

Digital Transformation Capacity of Small and Medium Enterprises: The Case of Hai Phong Province, Vietnam



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ABSTRACT: The objective of this article focuses on studying the internal factors affecting the digital transformation capabilities of small and medium-sized enterprises in Hai Phong Province to explain the reasons for the limitations in seizing opportunities and implementing digital transformation. These factors include: (1) Leadership; (2) Digital-oriented business strategy; (3) Employee capabilities; (4) Corporate culture; (5) Technological infrastructure. From there, solutions to enhance the digital transformation capabilities of small and medium-sized enterprises in Hai Phong Province can be proposed based on solid grounds.

The article utilizes a linear regression model analysis method to assess the impact of these factors on the digital transformation capabilities of businesses based on survey data from 427 samples, including experts and managers of small and medium-sized enterprises in Hai Phong Province. The research results indicate the factors that influence the digital transformation capabilities of businesses at various levels. Consequently, businesses will have appropriate solutions to enhance their digital transformation capabilities.

KEYWORD: Digital transformation capabilities, Internal factors, Small and medium-sized enterprises, Haiphong Province

1. INTRODUCTION

Although it emerged globally in the mid-20th century, it was only with the Fourth Industrial Revolution that Digital Transformation became widespread (Vu Trong Nghia 2021). Until now, digital transformation has become an essential trend and a matter of survival for countries, organizations, businesses, and consumers worldwide, especially in the current context of the COVID-19 pandemic (VCCI 2020). The significant changes in labor productivity, demand, user psychology, habits, and new production and business models being formed demonstrate the role and impact of digital transformation on social life and all professions today.

Digital transformation brings many benefits to businesses. When applying digital transformation, the information linkage among departments within a business is connected on a unified technological platform, enabling the resolution of issues that arise in the business immediately and ensuring smooth operations without negative impacts such as delayed customer service or decreased sales volume (Hinings, Gegenhuber et al. 2018). Participating in the digital transformation process allows managers to proactively and easily access reports on the business's activities (Nguyen Dinh Quyet 2021). Therefore, digital transformation, as an innovative approach, enables businesses to optimize production and business in an environment where resources are becoming increasingly scarce, enhancing competitiveness in the global business environment.

Small and medium-sized enterprises (SMEs) account for nearly 97% of the total number of businesses in Vietnam, operating under various constraints. Although digital transformation brings many benefits to businesses in terms of cost savings, changing production and business methods, improving the quality of goods and services, and enhancing business management effectiveness, not all businesses can afford to invest. The majority of small and medium-sized enterprises face difficulties in digital transformation. Specifically, 60.1% of businesses face challenges regarding investment costs and the application of digital technology; 52.3% struggle with changing habits, business practices, and a lack of internal workforce to adopt digital technology; 45.4% lack digital infrastructure; 40.4% lack information about digital technology; 38.5% have difficulties integrating digital solutions; and over 32% lack commitment and understanding from business leaders and management (The Vietnam Ministry of Planning and Investment 2022).

In the city of Hai Phong, there are currently 37,000 active businesses, with approximately 97% being small and medium-sized enterprises ((Hai Phong Statistics Office 2023). Following the trend, the transition from traditional production and business management models to digital-based platforms is happening rapidly and urgently, but most small and medium-sized enterprises are struggling to keep up. Many businesses do not know where to start. To find measures that help small and medium-sized enterprises change their mindset, develop suitable, feasible, and applicable strategies for successful digital transformation, the first important

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step is to understand the internal factors that influence the digital transformation capabilities of businesses, identify issues, and determine ways to overcome them.

2. LITERATURE REVIEW

2.1. Digital Transformation and Digital Transformation Capability of Enterprises The concept of digital transformation has been discussed and studied for many years, but up to now, there is still no unified definition. At each stage and from different perspectives, authors present different definitions. From a business perspective, authors generally agree that digital transformation involves the application of new technologies to optimize resources, operational processes, and better meet customer needs. According to (Stolterman and Fors 2004), digital transformation is defined as using technology to significantly improve business performance or access range. (McDonald Mark and Rowsell-Jones 2012) suggest that digital transformation is not just about digitizing resources but creating business value based on digital assets. In line with this viewpoint, (Fitzgerald, Kruschwitz et al. 2013) defines digital transformation in businesses as the use of new digital technologies, such as social media, smart mobile devices, new analytic techniques, or automated linking systems, to bring about significant changes in business operations, such as enhancing customer experience, optimizing activities, and creating new business models. (Hess T, Matt C et al. 2016) believe that digital transformation encompasses changes that digital technology can bring about in a business model, leading to changes in products, organizational structure, or automation of business processes. Therefore, digital transformation in enterprises is not merely about digitizing statistical data, operational processes, or organizational information; rather, it is more important to apply technology to analyze the digitized data and then change the way value is created for the business.

The digital transformation capability of an enterprise is its ability to apply new digital technologies in its organization, operations, and management, while creating valuable assets from digital technology applications to optimize resources, better meet market needs, and generate added value for the business. According to (Hinchcliffe D. 2016), the process of digital transformation in enterprises involves three aspects.

Firstly, it is the transformation of operational processes. Building and utilizing electronic data exchange systems will greatly save time and increase efficiency for businesses.

Secondly, it is the transformation of operating models, meaning changing the way operations are carried out to create value for the business.

Lastly, it is the change in customer experience. This results from the interaction between customers and the business, which the customers experience and perceive.

