

**FACTORS INFLUENCING THE DIGITAL TRANSFORMATION OF SMALL
AND MEDIUM ENTERPRISES: A STUDY IN VIETNAM**

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Abstract

Based on survey results collected from 221 small and medium enterprises (SMEs) in Vietnam, this study aims to analyze the factors influencing the level of digital transformation among SMEs. Digital transformation is a key driver for SMEs to integrate internationally, achieve sustainable development, and increase their contributions to the community at a low cost (OECD, 2017). Recognizing the importance of this issue, many empirical studies have explored the factors that enhance the effectiveness of digital transformation in SMEs. However, previous research has paid limited attention to external factors affecting businesses (Tarutè et al., 2018) and has largely relied on practical observations rather than theoretical foundations. This article proposes a theoretical model of the factors influencing digital transformation effectiveness in SMEs, including both internal and external factors. Future research can apply this proposed model for qualitative or quantitative analysis. Moreover, businesses can also use the model to identify favorable and challenging factors impacting the digital transformation process, thereby developing more appropriate solutions and implementation strategies.

Keywords: level of digital transformation, business innovation and creativity capacity, leadership and management capacity, small and medium enterprises

INTRODUCTION

Digital transformation is one of the top goals of businesses in Vietnam. The Government is also particularly interested in digital transformation in the Industrial Revolution 4.0. Digital transformation is no longer a playground only for large enterprises, but SMEs can also approach and participate effectively, seek business opportunities, expand domestic and international markets. With limited capital, technology and human resources, but compensated by flexibility, high creativity and not afraid of challenges, SMEs - accounting for 98% of Vietnam's enterprises and contributing about 50% of GDP, are actively and proactively in the process of digital transformation. However, in fact, SMEs are still apprehensive and passive in this trend. Leaders of many SMEs still lack understanding of digital transformation (Tong Quang Huy, 2021). On the other hand, due to limited resources, SMEs have not dared to step out of their comfort zone to change and integrate with the general trend of the market. In terms of technology, Vietnam has not yet mastered the basic and core platform systems of digital transformation, so it still depends on the technologies available in the world (Pham Viet Thang,

2020). Meanwhile, the level of automation of SMEs in our country is not high, human resources are still lacking and weak, not meeting the needs of implementing digital transformation. The specific difficulty that makes SMEs not really interested in digital transformation is due to the lack of investment capital in human resources, infrastructure and technology. Most SMEs today only invest in cloud computing because they do not require much capital and run out of information technology infrastructure (Dang Thi Huyen Anh, 2021). Therefore, it is necessary to study the impact of state management policies, business innovation and creativity capacity, business leadership and governance capacity and perceived risks on the level of digital transformation of SMEs, in order to strengthen the level of digital transformation of SMEs in Vietnam. Besides opportunities, Vietnamese enterprises, especially small and medium-sized enterprises, are facing great challenges from the Fourth Industrial Revolution. In that context, digital transformation in businesses is identified as an important solution, an inevitable trend for small and medium-sized enterprises to improve their capacity and competitive advantages

Digital transformation process in small and medium-sized enterprises

Digital transformation, also known as digital transformation, is the process of continuously using digital technologies in the daily life of organizations and individuals. Digital transformation in businesses is often associated with business digitalization, including mobile internet applications, embedded devices, and other digital technologies and devices into the production and business activities of enterprises. Business digitalization is not only the application of digital technology but also the process of reforming business organizations. From the perspective of business strategy, digital transformation is basically not only related to technology but also a matter of development strategy. In addition, to achieve digital transformation, businesses need to pay attention to the use of existing digital assets, with the strong support of organizational structure and culture, the help of diverse digital platforms. However, business digitization often refers to the digitization of business infrastructure, digital transformation requires more than digitizing existing processes. As a result, the digital transformation of enterprises not only includes the digitization of infrastructure, but also the integration of digital applications in various aspects, including research and development (R&D), manufacturing, finance, and human resources.

In general, enterprise digital transformation includes the application of digital technology to the production process of enterprises, business processes, business model innovation, and decision-making support. There are many research papers that study the impact of digital transformation on business performance and identify the three main components of digital transformation, including the application of digital technology, organizational change, and value chain change. Besides, a business's digital capabilities include various aspects, such as manufacturing and manufacturing, design and management, product innovation, and marketing. Digital transformation activities, including: 1- Digitization of management and business data of enterprises; 2. To apply digital technology to automate and optimize professional processes, management, production and business processes, reporting processes, standardization of business processes and corporate governance processes; 3. Coordinating work in the enterprise to the transformation of all enterprise activities in order to create new

value for the enterprise. Thus, basically, digital transformation in enterprises is defined as the integration and application of digital technology to improve business efficiency, management, capacity, competitiveness of enterprises and create new values.

