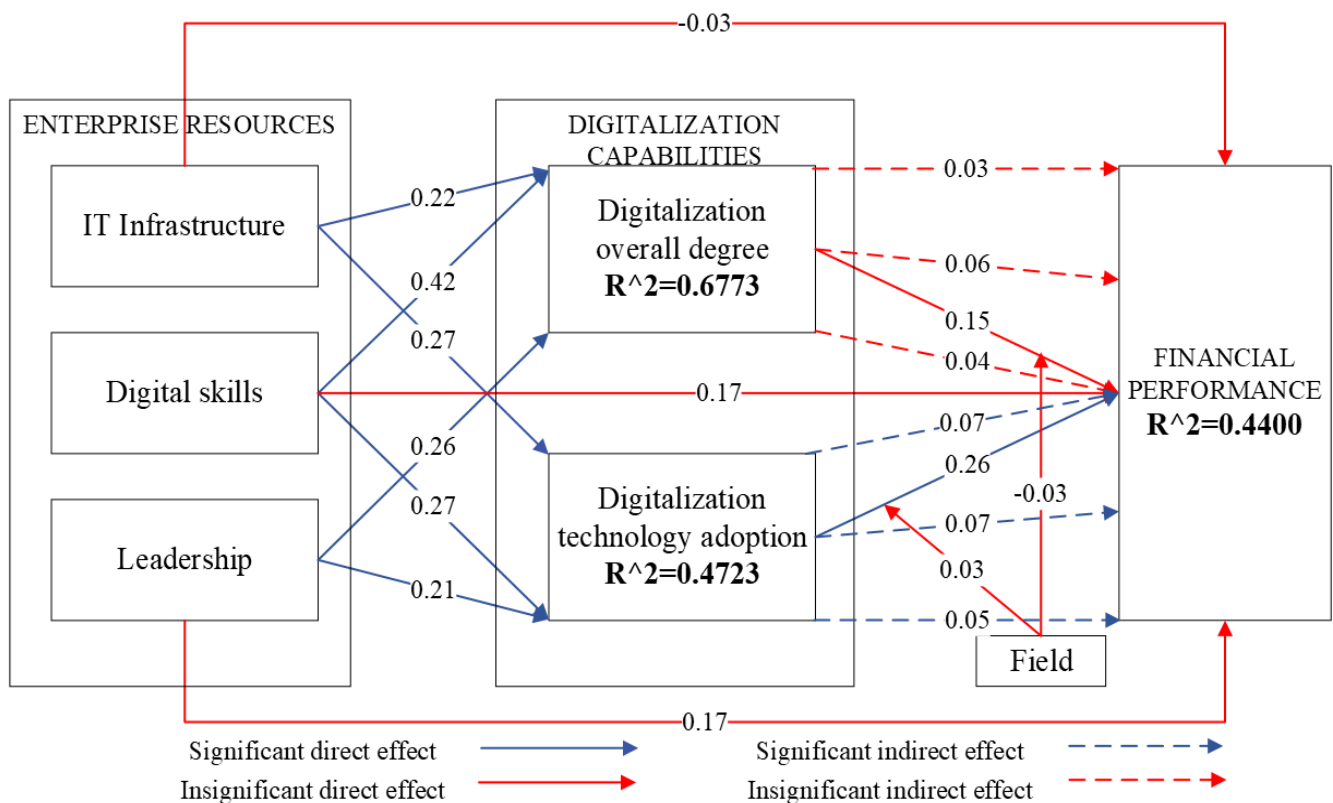


Figure 2: Research model results

Source: own research

3.1.3. The explanatory power and goodness of fit of the research model

The model's explanatory power was assessed using R-squared (R^2) values, as no universally accepted fit measures exist for PLS-SEM (Hair et al., 2021). Following Hair et al. (2019), the R^2 values showed that IT infrastructure, digital skills, and leadership explained 67.73% of the variance in digitalization and 44% in financial performance, indicating moderate explanatory power.

As SEMinR lacks goodness-of-fit (GoF) measures, the study used the GoF criterion proposed by Tenenhaus et al. (2005) for a more comprehensive model evaluation.

$$\text{GoF} = \sqrt{(\text{average AVE} * \text{average } R^2)} = \sqrt{(0.8649 * 0.5299)} = 0.6770$$

The GoF measure of 0.6770 exceeds the 0.36 threshold recommended by Tenenhaus et al. (2005), indicating a strong model fit. This confirms that the PLS-SEM model effectively explains 67.7% of the data's variance, supporting its validity in capturing complex relationships.

3.2. The result of semi-structured interview

The expert interviews revealed:

- Motivations for digitalization: Goals include improving efficiency, customer experiences, competitive advantage, and innovation, evolving with technology and market changes.
- Success factors: Effective planning, collaboration, and monitoring are crucial. Challenges like resistance to change and data privacy are addressed through project management and training.
- Key technologies: AI, IoT, cloud computing, blockchain, and other tools enhance efficiency, decision-making, and customer engagement.
- Cultural impact: Digitalization fosters innovation and continuous learning, supported by leadership and training.
- Assessment and outcomes: Success is measured by operational efficiency, customer satisfaction, revenue, cost savings, and profitability.
- Lessons and future strategies: Emphasis on agility, stakeholder engagement, and investments in digital skills. Future focuses include AI, new markets, and blockchain.