2.2. The necessity to promote digital transformation in Small and Medium-Sized Enterprises in Hai Phong Province

There are several reasons why small and medium-sized enterprises (SMEs) in Hai Phong Province should pay attention to promoting digital transformation:

Firstly, digital transformation is an essential aspect of the economy. The context of international integration, along with the Fourth Industrial Revolution, has impacted all aspects of human life. The internet and innovations in information technology have driven the process of digital transformation in businesses and rapidly become a prevailing trend (Ranganathan C, Watson-Manheim MB et al. 2004); (Besson P and Rowe F 2012).

Secondly, digital transformation brings numerous benefits to businesses. Through digital transformation, business leaders can proactively monitor reports and evaluate the business's performance and employees' work efficiency anytime through an automated tracking and reporting system. This ensures that all information and data about work tasks are presented clearly, transparently, accurately, and promptly. Such data assists leaders significantly in decision-making and strategic management (Berman SJ 2012). All businesses aspire to optimize their workforce's productivity. Digital transformation in enterprises helps improve and enhance employees' productivity by reducing manual tasks that consume a lot of time. As a result, the workforce can focus more on specialization and increase work efficiency (Daniel EM and Wilson HN 2003). Digital transformation enables businesses to operate anytime, anywhere. Whereas before, employees might have found it difficult to work from home or handle tasks outside of regular working hours due to the lack of on-site documents and machinery. Now, with just a computer or a smartphone, employees can work from anywhere, anytime (Nguyen Đình Quyet 2021). Increasing labor productivity allows businesses to have more time to improve customer services. Enhancing productivity reduces the waiting time for customers to receive a product or service. Therefore, applying digital transformation to increase productivity also significantly improves the quality of services (Hinings, Gegenhuber et al. 2018). The results of reducing operating costs, automating processes, etc., lead to increased revenue for the business. Additionally, when the business's services become more flexible and convenient for customers, it attracts more customers to know about and use them (Berman SJ 2012).

Thirdly, the Vietnamese government and the Hai Phong Province authorities are providing significant support to help SMEs access digital transformation. Currently, there are numerous legal documents regulating support for digital transformation for SMEs, such as Circular 06/2022/TT-BKHDT guiding Decree 80/2021/ND-CP guiding the Law on Support for Small and Medium-Sized Enterprises, the Digital Transformation Support Program for SMEs by the Ministry of Information and Communications in 2022,

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Resolution 03 of the Permanent Committee of Hai Phong Province, the digital transformation action plan of Hai Phong Province's People's Committee, etc.

2.3. Identifying factors affecting the digital transformation capability of Small and Medium-Sized Enterprises in Hai Phong Province

(Sven Nadkarni and Reinhard Prügl 2020) after reviewing previous published studies, pointed out that intrinsic factors determine a significant portion of the digital transformation capability of enterprises, which can be divided into three groups: 33% focusing on technology, 34% on organizational issues, and 33% on both technology and organization. Among the studies focused on the organization, four factors are frequently mentioned and directly influence the expected outcomes of the digital transformation for businesses: (1) leadership, (2) digital business strategy, (3) employee capabilities, and (4) organizational culture. In studies concentrating on technology, the use of technology platforms for business activities such as systematic data storage, customer interaction, internal communication, and other operations also affects the digital transformation capability of enterprises.

Table 1: Summary table of internal factors affecting the digital transformation capability of Small and Medium-Sized Enterprises

N	Internal factors	The authors mentioned
1	Digital business strategy	(Ireland RD, Covin JG et al. 2009), (Peltola S 2012), (Liu DY, Chen SW et al. 2011), (Dremel C, Wulf J et al. 2017).
2	Leadership	(Bennis W 2013), (Cha KJ, Hwang T et al. 2015), (Chatterjee D, Grewal R et al. 2002), (El Sawy OA, Kræmmergaard P et al. 2016), (Gerth AB and Peppard J 2016), (Granados N and Gupta A 2013), (Hu H, Huang T et al. 2016), (Kohli R and Melville NP 2019), (Llopis J, Gonzalez MR et al. 2004), (Loebbecke C and Picot A 2015), (Mazzei MJ and Noble D 2017), (Rigby DK, Sutherland J et al. 2016), (Rindova VP and Kotha S 2001), (Sia SK, Soh C et al. 2016), (Singh A and Hess T 2017), (Yeow A, Soh C et al. 2018).
3	Organizational culture	(Dremel C, Wulf J et al. 2017), (El Sawy OA, Kræmmergaard P et al. 2016), (Llopis J, Gonzalez MR et al. 2004), (Schuchmann D and Seufert S 2015), (Vey K, Fandel-Meyer T et al. 2017), (Sia SK, Soh C et al. 2016), (Kohli R and Johnson S 2011), (Kohli R and Melville NP 2019)
4	Organization system	(Berman SJ 2012), (Daniel EM and Wilson HN 2003), (El Sawy OA, Kræmmergaard P et al. 2016), (Granados N and Gupta A 2013), (Karimi J and Walter Z 2015), (Kohli R and Melville NP 2019), (Rindova VP and Kotha S 2001), (Sandström CG 2016), (Sebastian IM, Ross JW et al. 2017), (Setia P, Venkatesh V et al. 2013), (Singh A and Hess T 2017), (Svahn F, Mathiassen L et al. 2017), (Weill P and Woerner SL 2015).
5	Technology platform	(Cha KJ, Hwang T et al. 2015), (Hansen R and Sia SK 2015), (Kohli R and Johnson S 2011), (Schuchmann D and Seufert S 2015), (Seufert S and Meier C 2016), (Vey K, Fandel-Meyer T et al. 2017), (White M 2012)

Source: Author's compilation

After synthesizing the studies, 5 intrinsic factors that impact the digital transformation capability of businesses were identified with repetition: (1) Digital business strategy; (2) Leadership; (3) Organizational culture; (4) Organization system; (5) Technology platform. However, in the current international context, with increasing competition in the market, the demand for experiencing digital goods and services, business operations under global issues such as wars, diseases, climate change, government regulations, customer information management, and other pressures, businesses need to innovate through digital transformation. Therefore, research experts and business managers consulted all suggest the need to add the factor "business pressure" as an independent variable influencing the digital transformation capability of businesses, especially for SMEs.