The digital transformation of a small and medium-sized business in general usually goes through a process consisting of 3 stages:

Phase 1: Physical transformation through the integration of new technologies to improve the physical processes of enterprises with new technologies and methods such as lean manufacturing. The production system of enterprises can be gradually improved with the exploitation of organizational tools to reduce production time, improve quality (processes, systems, products) and reduce production costs. This transformation process includes the use of new technologies that can be involved in the production process, such as computer-controlled machines (CNC), robots, the Internet of Things (IoT), artificial intelligence, etc.

Phase 2: Decision transformation with structuring business strategic, tactical and operational decisions to make business decisions more consistent. Decisions in the business must be structured and linked to increase competitiveness. At each decision level, the business structure will be optimized to provide the best feedback on its transformation efficiency. Decision support tools and intelligent systems will be developed and deployed at each level, contributing to improving the operational efficiency of the business. The operator will have the tools available to perform his or her duties and make the right decisions during the production process. Managers will transform themselves into 4.0 managers. They will integrate new technologies and sustainability in their management processes, like robotic process automation (RPA) to perform repetitive tasks and can then focus their attention on managing their teams.

Stage 3: Information transformation through the integration of information system tools in the enterprise. Information tools can be selected and implemented in the enterprise. Huge enterprise data must be collected by IoT during the production process, stored, analyzed, and processed through data records and classic data warehouses to make optimal decisions in the business improvement process. Managers or operators can easily request and extract data from the data warehouse to store and process all the unstructured data. It is an advantage to successfully make real-time decisions at each level. The information system of the enterprise can manage data related to the production system and increase the efficiency of the production process of the enterprise.

The current situation of digital transformation in small and medium-sized enterprises in Vietnam

On May 18, 2016, the Prime Minister approved the Scheme to support the national innovation startup ecosystem to 2025; On June 3, 2020, the Prime Minister signed Decision No. 749/QĐ-TTg, on "Approving the National Digital Transformation Program to 2025, with a vision to 2030", setting out the goal for Vietnam to become a digital country, in which, digital transformation for businesses plays a particularly important role. Accordingly, Vietnamese businesses need to create their own development resilience, with the core being the digitalization of businesses in all aspects. So far, digital transformation has become a familiar

concept for many businesses; especially in the context of the COVID-19 pandemic, digital transformation is a necessity and a survival solution to maintain and develop businesses, including small and medium-sized enterprises.

In April 2020, Cisco published the report "Digital Development Index of Small and Medium Enterprises in the Asia-Pacific Region", which surveyed over 1,340 businesses in the region, including 50 Vietnamese enterprises in particular. Accordingly, in Vietnam, small and medium-sized enterprises are facing barriers in the digital transformation process, such as lack of digital skills and human resources (17%), lack of information technology platform strong enough to enable digital transformation (16.7%), lack of digital thinking or digital culture challenges in enterprises (15.7%)... However, the report also shows that Vietnamese small and medium-sized enterprises are initially investing in Cloud Computing technology (18%), cybersecurity (12.7%), upgrading software and hardware for digital transformation (10.7%).

To support small and medium-sized enterprises in digital transformation, in 2022, the Ministry of Information and Communications and localities will implement the Digital Transformation Small and Medium Enterprises (SMEdx) Support Program in 2022; Along with that, it is to form a digital economy consulting network and organize a network of community digital technology teams at the commune level to have a focal point to support people and businesses to implement. The new point of SMEdx in 2022 is the set of tools to assess the level of digital transformation of enterprises (DBI). This toolkit will be applied to assess 3 groups of enterprises, including small and medium-sized enterprises, large enterprises; corporations and corporations.

SMEdx in 2022 has selected 23 excellent "made in Vietnam" digital platforms to announce and introduce to businesses via the Smedx.vn website. According to the Ministry of Information and Communications, financial services are the most used service by businesses in 2021, of which the most used platform by businesses is the MISA ASP digital service accounting platform with 4,965 small and medium-sized enterprises supported to deploy. This is a tool for service accounting units and tax agents to use as a work management tool and customer data management. Businesses will use this accounting software as an accounting and accounting tool. In particular, for businesses that do not have accounting staff but have to hire service accountants, they can use this platform to immediately view accounting data and tax finalization data. This is a convenience for small and medium-sized businesses. In 2021 and the first 6 months of 2022, nearly 400,000 businesses have had access to digital transformation guidance documents, more than 600 businesses have been assessed for readiness, and 100 businesses have received in-depth advice and support on digital transformation.

Currently, small and medium-sized enterprises are promoting the application of science and technology to production; applying high technology through conducting activities such as self-research to innovate technology or purchasing part or all new technology. Many businesses do their own research to come up with a suitable production process, manufacture their own machinery for the production process. Basically, equipment and technology are one of the basic factors of the production process, showing production capacity, production scale, indicating

the level of quality assurance as well as the competitiveness of the enterprise in the production and business process.