- External influences: Regulatory changes and technological advancements impact strategies, with trends like smart cities and ESG shaping digital transformation.
- Recommendations: Prioritize cybersecurity, data analytics, innovation, and strategic alignment to maximize digitalization benefits.

Table 11 details specific aspects of the experts' responses on digitalization strategy, technological infrastructure, and performance measurement & metrics.

Table 11: Result of semi-structured interview

Company	Digitalization strategy	Technological infrastructure	Performance measurement & metric
Company A	Focuses on AI-driven cybersecurity, agile development, and cloud computing. Implements culture strategies and leadership management.	Uses AI, IoT, cloud computing, and blockchain for enhanced cybersecurity and software development.	Effectiveness of cybersecurity solutions, customer satisfaction, and operational efficiency.
Company B	Emphasizes data analytics, social media integration, and programmatic advertising. Provides digital skills training program for employees.	Employs data management platforms, content management systems, and advertising technology platforms.	Audience engagement, advertising performance, and financial performance.
Company C	Prioritizes advanced CRM systems, cloud technologies, and data analytics. Focuses on enhancing the digital skills.	Utilizes cloud computing for smart building management, and data analytics.	Operational efficiency, customer satisfaction, and market share growth.
Company D	Leverages ERP systems, electronic invoicing, and financial analytics. Prioritizes in talents and leadership programs.	Implements ERP systems, electronic document management, and financial analytics.	Efficiency gains, error rate reduction, and financial reporting timeliness.

Source: own research

3.3. Main findings of the dissertation

3.3.1. Impact of enterprise resources on digitalization capabilities

1. IT Infrastructure

Empirical research highlights the importance of IT infrastructure (INF) in enhancing both the overall digitalization degree (DIGO) and digital technology adoption (DIGT). This is supported by studies such as Brieger et al. (2022) and Jia et al. (2024), who demonstrate that robust digital infrastructure is foundational for internationalization and enterprise digital transformation, respectively. The study's path coefficient of 0.2731 for DIGT underscores IT infrastructure's role in enabling digital advancements.

Research by Schwertner (2017) and others also confirms that strong IT infrastructure significantly enhances digital readiness, which is critical for successful digital transformation, especially in SMEs. Findings from interviews further reveal that technologies like AI, IoT, cloud computing, and data management platforms rely heavily on robust IT infrastructure for enhancing performance metrics such as efficiency, customer satisfaction, and financial performance. Additionally, Manny et al. (2021) identify barriers to digital transformation, such as regulatory challenges, that can be mitigated by solid IT infrastructure.

2. Digital skills

The study demonstrates that digital skills (SKI) significantly influence both DIGO and DIGT, aligning with Ciarli et al. (2021) and Abou-Foul et al. (2021), who stress that digital skills are essential for effective technology adoption and integration. Path coefficients (0.4158 for DIGO and 0.2668 for DIGT) confirm their substantial impact.

Qualitative insights reveal diverse strategies by organizations to enhance digital skills, such as training programs for data analytics, social media integration, and advanced CRM systems. These findings align with research by Eller et al. (2020) and others, emphasizing that digital skills across all organizational levels are crucial for maximizing digitalization benefits.

3. Leadership

Leadership (LED) plays a crucial role in driving digital transformation, significantly influencing both DIGO (0.2574) and DIGT (0.2075). The study confirms that effective leadership fosters a culture of innovation and strategic alignment, essential for technology adoption and digital growth, aligning with Larjovuori et al. (2016) and Ruel et al. (2021). Strong leadership enhances organizational agility and is vital for navigating digital transformation, especially in SMEs.

3.3.2. The mediation role of digitalization

1. IT Infrastructure and financial performance

IT infrastructure (INF) shows no direct impact on financial performance (FINP) but has a significant indirect effect through digital technology adoption (DIGT). Eller et al. (2020)

argue that IT infrastructure's value is realized through its role in supporting other capabilities, such as innovation and agility. The study confirms that DIGT mediates the relationship between INF and FINP by enhancing process efficiencies and agility.

2. Digital skills and financial performance

Digital skills (SKI) do not directly impact financial performance but have a significant mediating effect through DIGT. Abou-Foul et al. (2021) emphasize that digital skills enhance the effective use of digital technologies, which in turn drives financial performance. The study's findings align with this perspective, showing that skills indirectly contribute to financial gains through their role in technology adoption.

3. Leadership and financial performance

Leadership (LED) has no direct significant impact on FINP but exhibits a strong mediating effect through DIGT. Ruel et al. (2021) suggest that leadership influences financial performance primarily by driving digital technology adoption, aligning with our findings. The study confirms that specific technological implementations, rather than broad digitalization efforts (DIGO), have more immediate financial impacts.