Thus, the research proposes 6 factors that influence the digital transformation capability of businesses, described as follows:

2.3.1. Enterprises Pressure

Faced with the pressure of competition to meet customer needs, prolonged disease situations, new government regulations, businesses are increasingly recognizing the challenges they are facing, requiring them to improve and optimize management, processes, and resource utilization.

2.3.2. Digital Business Strategy

(Bharadwaj A, El Sawy O et al. 2013) argue that information technology plays an increasingly important role in business activities. It is not only a means of support but has become an essential element in building business strategies. Developing and implementing business strategies to achieve long-term goals on a digital technology platform is called a digital business strategy. This requires

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changes in information management (Mazzei MJ and Noble D 2017), new communication principles (Bennis W 2013) or new production methods (Granados N and Gupta A 2013), which directly form the digital transformation capability of the business.

2.3.3. Leadership

Changes in thinking and actions of leadership significantly affect the digital transformation capability of the business. First and foremost, leadership establishes the innovation viewpoint and implements digital transformation in the business, laying the foundation for forming the digital transformation capability of the business (El Sawy OA, Kræmmergaard P et al. 2016). Moreover, leadership needs to have a new digital mindset to lead the business's digital transformation journey (Sia SK, Soh C et al. 2016). Previously, leadership training programs mainly focused on leadership and communication skills. But in the digital transformation era, executives must become technology-savvy and develop their adaptability. Transparency in management and communication through the media, along with the dissemination of information and data online, are significant challenges in the digitalization process for managers that require continuous learning and more direct interaction (Bennis W 2013).

2.3.4. Organizational Culture

Digital transformation is not only a challenge driven by technology but also requires a profound cultural change within the business. Everyone in the business must be prepared with adaptive skills and digital knowledge. First, digital transformation requires an organizational culture that always verifies and shares verified data (Dremel C, Wulf J et al. 2017). Data must be viewed as valuable assets and a driving factor for the business's digital transformation. This will require greater transparency in work processes and daily business, as well as data thinking among employees. Second, digital transformation can cause a cultural conflict between tech-savvy young employees and experienced older employees in traditional business but lagging in technology (Kohli R and Johnson S 2011). Management should prevent conflicts between the two different cultural groups within the organization through creating a friendly learning culture and open support and trust from the executive level, which can effectively minimize potential cultural division (Kohli R and Melville NP 2019).

2.3.5. Organization System

To promote the digital transformation process, there are additional elements and adjustments required for both organization and management. For employees and management levels, there needs to be a process for faster, more accurate, and more effective operations in the digital transformation. Therefore, employees need to have the capacity, readiness, development, and use of new technologies for improvement and execution of work (Bharadwaj A, El Sawy O et al. 2013). Furthermore, depending on the business conditions, such as industry and organizational operating models, employees, as well as management, must develop the ability to perceive and adapt to fully utilize the network system and connectivity in the digital environment (Kohli R and Melville NP 2019) to identify new ideas, evaluate, modify, and ultimately introduce new business models (Berman SJ 2012); (Daniel EM and Wilson HN 2003).

2.3.6. Technology Platform

Digital transformation will change job structures (Hansen R and Sia SK 2015); (Loebbecke C and Picot A 2015) work roles, and requirements in the workplace (White M 2012). Digital connectivity enables the appearance of cross-functional positions throughout the entire business scope. In this context, the traditional hierarchical work structure gradually disappears, and new opportunities arise beyond the boundaries of the business, such as integrating external services (Loebbecke C and Picot A 2015). In addition, deploying a digital technology platform becomes essential. According to (White M 2012), a digital workplace must be adaptable, principled, imaginative, and not dependent on work positions. Thus, how businesses apply technology platforms in current operations will significantly affect the success of their future digital transformation.

3. METHODOLOGY

3.1 Research model and hypothesis

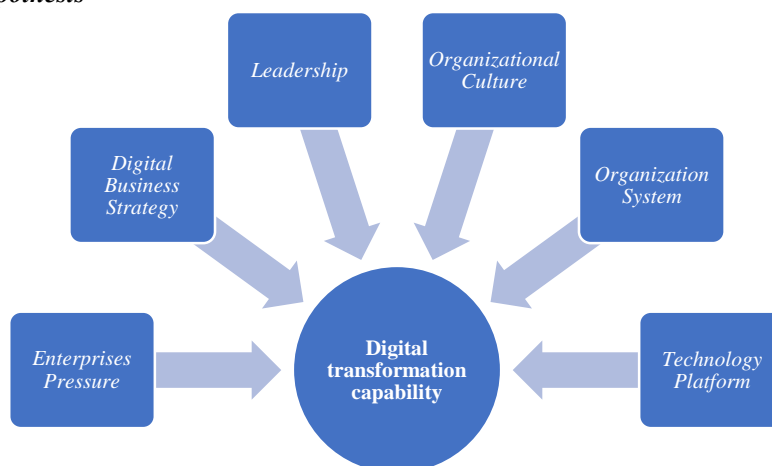


Figure 1: Proposed research model on internal factors affecting the digital transformation capacity of Small and medium enterprises

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The research hypotheses are formulated as follows:

(H1): The motivation for innovation from environmental business pressures will enhance the digital transformation capacity of enterprises.