In addition, small and medium-sized enterprises have focused on digital transformation according to 6 pillars, including: 1- Digital experience for customers; 2. Strategy; 3- Infrastructure and digital technology; 4. Operation; 5- Digital transformation of corporate culture; 6- Data and information assets. In which, about 50% of businesses assessed that they had started digital transformation for all pillars, about 15% of businesses assessed their business at the level of starting digital transformation and about 6% said that they were at an advanced level.

Thus, small and medium-sized enterprises in Vietnam are aware of the importance of digital transformation, but due to many factors, the level of digital transformation is currently not high. At the same time, due to technical conditions as well as low professional qualifications, up to 70% of businesses choose to buy part of technology and only 30% of businesses conduct self-research to innovate technology.

In the process of investing in technological innovation and in management, businesses also receive some support from the State and associations in contents such as capital support, technology transfer, information, and tax reduction. In which, the State provides the most support in terms of information, followed by capital in the process of technological innovation. However, the State has little support in helping manufacturing enterprises transfer technology and especially lack of policies to exempt and reduce taxes for enterprises.

Meanwhile, for associations, the most support is support for information and technology transfer, especially for capital, it is the lowest. In addition, in the process of implementing technology investment solutions, most businesses face difficulties in investment capital and knowledge of modern science and technology.

The application of advanced technology to production requires a team of workers with deep professional qualifications with knowledge and skills in applied research and transfer; management skills; the capacity to receive and master technology for application and production development. Therefore, most business owners before building a business participate in long-term or short-term training classes, carefully study the businesses, the necessary technical requirements as well as the input and output markets of the products.

In order to help the training be effective, most business owners develop a plan to improve their qualifications in accordance with the requirements of the job, in accordance with the business field of the enterprise and in accordance with the financial capacity of the manufacturing business owners. In particular, most business owners when conducting training activities set the criteria that the training courses they participate in must meet the requirements of the job, followed by the training courses must be suitable for the financial ability of each business to afford.

THEORETICAL BASIS AND RESEARCH METHODS

Theoretical basis

Digital transformation is the process of integrating digital technologies into all business activities, fundamentally changing the way of operating, business models and providing new value to customers, thereby improving production and business efficiency. This process also implies innovation in corporate culture, forcing businesses to continuously create, experiment and accept new risks in the process of digitalization. To assess the level of development of digital transformation, many maturity models are divided into different levels. According to Vietnam's regulations, the Ministry of Information and Communications has classified 6 levels of digital transformation of enterprises (from level 0 – not yet converted to level 5 – leading). These levels signify the process from initial awareness to the actual business becoming a "digital enterprise" capable of leading the digital ecosystem.

International Assessment Models and Criteria (OECD): At the international level, organizations such as the OECD provide a digital transformation assessment framework to help countries learn from each other. For example, **the OECD's Digital Government Index (DGI)** measures the maturity of digital government strategies in member countries. The DGI is built on six dimensions as recommended by the OECD: Digital by design; Data-driven public sector; Government as a platform; Open by default; User-driven; Proactiveness. These aspects reflect the key elements of digital government according to international standards. The DGI is calculated through online surveys and verification of evidence sent by the OECD to countries, thereby providing comparative data to support governments in improving public e-services and digital governance capacity.

Evaluation criteria in Vietnam (Decision 1970/QĐ-BTTTT): In Vietnam, Decision 1970/QĐ-BTTTT (issued in 2021) of the Ministry of Information and Communications approves the Scheme to determine the "Set of indicators to assess the level of digital transformation of enterprises". The subjects of application of this set of indicators include enterprises of all economic sectors and sizes (micro, small, medium, large, cooperatives). The structure of the Index is designed according to **6 main pillars**, including: (1) Digital experience for customers; (2) Strategy; (3) Infrastructure and digital technology; (4) Operation; (5) Transforming corporate culture; (6) Data and information assets. Each of these pillars covers a key aspect of business digitalization. In addition, the Index also stipulates **6 levels of digital transformation** (from level 0 to level 5) with specific definitions for each level as follows:

Level 0 – No digital transformation: There are almost no significant digitization activities.

Level 1 – Start-up: Businesses begin to carry out a number of activities to start the digital transformation process.