3.3.3. The impact of digitalization on financial performance

1. Digitalization overall degree (DIGO)

The study finds that the overall degree of digitalization (DIGO) does not have a significant direct impact on financial performance (FINP). This is consistent with prior research, which suggests that digitalization alone does not guarantee financial benefits; its success depends on specific practices, technologies, and strategic alignment.

Challenges such as resource constraints and integration issues often limit direct financial gains from digitalization (Eller et al., 2020). Insights from interviews highlight that effective digital strategies aligned with broader business objectives and measured through KPIs like operational efficiency and profitability are more likely to yield positive financial outcomes.

2. Digitalization technology adoption (DIGT)

Digitalization technology adoption (DIGT) has a significant positive impact on financial performance. Technologies like AI, IoT, cloud computing, and big data analytics enhance efficiency, innovation, and market positioning, leading to better financial results.

However, these benefits are dependent on strategic integration and effective implementation (Eller et al., 2020). Successful digital adoption is linked to specific business goals, which helps improve revenue, cost savings, and profitability (Abou-Foul et al., 2021; Fernández-Portillo et al., 2022).

3. Impact of sector on digitalization and financial performance

The sector (Field variable) does not significantly affect the relationship between digitalization (DIGO and DIGT) and financial performance. Differences in regulatory environments, market structures, and customer behaviors may influence outcomes, but digitalization's direct financial effects appear minimal across sectors (Holmlund et al., 2017).

The findings suggest that while digitalization initiatives can be valuable, their financial impact depends on sector-specific factors and strategic alignment (Kohtamäki et al., 2020; Autio et al., 2021).

4. CONCLUSIONS AND NOVEL RESULTS OF THE DISSERTATION

4.1. Main conclusions

1. Enterprise resources and digitalization capabilities

IT infrastructure, digital skills, and leadership are crucial for enhancing digitalization capabilities. IT infrastructure provides the technological foundation, digital skills ensure effective use, and leadership drives strategic support for digital initiatives. Expert interviews confirm these resources' pivotal roles in supporting digital transformation.

2. Indirect impact on financial performance

These resources do not directly affect financial performance. Instead, their impact is mediated through digital technology adoption (DIGT). Effective use of digital technologies, rather than just possessing resources, is essential for financial success.

3. Differentiated impacts on financial performance

The overall degree of digitalization does not directly impact financial outcomes. Financial benefits are more closely tied to specific technology adoption, such as AI and IoT, which improve efficiency and competitiveness. Targeted digital technology adoption leads to better financial performance.

4. Sector insensitivity

The sector does not significantly influence the relationship between digitalization and financial performance. This suggests that digitalization benefits are broadly applicable across industries and are influenced more by strategic application than by sector-specific factors.

4.2. Novel findings for Vietnam enterprises

1. Mediation effect of digitalization technology adoption

Digitalization technology adoption significantly enhances financial performance in Vietnamese enterprises. IT infrastructure, digital skills, and leadership drive financial outcomes when integrated into targeted digital tools. Strategic investments in operationally relevant digital technologies are crucial for navigating challenges like uneven infrastructure and digital literacy gaps.

2. Limited impact of overall digitalization degree

A broad increase in digitalization does not guarantee improved financial performance. Vietnamese enterprises should focus digitalization efforts on high-impact areas like logistics, customer engagement, and production efficiency. Targeted digital strategies align better with Vietnam's challenges, such as regional infrastructure disparities and emerging Industry 4.0 adoption

3. Sector insensitivity of digitalization benefits

The impact of digitalization on financial performance is consistent across industries. Digital transformation benefits enterprises in diverse sectors, including manufacturing, retail, and fintech. This universality supports broad-based strategies and encourages cross-sector best practices.

5. PRACTICAL APPLICABILITY OF THE RESULTS

5.1. For enterprises

1. Strategic investment in Digital technologies

Focus on targeted investments in digital technologies that align with operational and financial goals. Prioritize tools like advanced data analytics and automation that can enhance core business processes and drive financial performance.

2. Comprehensive Digital skills training

Implement ongoing training programs to develop a wide range of digital competencies. Foster a culture of continuous learning to improve workforce adaptability and proficiency with digital tools.

3. Fostering Digital leadership

Encourage leaders to support and drive digital innovation. Ensure leaders are knowledgeable about digital trends and integrate digital strategies with organizational goals. Empower both top executives and middle management to champion digital initiatives.

5.2. For Government

1. Support for Digital infrastructure development

Invest in robust digital infrastructure, particularly in underdeveloped areas. Enhance high-speed internet and connectivity to enable widespread adoption of digital technologies.

2. Incentives for Digital skills training

Provide tax breaks, grants, or subsidies to businesses investing in digital skills training for their employees. Support workforce development to build a more digitally proficient and competitive workforce.

3. Promotion of Digital leadership programs

Develop and promote programs that enhance digital leadership skills across industries. Offer training workshops and certification courses to prepare leaders for managing digital transformation and driving innovation.

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List of publications related to the dissertation

Articles, studies (4)

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