(H2): Businesses that develop a digital-oriented business strategy will enhance their digital transformation capacity.

(H3): Technologically visionary leadership that guides the digital transformation process will enhance the digital transformation capacity of enterprises.

(H4): A unified and technology-adaptive corporate culture will enhance the digital transformation capacity of enterprises.

(H5): An organization that adapts to digital technology will enhance the digital transformation capacity of enterprises.

(H6): Enterprises that establish a modern digital technology platform will enhance their digital transformation capacity.

3.2. Research Design

3.2.1. Observed Variables

From describing the independent variables and inheriting observed variables from each independent variable, which were synthesized from published studies, and combined with discussions with experts to construct a measurement scale of observed variables in the research model to reflect and confirm the proposed hypotheses, as detailed in Table 2 below:

Table 2. Observed variables

N	Variables
1	Independent variables
1.1	Enterprise pressure (Measured by 5 observed variables) 1.1 (TC1) Enterprises need to use digital technology to better interact with customers 1.2 (TC2) Enterprises need to optimize business processes and management 1.3 (TC3) Enterprises need to utilize resources more effectively 1.4 (TC4) Enterprises need to enhance transparency and efficiency in management 1.5 (TC5) Enterprises need to innovate in creating products/services for customers
1.2	Digital Business Strategy (Measured by 6 observed variables) 2.1 (TN1) Digital transformation goals mentioned in the business strategy of enterprises 2.2 (TN2) Enterprise determines the establishment of an electronic office in its business strategy 2.3 (TN3) Enterprises have deployed the database system (database) 2.4 (TN4) The business strategy of the enterprise aims to change the operating model to create new value for customers. 2.5 (TN5) Enterprises aim to optimize customer experience on digital platforms 2.6 (TN6) Enterprises have identified specific digital solutions for production and business activities
1.3	Leadership (Measured by 5 observed variables) 3.1 (DT1) Leadership shows a strong interest in digital transformation issues 3.2 (DT2) Leadership has a positive attitude towards the digital transformation of the enterprise. 3.3 (DT3) Leadership supports proposals for digital technology applications in operational and management processes of the enterprise. 3.4 (DT4) Leadership continuously learns to develop the capabilities to meet digital transformation requirements. 3.5 (DT5) Leadership is willing to address concerns arising from the negative aspects of digital transformation.
1.4	Organizational Culture (Measured by 5 observed variables) 4.1 (LD1) Each individual in the enterprise is willing to share knowledge and experience with each other 4.2 (LD2) Each individual actively embraces modern technology in production and business. 4.3 (LD3) Information storage is a shared asset of the enterprise. 4.4 (LD4) Enterprise data is always verified before storage and sharing. 4.5 (LD5) Employees have a positive attitude towards new technology applications in their work
1.5	Organization System (Measured by 4 observed variables) 5.1 (DN1) Employees have good skills in using information technology applications 5.2 (DN2) The enterprise has training programs and equips employees with digital process digitization 5.3 (DN3) The enterprise reorganizes its system to suit the use of digital technologies. 5.4 (DN4) There is always cooperation in work on digital platforms among the labor force in the enterprise.
1.6	Technology Platform (Measured by 6 observed variables) 6.1 (MT1) The enterprise is investing in equipping digital infrastructure for all production and business activities. 6.2 (MT2) The enterprise uses a website to provide information and promote its image.

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N	Variables
	6.3 (MT3) The enterprise creates conditions for employees to use personal electronic devices to serve their work 6.4 (MT4) The enterprise is using an internal interactive digital technology system to directly monitor production and business activities. 6.5 (MT5) The enterprise uses cloud computing technology in internal management. 6.6 (MT6) The enterprise establishes a digital workspace in its working environment.
2	Dependent variable
2.1	HL1: Enterprises are doing a good job of digital transformation for business processes and management
2.2	HL2: Businesses can bring new values and experiences to customers on digital platforms
2.3	HL3: Enterprises can fully optimize the distribution and use of resources on the digital technology platform
2.4	HL4: Enterprises are fully equipped with digital technology infrastructure
2.5	HL5: Enterprises have built digital datasets and information assets
2.6	HL6: Enterprises capable of successful digital transformation

3.2.2. Measurement Scales

The measurement scales used in the survey questionnaire consist of: nominal scale, ordinal scale, interval scale, and a 5-point Likert scale: (1) Strongly Disagree; (2) Disagree; (3) Neutral; (4) Agree; (5) Strongly Agree.

3.2.3. Survey

Survey Subjects: Experts in the field of digital transformation of enterprises, and managers of small and medium enterprises in Hai Phong Province.

Sample Size: The study uses a formula to determine the sample size when the total population is large and the exact number is not known, as follows:

$$n = \frac{z^2(p.q)}{e^2}$$

where: n is the sample size; z is the value of distribution corresponding to the selected confidence level (at 95% confidence level, z is 1.96); p is the estimated percentage of the population, q = 1-p (usually p and q are estimated to be 50%/50% as the most likely occurrence in the population); e is the allowable margin of error (5%).

Using the formula above, the survey sample size is calculated to be n=385. To ensure the data's confidence, the author chose to collect 450 samples. However, only 427 usable samples were collected after cleaning.

Sampling Method: Due to limitations in time and budget for this study, the author used a convenient non-probability sampling method. Although this sampling method has limitations in generalizing the research findings and may encounter sampling errors, it is suitable for low-cost research.

Data Analysis Technique: Using SPSS 20.0 software.