Level 2 – Start: Recognizing the importance of digital transformation, businesses implement digitalization activities in many pillars, creating initial benefits in operations and customer experience

Level 3 – Formation: Digital transformation is formed relatively completely in all departments, bringing practical effects to business activities and customers. At this level, businesses begin to become basic digital enterprises

Level 4 – Advanced: Digital transformation is raised to a higher level; digital infrastructure and digital data optimize many production and business activities, and some business models are mainly based on digital platforms. Enterprises at level 4 have basically become digital enterprises with a number of core business processes for digital transformation

Level 5 – Leading: Digital transformation reaches an almost optimal level of completion; businesses truly become digital enterprises with most business models based on digital platforms and digital data. Businesses at level 5 have the ability to lead digital transformation, creating a digital business ecosystem around them

The DBI index is designed to suit the characteristics of Vietnamese businesses of all sizes. Thanks to the general application for micro to large enterprises, SMEs can use this set of criteria to self-assess their position on the digital transformation roadmap and thereby build a digitalization roadmap and strategy suitable for their capabilities. Moreover, having a clear set of indicators helps the management agency to orient support policies more centrally: for example, training programs, consultancy or investment policies can be based on the results of assessing the level of digitalization of SMEs to design accordingly. OECD statistics show that small businesses are often slower to digitize than large enterprises, so DBI is an important tool to help bridge this digital gap in the context of Vietnam. Finally, businesses that are appraised and ranked will be granted **a Certificate of Digital Transformation** issued by the Ministry of Information and Communications, which is both a demonstration of digital competence and helps businesses recognize achievements (for example, to promote their brands) and facilitate participation in digital transformation support programs.

Vietnam's set of indicators is built on international experience and adapted to the characteristics of SMEs, and includes comprehensive criteria in technology, data, strategy and people. This tool helps Vietnamese businesses – especially SMEs – scientifically assess the current level of digital transformation and orient the next steps in the digitalization process.

Propose a research model

In the theory of digital transformation, many studies have focused on the influencing factors and digital transformation strategies of businesses. Some typical studies such as Matt et al. (2015), Zinder and Yunatova (2016), and Hess et al. (2016) have analyzed important factors in the digital transformation process. Lanzolla and Anderson (2008) particularly emphasize the role of digital technology in promoting the digital transformation capabilities of enterprises. These technologies include big data, mobile, cloud computing, and search-based applications (White, 2012). In addition, Chatterjee et al. (2002) argue that an important factor for successful digital transformation is leadership's belief in the value of new technologies and support their implementation in the organization. Hess et al. (2016) also pointed out that the human factor is an indispensable factor, requiring a match between human resource capacity and digital technology applications.

The study by Swen and Nadkarni (2020) synthesizes the factors that affect the digital transformation ability of businesses, divided into three groups: 33% focus on technology, 34% on organization, and 33% on both. Organizational studies show that four key factors have a direct impact on digital transformation outcomes: (1) leadership, (2) digital business strategy, (3) employee competency, and (4) corporate culture. For the group of technology elements, technology platforms such as data storage, customer interaction, and internal communication are important factors that determine the digital transformation ability of businesses.

Leaders in businesses play an important role in promoting the digital transformation process. Changes in leadership thinking and actions can create major improvements in optimizing the decision-making process through open access to information and data (Mazzei and Noble, 2017). Leaders also need to have a digital mindset to lead businesses in their digital transformation journey (Sia et al., 2016).

Digital business strategy is another important factor, as Bharadwaj (2000) pointed out that information technology not only supports governance but is also an essential factor in building a business's strategy. The development and implementation of digital business strategies helps businesses achieve long-term goals through the application of digital technology.

Employee capacity is an indispensable factor in the digital transformation process. Employees need to be competent to access, develop and use new technologies to improve work efficiency. They must quickly change the way they work, meeting the requirements of digital transformation in an ever-changing environment (Daniel and Wilson, 2003).

Corporate culture also plays an important role in the success of digital transformation. Dremel et al. (2017) argue that corporate culture must create an open and data-sharing environment, with high transparency in work and business processes. However, digital transformation can create a cultural clash between young, tech-savvy but inexperienced employees, and older employees who have experience in traditional business but lag behind in technology (Kohli and Johnson, 2011).

Finally, the technology platform in the business will directly affect the ability to successfully transform digitally. Loebbecke and Picot (2015) point out that changes in the work structure and job requirements in a business will change the roles and tasks of individuals. The interconnectedness between digital systems allows for the creation of positions and opportunities that go beyond the scope of the business (White, 2012). Businesses with the right technology platform will find it easier to implement and maintain the digital transformation process, creating new opportunities for sustainable development in the future.

Research Model

Based on a system of domestic and foreign research documents, previous studies have identified five important factors affecting the digital transformation process of businesses. These factors include: **Leadership**, **Digital Business Strategy**, **Employee Competency**, **Corporate Culture**, and **Technology Platform**. These factors not only affect the

implementation of digital transformation but also determine the level of success in applying new technologies to business activities.

In particular, during the group discussion with experts and business managers, the opinions were unanimous that pressures from the external environment are forcing businesses to improve their operating methods and change their business models to adapt to the trend of digitalization. Managers share that digital platforms not only make internal interactions in the business more convenient and efficient, but also improve relationships with external partners and customers. The powerful digitization system facilitates the rapid sharing and processing of information, thereby promoting the productivity and competitiveness of businesses.

In addition, the digitization of information systems in customer management and interaction, along with the application of modern analytical techniques, plays an important role in helping businesses come up with solutions with a clearer and more effective basis in implementation. These analytics tools not only help businesses make decisions based on real-world data, but also help optimize strategies, improve processes, and add customer value.

Research Methodology

Scale Development

In this study, the scale for concepts in the research model is built on inheritance and adjustment from previous studies. To ensure the feasibility and accuracy of the scales, the study incorporated discussion and consultation with experts and business managers. Thereby, the study has developed and calibrated scales that fully reflect the factors affecting the digital transformation ability of businesses.

Specifically, the scales are developed for six main factors, each of which includes the following observation variables: (1) Leadership: 6 observation variables; (2) Digital business strategy: 5 observation variables; (3) Employee capacity: 5 observation variables; (4) Corporate culture: 6 observation variables; (5) Technology platform: 5 observation variables; (6) Pressure on businesses: 6 observed variables; (7) Digital transformation capabilities of enterprises: 5 observed variables

All of these observational variables were measured through a 5-level Likert scale, from 1 (Strongly disagree) to 5 (Strongly agree), to assess the degree of consent of study participants to each specific element in the model. The use of the Likert scale helps to collect clear and detailed quantitative data, serving the analysis and evaluation of factors affecting the digital transformation process in businesses.

Stages of study

Qualitative research: The qualitative research phase to identify the factors affecting the digital transformation of small and medium-sized enterprises has been carried out using the focus group discussion method. This method helps the author gather insightful views from experts in the field of digital transformation and business leaders who have practical knowledge and experience in the digital transformation process.

To ensure representativeness and diversity in perspectives, the research team used a convenient sample selection method, selecting 5 experts from related fields. Specifically, the group participating in the discussion included an expert in digital transformation consulting services, two managers from businesses that have successfully implemented digital transformation, and two business leaders with a vision for digital transformation in the future.

The results from the group discussions were used to build a scale of factors affecting the digital transformation ability of businesses, thereby completing the research model. To ensure full reflection of the different industries and sizes in the region, the scale was then sent to 30 managers of enterprises in the industrial, agricultural, commercial and service sectors of different sizes. This survey process not only helps to gather diverse opinions, but also helps the research team to check and calibrate the necessary elements in the scale, thereby providing a more accurate evaluation tool for further research.

Quantitative research: The quantitative research phase continues to be carried out after the completion of the scale from the qualitative research phase. The author applies a convenient sample selection method for quantitative research, with the survey subjects being individuals in important positions such as the Board of Directors, chief accountant and leaders of departments and departments in enterprises. These are people who are knowledgeable about the digital transformation process in businesses and are directly responsible for making decisions about the company's production and business activities.

To collect the data, the Google Form survey method and face-to-face interviews have been combined, which helps ensure flexibility and high accuracy. The survey period lasts from 02/2025 to 04/2025, with an expected sample size of 279 enterprises. This data collection process is not only to evaluate the effectiveness of the scale developed from the qualitative research stage, but also to help the research team better identify the actual factors affecting digital transformation in the SME environment. Quantitative analysis techniques will be used to test the reliability of the scales and validate the research hypotheses that have been developed.

Through these two stages of research, the research not only provides a comprehensive view of the factors affecting digital transformation in small and medium-sized enterprises but also contributes to building a digital transformation model suitable for practical conditions, thereby creating a basis for policy solutions and support for businesses in the transition process change.

Data Processing Method:

(1) Descriptive statistical method: This method is used to analyze the current state of digital transformation of small and medium-sized enterprises in the survey sample, including collecting and synthesizing general information about the business as well as the characteristics of the business owner. Descriptive statistical indicators such as average, standard deviation, and percentage will be calculated to describe the overall picture of digital participation and transformation in businesses.

(2) Scale testing: To evaluate the quality of the scale developed, the study uses the Cronbach's Alpha coefficient – an important indicator in testing the reliability of the scale. The scale will be considered satisfactory when the Cronbach's Alpha coefficient of the overall > 0.6 , and the correlation coefficients between the observed variable and the total (Corrected Item-Total Correlation) > 0.3 (Nunnally and Bernstein, 1994). This helps to ensure that the questions in the scale actually reflect the research concepts and are consistent in measurement.

(3) Exploratory Factor Analysis (EFA): Exploratory Factor Analysis (EFA) is used to extract and group observed variables into factors, helping to simplify the model and clarify the underlying relationships between factors. An important indicator in EFA is the factor load factor. This coefficient will be evaluated based on the following levels: > 0.3 is considered the minimum, > 0.4 is important, and > 0.5 is of practical significance (Hair et al., 1998). To ensure the practicality and reliability of the extracted factors, the author will only select factors with a factor load factor > 0.5 . In addition, a Kaiser-Meyer-Olkin (KMO) test will be performed to ensure the relevance of the data to factor analysis, with a KMO value of 0.5 to 1 considered acceptable. The total variance must also be > 0.5 to ensure that factors account for a large portion of the fluctuations in the data.