Data Analysis Method: After recovering survey questionnaires, inputting and cleaning the data, the author analyzed the reliability of the scales through Cronbach's alpha analysis, assessed the convergent and discriminant validity of the scales through EFA analysis, and finally conducted correlation and multiple regression analysis. From there, a linear regression equation was derived for the factors affecting the digital transformation capacity of small and medium enterprises in Hai Phong Province.

The research results will be discussed and used as a basis to propose solutions to enhance the digital transformation capacity of small and medium enterprises in Hai Phong Province.

4. RESEARCH RESULTS

4.1. Evaluation of Measurement Scales

Firstly, Cronbach's Alpha coefficient was used to eliminate unsuitable variables. The scale is considered acceptable when the Cronbach's Alpha reliability coefficient is 0.5 or higher, and variables with low total correlation coefficients that cause the Cronbach's Alpha coefficient to fall short of the requirement will be eliminated.

The results of the reliability evaluation of the scales (Table 3) show that there are 7 scales with high Cronbach's Alpha coefficients, all with acceptable total correlation coefficients (>0.3). Therefore, the constructed scales are reliable.

Table 3. Reliability of the scales

Scale	Number of observed variables	Cronbach's Alpha	Comments
Pressure of Enterprises	5	.751	Good
Digital Business Strategy	6	.841	Good

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Leadership	5	.760	Good
Organizational Culture	5	.760	Good
Organization System	4	.869	Good
Technology Platform	6	.794	Good
Digital transformation capability	6	.816	Good

Source: Analysis of the author's survey data

4.2. Descriptive statistics of internal factors affecting the digital transformation capacity of small and medium enterprises in Hai Phong Province

The results of the survey and data statistics are as follows:

Table 4. Survey results of internal factors affecting the digital transformation capacity of small and medium enterprises in Hai Phong Province

N	Code	Observed variables	N	Min	Max	Mean
1	TC	Enterprises Pressure				3.483
1.1	TC1	Enterprises need to use digital technology to better interact with customers.	427	1	5	3.538
1.2	TC2	Enterprises need to optimize business processes and management.	427	1	5	3.471
1.3	TC3	Enterprises need to utilize resources more effectively.	427	1	5	3.484
1.4	TC4	Enterprises need to enhance transparency and efficiency in management.	427	1	5	3.362
1.5	TC5	Enterprises need to innovate in creating products/services for customers.	427	1	5	3.558
2	TN	Digital Business Strategy				2.676
2.1	TN1	Digital transformation goals are mentioned in the business strategy of the enterprise.	427	1	5	2.587
2.2	TN2	The enterprise determines the establishment of an electronic office in its business strategy.	427	1	5	2.724
2.3	TN3	The enterprise has deployed the use of a database system.	427	1	5	2.782
2.4	TN4	The business strategy of the enterprise aims to change the operating model to create new value for customers.	427	1	5	2.728
2.5	TN5	The enterprise aims to optimize customer experiences on digital platforms.	427	1	5	2.740
2.6	TN6	The enterprise has identified specific digital solutions for production and business operations.	427	1	5	2.494
3	DT	Leadership				2.641
3.1	DT1	Leadership shows a strong interest in digital transformation issues.	427	1	5	2.548
3.2	DT2	Leadership has a positive attitude towards the digital transformation of the enterprise.	427	1	5	2.628
3.3	DT3	Leadership supports proposals for digital technology applications in operational and management processes of the enterprise.	427	1	5	2.679
3.4	DT4	Leadership continuously learns to develop the capabilities to meet digital transformation requirements.	427	1	5	2.827
3.5	DT5	Leadership is willing to address concerns arising from the negative aspects of digital transformation.	427	1	5	2.522
4	LD	Organizational Culture				3.546
4.1	LD1	Each individual in the enterprise is willing to share knowledge and experiences with each other.	427	1	5	3.619
4.2	LD2	Each individual actively embraces modern technology in production and business.	427	1	5	3.436
4.3	LD3	Information storage is a shared asset of the enterprise.	427	1	5	3.936

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4.4	LD4	Enterprise data is always verified before storage and sharing.	427	1	5	3.311
4.5	LD5	Employees have a positive attitude towards new technology applications in their work.	427	1	5	3.429
5	DN	Organizational System				3.109
5.1	DN1	Employees have good skills in using information technology applications.	427	1	5	3.558
5.2	DN2	The enterprise has training programs and equips employees with digital process digitization.	427	1	5	2.724
5.3	DN3	The enterprise reorganizes its system to suit the use of digital technologies.	427	1	5	2.551
5.4	DN4	There is always cooperation in work on digital platforms among the labor force in the enterprise.	427	1	5	3.603
6	MT	Technology Platform				2.796
6.1	MT1	The enterprise is investing in equipping digital infrastructure for all production and business activities.	427	1	5	2.891
6.2	MT2	The enterprise uses a website to provide information and promote its image.	427	1	5	2.760
6.3	MT3	The enterprise creates conditions for employees to use personal electronic devices to serve their work.	427	1	5	2.715
6.4	MT4	The enterprise is using an internal interactive digital technology system to directly monitor production and business activities.	427	1	5	2.933
6.5	MT5	The enterprise uses cloud computing technology in internal management.	427	1	5	2.500
6.6	MT6	The enterprise establishes a digital workspace in its working environment.	427	1	5	2.978

Source: Analysis of the author's survey data

Through the analysis of survey data, there are several factors that have been assessed quite high with mean >3 , such as "Enterprise Pressure" (mean is 3.483); "Organizational culture" (Mean is 3.546); and "Organizational system" (Mean is 3.109). On the other hand, the remaining factors were evaluated at a lower average level below 3. This indicates that although the current context is creating pressures that require businesses to seek digital transformation solutions to enhance operational efficiency, most employees in these enterprises are aware of the necessity and adapt to accessing digital technology. However, the digital transformation capacity of small and medium-sized enterprises in Hai Phong Province is still considered low.

The enterprises face the most difficulties in investing in technology infrastructure due to limitations in financial resources, hesitancy from leadership, or the lack of a new digital business strategy. These are issues that most small and medium-sized enterprises in Hai Phong Province have encountered recently.

4.3. Exploratory Factor Analysis (EFA)

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the independent variables in the obtained model is $0.778 > 0.5$, with $\text{sig} = 0.00 < 0.05$, which satisfies the condition for EFA analysis.

Table 5. KMO for the independent variables in the model.

Hệ số KMO và kiểm định Bartlett's

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.778
Bartlett's Test of Sphericity	Approx. Chi-Square	1.031E3
	df	312
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the independent variables in the obtained model is 0.778, which is greater than 0.5, and the significance level (sig) is 0.00, which is less than 0.05, meeting the conditions for conducting EFA.

After conducting the Cronbach's Alpha test, the model accepts 31 observed variables and performs factor analysis on these 31 variables.

Table 6. Extracted variance of independent variables in the model

Total Variance Explained									
Component	Initial Eigenvalues			Initial Eigenvalues			Initial Eigenvalues		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,661	8,065	43,026	2,661	8,065	43,026	3,022	9,157	27,888
2	2,341	7,093	50,119	2,341	7,093	50,119	2,975	9,014	36,903
3	1,960	5,941	56,060	1,960	5,941	56,060	2,771	8,396	45,299
4	1,801	5,459	61,519	1,801	5,459	61,519	2,761	8,367	53,666
5	1,439	4,362	65,880	1,439	4,362	65,880	2,710	8,213	61,879
6	1,287	3,899	69,779	1,287	3,899	69,779	2,607	7,900	69,779
7	,831	2,517	72,296						
8	,801	2,427	74,723						
9	,698	2,114	76,837						
10	,656	1,987	78,824						
11	,550	1,666	80,490						
12	,535	1,620	82,110						
13	,507	1,537	83,647						
14	,471	1,427	85,074						
15	,436	1,320	86,395						
16	,404	1,225	87,620						
17	,400	1,211	88,830						
18	,374	1,132	89,963						
19	,359	1,088	91,051						
20	,332	1,006	92,057						
21	,321	,973	93,030						
22	,294	,890	93,920						
23	,283	,857	94,777						
24	,274	,832	95,609						
25	,260	,787	96,396						
26	,243	,737	97,133						
27	,237	,718	97,851						
28	,203	,616	98,467						
29	,198	,599	99,066						
30	,183	,553	99,619						
31	,126	,381	100,000						

Extraction Method: Principal Component Analysis.

Table 6 shows that when the scale items were analyzed, 6 factors were extracted corresponding to 6 independent variables. The total variance extracted is 69.779%, which is greater than 50%, indicating that the 6 extracted factors explain 69.779% of the data variation.

The factor interpretation was based on recognizing observed variables with high factor loadings within the same factor. The results of the EFA are presented in the factor matrix after rotation in Table 28. The factor loadings for each factor are all > 0.5, indicating that all the variables are retained and not removed. Therefore, the model has successfully extracted 6 independent factors.

Table 7. EFA results of the independent variable in the model

	Correlations					
	1	2	3	4	5	6
TC2	.845					
TC4	.838					
TC3	.809					
TC1	.761					
TC5	.753					
DN1		.871				
DN3		.819				
DN2		.804				
DN4		.791				
DT4			.820			
DT2			.813			
DT1			.813			
DT5			.774			
DT3			.755			
LD2				.807		
LD1				.806		
LD4				.763		
LD3				.731		
LD5				.728		
MT4					.827	
MT3					.805	
MT2					.778	
MT1					.749	
MT5					.730	
MT6					.717	
TN3						.801
TN4						.791
TN2						.773
TN1						.767
TN6						.743
TN5						

4.4. EFA factor analysis for dependent variables

In the factor analysis of the dependent variables, it can be observed that the KMO coefficient is 0.646 > 0.5 with a significance level of 0.00 < 0.05, indicating that the factor analysis is appropriate. (Table 8)

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.646
Bartlett's Test of Sphericity	Approx. Chi-Square	170.988
	df	6
	Sig.	.000

Table 9. Extracted variance of dependent variable in the model

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.132	71.072	71.072	2.132	71.072	71.072
2	1.536	67.291	79.351			
3	.903	53.447	88.239			
4	.617	20.573	91.645			
5	.459	15.663	95.567			
6	.251	8.355	100.000			

Extraction Method: Principal Component Analysis.

The total variance extracted is 71.072% > 50%, indicating that it can represent a significant portion of the variability. Principal Component Analysis with Varimax rotation was performed, and one factor was extracted, which can account for the variance in the data. The factor loadings in the factor matrix all have values > 0.5, indicating that this dependent factor is related to the model and meets all the EFA conditions.

Table 10. EFA results of the dependent variable in the model

Component Matrix^a

	Component
	1
HL3	.899
HL1	.886
HL5	.871
HL4	.844
HL6	.762
HL2	.735

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Thus, after factor analysis, all factors have ensured the explanation of the variation in the model's data. The model remains fully intact.

4.5. Model validation

Following the factor analysis, six independent variables (with 31 observed variables) and one dependent variable (with six observed variables) were included in the model validation. The factor score is the average of the observed variables belonging to that factor. Pearson correlation analysis was used to examine the appropriateness of incorporating the components into the regression model. The results of the regression analysis will be used to test the hypotheses.