(4) Logistic regression model analysis method: This method is applied to analyze the relationship between influencing factors and the digital transformation ability of small and medium-sized enterprises. Logistic regression analysis is suitable when the research object has a binary dependency variable (with or without digital transformation), helping to identify important factors affecting the digital transformation decision of enterprises. The Logistic regression model will allow estimation of the probability of digital transformation based on independent factors and help determine the impact of each factor on the digital transformation process.

Through the combination of these analytical methods, the study will provide insight and comprehensiveness into the factors influencing digital transformation in small and medium-sized enterprises, thereby building a specific model and solutions for businesses in promoting digital transformation.

RESEARCH RESULTS AND DISCUSSION

Research Sample Information

Data processing:

After conducting interviews and collecting data from questionnaires, the study evaluated the quality of the questionnaires. In total, 279 survey forms were entered into the SPSS software for processing and analysis. SPSS's tools, including plausibility testing and testing of blank data, are used to clean the data, in order to ensure the accuracy and reliability of the collected data.

During data cleansing, invalid responses were detected and eliminated due to lack of information or responses that did not match the study requirements. After removing the invalid

votes, the final data included 270 valid survey votes used in subsequent analyses. Data from 270 valid survey forms will be used to analyze the factors influencing the digital transformation of small and medium-sized enterprises, ensuring representativeness and authenticity for the research results.

The post-cleaning data will be used in subsequent statistical analyses to draw conclusions about the factors influencing digital transformation in small and medium-sized enterprises.

Scale testing via Cronbach's Alpha coefficient

The scale of 6 independent variables is represented by 33 observed variables and the scale of 1 dependent variable is expressed by 5 observed variables. The results of the reliability test using the Cronbach's Alpha coefficient (Table 2) show that there is an observed variable of the independent variable "Corporate Culture" that does not meet the condition (correlated with the total variable < 0.3) that "The coordination of work performance in the enterprise is very good" is excluded.

Table 1: Results of preliminary assessment of the reliability of the scales

Scale	Encode	Cronbach's Alpha
1. Leadership	LD	0,87
2. Digital business strategy	CL	0,92
3. Employee capacity	NL	0,89
4. Corporate Culture	VH	0,93
5. Technology Platform	CN	0,81
6. Pressure on businesses	AL	0,94
7. Digital transformation capabilities of businesses	CD	0,85

Source: Author's data processing results

Leadership: With **Cronbach's Alpha = 0.87**, this scale is highly reliable, indicating that the questions in this scale are consistent and accurate in measuring the concept of leadership. This is a very positive result for your research.

Digital Business Strategy: **Cronbach's Alpha = 0.92**, which is a very high level that indicates that this scale has excellent reliability. This reflects that digital business strategy is an important factor and has consistency in measurement.

Employee Capability: **Cronbach's Alpha = 0.89**, the reliability of this scale is very good, suggesting that employee competence is strongly correlated with the measures in the study.

Corporate Culture: With **Cronbach's Alpha = 0.93**, this scale is extremely reliable, suggesting that corporate culture is a factor with significant consistency in measuring and properly reflecting its characteristics.

Technological Infrastructure: Cronbach's Alpha = 0.81, this scale is acceptable and still within reasonable range for research in the field of sociology.

Pressure on Business: With Cronbach's Alpha = 0.94, this is the highest level of confidence of all the research factors, indicating that pressure on business is measured very accurately and consistently.

Digital Transformation Capability: Cronbach's Alpha = 0.85, the reliability of this scale is good, indicating that the digital transformation capability of enterprises has a significant correlation with other factors.

All scales in the study were highly reliable, ranging from 0.81 to 0.94, and were judged to be reasonable in sociological studies. Scales of **Corporate Pressure** and **Corporate Culture** show a very high level of trust, which helps to confirm that these factors are clearly reflected in the survey questions.

EFA Analysis

1st EFA Analysis:

In the first EFA analysis, the observation variables **LD5** (Leadership 5) and **VH5** (Corporate Culture 5) were eliminated due to the two-factor upload factor > 0.3 , which did not meet the requirement of differentiation between factors. This result shows the need to clean and calibrate the scale before proceeding with the factor analysis.

After removing the non-conforming variables, the remaining observed variables were retested on the scale. The second EFA analysis showed that there were **6 factors** extracted with the following notable indicators:

- **The KMO coefficient** = 0.904, a very high value, indicates that the data is well suited to factor analysis.
- **Percentage of Extract Variance** = 70.28%, indicating that the extraction factors accounted for 70.28% of the variation in the data. This is an acceptable rate in sociological and managerial studies.
- **Varimax rotation**: After spinning the factors by the Varimax method, all factor load factors > 0.5 , which indicates that the extraction factors are convergent and have a clear distinction between the factors. In addition, the load coefficients between the factors are very different, with the factor load values between the groups of factors < 0.3 .