The correlation coefficients are used to examine the linear relationship between the independent and dependent variables. The correlation coefficient (r) indicates the strength of the linear relationship, with a value closer to 1 indicating a stronger correlation, and r = 0 indicating no linear relationship between the variables.

The two-tailed test is performed for the correlation analysis. The correlation coefficient between a variable and itself is 1, and the correlation coefficients between different variables are all > 0. According to the correlation matrix, the correlation coefficients between the independent variables and the dependent variable are all significant at the 0.01 level. The corresponding coefficients are as follows:

- The variable "Digital business strategy" has a correlation coefficient of 0.639 with the dependent variable. This indicates a moderate level of correlation.
- The variable "Organizational system " has a correlation coefficient of 0.483 with the dependent variable.
- The variable "Leadership" has a correlation coefficient of 0.607 with the dependent variable.
- The variable " Organizational culture" has a correlation coefficient of 0.429 with the dependent variable.
- The variable "Technological Plaform has a correlation coefficient of 0.519 with the dependent variable.
- The variable "Enterprise Pressure" has a correlation coefficient of 0.465 with the dependent variable.

Table 11. Correlation matrix between variables in the model.

Correlations

		HL	TN	DN	DT	LD	MT	TC
HL	Pearson Correlation	1	.639**	.483**	.607**	.429**	.519**	.465**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	312	312	312	312	312	312	312
TC	Pearson Correlation	.639**	1	.366**	.321**	.179*	.400**	.391**
	Sig. (2-tailed)	.000		.000	.000	.025	.000	.000
	N	312	312	312	312	312	312	312
DN	Pearson Correlation	.483**	.366**	1	.383**	.186*	.251**	.277**
	Sig. (2-tailed)	.000	.000		.000	.020	.002	.000
	N	312	312	312	312	312	312	312
DT	Pearson Correlation	.607**	.321**	.383**	1	.373**	.378**	.475**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	312	312	312	312	312	312	312
LD	Pearson Correlation	.429**	.179*	.186*	.373**	1	.074	.399**
	Sig. (2-tailed)	.000	.025	.020	.000		.358	.000
	N	312	312	312	312	312	312	312
MT	Pearson Correlation	.519**	.400**	.251**	.378**	.074	1	.413**
	Sig. (2-tailed)	.000	.000	.002	.000	.358		.000
	N	312	312	312	312	312	312	312
TN	Pearson Correlation	.465**	.391**	.277**	.475**	.399**	.413**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	312	312	312	312	312	312	312

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

So, the lowest correlation coefficient is between the variable "Enterprise culture" and the dependent variable "Digital transformation capacity of the enterprise". This indicates that the impact of this variable on the dependent variable is not as high as the other independent variables. However, this variable still shows a moderate level of correlation.

The highest correlation coefficient is between the variable "Digital business strategy" and the dependent variable, showing that this factor is always essential in assessing the digital transformation capacity of the enterprise. It is the most complex factor but also the most influential one that can cause the most significant variation in the dependent variable.

Furthermore, the correlation matrix table also indicates that the independent variables have certain correlations with each other. This means that implementing one independent variable can influence other independent variables, thus also affecting the digital transformation capacity of the enterprise.

Table 11 shows that the hypotheses are not rejected and can be included in the model to explain the dependent variable.

4.6. Regression analysis

Regression analysis is performed with 6 independent variables: "Enterprise Pressure" (TC), "Digital business strategy" (TN), "Leadership" (DT), " Organizational culture" (LD), "Organizational system" (DN), and "Technological platform" (MT). The dependent variable is "Digital transformation capacity of the enterprise" (HL).

The values of the independent variables are computed as the mean based on the component observation of those independent variables. The value of the dependent variable is the average value of the component observations regarding "Digital transformation capacity of the enterprise". The analysis is conducted using the Enter method, and all variables are entered simultaneously to examine their appropriateness. The results of the regression analysis are as follows:

Table 12. Evaluation of the model fit.

Variables Entered/Removed^b

Model	Variables Entered	Variables Removed	Method
1	TC, TN, DT, LD, DN, MT ^a	.	Enter

a. All requested variables entered.

b. Dependent Variable: HL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.823 ^a	.678	.667	.54465

a. Predictors: (Constant), TC, TN, DT, LD, DN, MT

The results in Table 12 show that the regression model is relatively suitable with a significance level of 0.05. The adjusted R-squared value is 0.667, meaning that about 66.7% of the variance in workplace culture is explained by the 6 independent variables. The F-test used in the analysis of variance table is a hypothesis test about the overall fit of the linear regression model. The idea behind this test is to examine the linear relationship between the dependent variable and the independent variables. In the ANOVA table, we can see that the sig value is very small (sig = 0.00), indicating that the regression model is appropriate and can be used.

Table 13. Testing the model's fit.

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	94.184	6	18.837	63.500	.000 ^a
	Residual	44.793	151	.297		
	Total	138.977	156			

a. Predictors: (Constant), TC, TN, DT, LD, DN, MT

b. Dependent Variable: HL

The ANOVA test results show that the F-value is 63.500 (sig = 0.000). The highest VIF value for each variable is 1.483 (Table 14), which is quite small (less than 2). Therefore, multicollinearity does not have a significant impact on the model's explanatory results. The rule is that when VIF exceeds 2, it indicates multicollinearity. The sig values for the largest factors of the "Corporate Culture" variable are 0.005, which is less than 0.05, indicating that all variables are accepted.

Table 14. Regression model results.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.931	.248		-3.755	.000		
	TN	.314	.045	.373	6.997	.000	.749	1.334
	LD	.219	.076	.150	2.880	.005	.785	1.273
	MT	.342	.072	.266	4.733	.000	.674	1.483
	TC	.316	.073	.219	4.352	.000	.846	1.182
	DT	.303	.042	.327	6.128	.000	.793	1.152
	DN	.191	.047	.215	4.055	.000	.761	1.315

a. Dependent Variable: HL

From the results of the regression analysis, the statistical hypotheses are reconstructed as follows:

Table 15. Results of testing the model's hypotheses

N	Hypothesis	β	P-value (5%)	Conclusion
1	The motivation for innovation from environmental business pressures will enhance the digital transformation capacity of enterprises.	0.373	0%	Accept
2	Enterprises that develop a digital-oriented business strategy will enhance their digital transformation capacity.	0.150	0.5%	Accept
3	Technologically visionary leadership that guides the digital transformation process will enhance the digital transformation capacity of enterprises.	0.266	0%	Accept
4	A unified and technology-adaptive corporate culture will enhance the digital transformation capacity of enterprises.	0.219	0%	Accept
5	An organization that adapts to digital technology will enhance the digital transformation capacity of enterprises.	0.327	0%	Accept
6	Enterprises that establish a modern digital technology platform will enhance their digital transformation capacity.	0.215	0%	Accept

The regression equation demonstrates the relationship between the digital transformation capabilities of small and medium-sized enterprises in Hai Phong Province and the factors: Enterprise Pressure (TC), Digital Business Strategy (TN), Leadership (DT), Organizational Culture (LD), Organizational System (DN), and Technological Platform(MT), expressed as follows (Using the equation with the constant removed):

$$Y = 0.373 * X1 + 0.150 * X2 + 0.266 * X3 + 0.219 * X4 + 0.327 * X5 + 0.215 * X6$$

Where:

Y: Digital transformation capabilities of the enterprises.

X1: Digital Business Strategy, X2: Organizational Culture, X3: Technological Platform, X4: Enterprise Pressure, X5: Leadership, X6: Organizational System

4.7. Evaluation of the digital transformation capabilities of Small and medium-sized enterprises in Hai Phong Province

Based on the research findings, it can be observed that the digital transformation capabilities of small and medium-sized enterprises in Hai Phong Province are not highly evaluated. Specifically:

Table 16. Evaluation of the digital transformation capabilities of Small and medium-sized enterprises in Hai Phong Province

N	Content	Mean
1	Enterprises are doing a good job of digital transformation for business processes and management	2.491
2	Businesses can bring new values and experiences to customers on digital platforms	2.760
3	Enterprises can fully optimize the distribution and use of resources on the digital technology platform	2.715
4	Enterprises are fully equipped with digital technology infrastructure	2.533
5	Enterprises have built digital datasets and information assets	2.500
6	Enterprises capable of successful digital transformation	2.978

The lowest-rated aspect is the perception that "Enterprises are performing well in the digital transformation of business processes and management" (Mean is 2.491). Survey participants believe that many enterprises have not yet engaged in the digital transformation of their business processes and management. Only about 40% of them have started the digital transformation process. Similarly, the statement "Enterprises have established digital datasets and information assets" is also rated at mean of 2.533. Many small and medium-sized enterprises still store data manually in separate files or on separate software without proper integration. This is because many enterprises in Hai Phong Province currently lack the necessary digital infrastructure to participate in the digital transformation process. However, many enterprises also recognize that operating on a digital platform can "bring new values and experiences to customers" (Mean is 2.76) and "optimize resource distribution and utilization" (Mean is 2.715). Thus, even though not all enterprises have fully completed their digital transformation, the importance of digital transformation has been acknowledged positively by the enterprises.

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The highest-rated aspect is the belief that "Enterprises have the ability to successfully undertake digital transformation," which shows the positive expectations of small and medium-sized enterprises in Hai Phong Province as they prepare for the digital transformation process.

5. CONCLUSION AND RECOMMENDATIONS

Based on the research of relevant publications and input from experts and researchers, six internal factors that significantly influence the digital transformation capabilities of enterprises have been identified. The research model presented in this study consists of six independent variables and one dependent variable, based on survey opinions from experts and managers of small and medium-sized enterprises in Hai Phong Province. The survey data has been recorded and verified using Cronbach's Alpha test, which yielded favorable coefficients, affirming the appropriateness of the model.

The research results indicate that certain factors, such as "Organizational Culture," "Enterprise Pressure," and "Organizational System" are highly rated. However, there are still many factors, like "Digital Business Strategy," "Leadership," and especially "Technological Platform," that have received lower evaluations, reflecting the challenges enterprises face in the digital transformation process. The research findings show that different factors have varying degrees of influence on the digital transformation capabilities of small and medium-sized enterprises in Hai Phong Province. Therefore, enterprise managers can adopt suitable strategies to enhance their digital transformation capabilities, given that digital transformation has become an inevitable trend.

The author proposes the following recommendations:

Firstly, Enterprise leaders should actively explore various channels of digital transformation and raise awareness of the role of digital transformation in business operations, as well as improving the competitiveness of the enterprise. Additionally, leaders should engage in exchanges, learning from successful small and medium-sized enterprises in the same industry, seeking advice, guidance, and selecting appropriate digital transformation solutions for their own enterprises.

Secondly, Enterprises need to carefully choose digital transformation solutions and redefine their digital business strategies towards providing better experiences for customers with digital products/services. Moreover, the digital business strategy should be aligned to efficiently utilize existing resources. Thirdly, Enterprises should calculate and allocate certain financial resources for investing in digital infrastructure to ensure synchronization and efficiency. Especially, enterprises should avoid the piecemeal investment mentality or combining digital and traditional technologies, which may lead to unnecessary cost increases.

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