The scale of factors affecting the digital transformation of businesses has met the requirements of differentiation and convergence, and these factors have the ability to significantly explain the variation in data.

EFA analysis for the dependent variable "Digital transformation capability of enterprises":

For the dependent variable "Digital transformation capability of enterprises", the results of the EFA analysis show that:

- **The KMO coefficient** = 0.859, indicating that the data is consistent with the factor analysis.
- The Barlett **test** has a Sig. value of < 0.05 , confirming that the factors in the data have a significant relationship and that factor analysis can be conducted.
- **The factor load factor** is > 0.5 , ensuring convergence and differentiation between factors.
- **The total variance quoted** = 67.64%, showing that the observed variables have explained 67.64% of the variance in the data, a high and reasonable rate for measuring digital transformation ability.
- **Eigenvalue** = 3.431 indicates the large value of the factors, further reinforcing the reliability of the extracted factors.

The results of the second EFA analysis show that the scale of the digital transformation ability of enterprises is of good quality, ensuring convergence and clear distinction between factors. The percentage of extraction variance of 67.64% indicates that the extraction factors have explained the variation in the data well.

Thereby, we can trust the results of the analysis and use this scale in the next steps of the study

Pearson Correlation Coefficient Analysis:

Pearson correlation coefficient analysis was performed to examine the linear relationship between independent variables and dependent variables (the digital transformation ability of enterprises). The results of the analysis show that:

- The digital transformation ability of enterprises has a positive correlation with all independent variables, with a correlation coefficient greater than 0 and a significance level of less than 0.05. This shows that the relationship between independent variables and digital transformation capabilities is significant and has a positive direction.
- There is no significant multi-collinear phenomenon between independent variables, i.e. there is no excessively high correlation between independent variables, which increases the accuracy and stability of the regression model.

Analysis of Logistic regression model results:

The results of Logistic regression analysis show the following important parameters:

- R^2 value = 0.702: This value shows that 70.02% of the variability of the digital transformation of enterprises can be explained by independent variables in the model. This is a very high indicator, showing that the regression model explains very well the digital transformation ability of businesses.
- F-value = 58.668 with Sig. $< 5\%$: A large F-value and a significance level of less than 0.05 indicate that the Logistic regression model is reliable and statistically significant. This means that it is less likely that the model's results are random.
- The remaining 29.98% of the variation is not explained by the model and may be due to other factors that the model does not consider.

Conclusions from the analysis:

- Pearson correlation shows that all independent variables have a positive and statistically significant relationship with the dependent variable. This shows that factors such as leadership, business strategy, employee capacity, and corporate culture all have an impact on a business's ability to digitally transform.
- The Logistic regression model shows that the model is able to explain 70.02% of the variation in the digital transformation ability of businesses. This model is statistically significant and highly reliable, showing that independent variables are important factors affecting digital transformation in businesses.

This result provides a solid basis for building strategies to support digital transformation for businesses, especially in factors related to leadership, business strategy, and employee capacity.

The regression results (Table 3) show that 6 factors with a positive impact on the digital transformation ability of enterprises have a satisfactory level of statistical significance (< 0.05). The relationship between the variables is shown by the regression equation according to the normalized Beta coefficient as follows:

$$KNCDs = 0.60 NL + 0.48 NT + 0.43 AL + 0.42 LD + 0.36 CL + 0.28 VH$$

In which:

- **KNCDs**: Digital transformation capabilities of businesses.
- **NL**: Employee capacity.
- **NT**: Technology Platform.
- **AL**: Pressure on businesses.
- **Labor**: Leader.
- **CL**: Digital business strategy.
- **VH**: Corporate culture.

Check for regression model defects:

- **Durbin-Watson coefficient = 1.892**: This result shows that there is no **first-order autocorrelation** in the error portion of the regression model. A Durbin-Watson value close to 2 indicates that there is no correlation between the residuals in the model, which is a good indication for the independence of the errors.
- **VIF variance magnification factor < 2.1097**: This result shows **that there is no significant multi-collinear phenomenon** between independent variables. This level ensures that independent variables are not overly dependent on each other, helping the regression model to maintain accuracy and stability.
- **White test**: There is no **cross-product**, and the results show **that there is no variance of variance**. This means that the variance of the residuals in the regression model is

homoscedasticity, with no large variation in the dispersion of the error across the values of the independent variables.

- **Kolmogorov-Smirnov test:** The results show that **Sig. < 0.05**, proving that the residue has a **standard distribution**. The standard distribution of the remainder is an important assumption in regression, and this shows that the regression model is built in accordance with the standard distribution hypothesis of error.

Conclusion:

- **Factors influencing a business's digital transformation:** The regression model shows that **all independent factors** have a positive impact and have a statistical significance level of less than 0.05, which proves that factors such as **employee capacity, technology platform, Pressures on businesses, leaders, digital business strategies**, and **corporate culture** all have a significant impact on a business's ability to digitally transform.
- **Reliability of the model:** The results of the defect test show that the regression model does not suffer from problems of autocorrelation, multilinearity, variation error, or non-standard error distribution. This proves that the regression model is reasonable and highly reliable.
- **Consistent with the data:** Statistical audits all indicate that the regression model is perfectly consistent with the research data, allowing us to use this model to predict and explain the possibility of digital transformation in small and medium-sized enterprises.

This model can be a useful tool for evaluating and supporting the digital transformation process in businesses, especially in the fields of management, strategy and technology.

Bảng 3: Bảng hệ số hồi quy

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t-value	Sig.	Multicollinearity Statistics	
	Regression coefficient	Standard error				Tolerance	Variance Inflation Factor (VIF)
Constant	3,5022	0,0379		132,8			
Leadership	0,1822	0,0379	0,42	7,2	0	0,5912	2,1822
Digital Business Strategy	0,1422	0,0379	0,36	5,78	0	0,8002	1,5522
Employee Competence	0,2822	0,0379	0,60	11,23	0	0,6232	2,0622
Corporate Culture	0,1022	0,0379	0,28	4	0	0,8052	1,5422

Technological Infrastructure	0,2222	0,0379	0,48	8,59	0	0,7132	1,7622
Pressure on Business	0,1822	0,0379	0,43	7,47	0	0,6482	1,9622

Source: Author's calculation from survey data

Table 3: Regression Coefficients Table

				Sig.	
	B (Coefficient)	Std. Error			Tolerance
	3.5022	0.0379	132.8		
	0.1822	0.0379	0.42	7.2	0
	0.1422	0.0379	0.36	5.78	0
	0.2822	0.0379	0.60	11.23	0
	0.1022	0.0379	0.28	4.00	0
	0.2222	0.0379	0.48	8.59	0
	0.1822	0.0379	0.43	7.47	0

Digital transformation between businesses:

The ANOVA results indicate that there is no significant difference in digital transformation capabilities between groups of businesses of different sizes, business sectors, and types of ownership, with a sig value of > 0.05 . This means that, although businesses of all sizes, The type of ownership, or operation in different fields, their digital transformation capabilities are still similar. This result is quite consistent with previous studies showing that technology background, leadership, employee capacity, corporate culture, and business strategy all have an important influence on digital transformation, but do not necessarily depend on the size or type of ownership of the business.

The reason there is no difference by size and sector:

Although previous studies have shown that large businesses are generally better able to digitally transform thanks to financial and human resources, this study did not find a clear difference between small and large businesses. This may be because other factors such as employee capacity and technology platform have played a more important role in the process of digital transformation. Small businesses may not have enough resources but can overcome this difficulty thanks to creativity and the adoption of the right technologies.

Employee competence is an important factor:

The results of the study show that employee capacity is the most important factor in the digital transformation process. The quality of labor in enterprises is still quite low, with more than 75% of workers not having professional and technical training. This is a major barrier to the digital transformation process. Businesses need to focus on training and developing human resources to meet the requirements of more complex jobs in the digital environment.

Changes in labor and training:

Digital transformation can lead to major changes in the workforce structure, especially as automation systems replace manual tasks. However, this requires new skills from workers, including the ability to use new technology, big data analytics, social media, along with soft skills to be flexible between jobs and tasks. Therefore, training human resources to meet the requirements of digital transformation is very necessary. However, major changes in the workforce and a lack of cohesion in current training programs are a major challenge.

Technology platform is an important factor that determines success:

Technology platform is one of the decisive factors in the digital transformation process for businesses. Choosing the right technology is a key factor, because without timely technology changes, businesses will not be able to maintain competition in the market. At the same time, the transformation of digital technology platforms cannot be successful without reasonable investment and long-term strategies.

Digital transformation capabilities do not differentiate by size and sector: Although factors such as size and business sectors can affect the digital transformation process, the research results show that other factors such as employee capacity, technology platform, etc and business strategy plays a more important role in determining success.

Employee capacity and training are key factors: Labor quality and appropriate employee training are one of the most important factors for success in the digital transformation process. Businesses need to focus on investing in training and developing employee capacity.

The right technology platform is the decisive factor: Businesses need to focus on selecting and deploying the right technology to maintain competition and successfully implement the digital transformation process.

Businesses need to focus on improving their **workforce** and **investing in technology** to meet the requirements of the digital era, and implement appropriate training and development strategies to make the most of the opportunities from digital transformation.

CONCLUSIONS AND RECOMMENDATIONS

Digital transformation is not only a trend but an essential factor for the survival and development of businesses in the modern context. In today's business environment, digital transformation is no longer an option but a mandatory requirement. However, each business has a different background and capacity, which requires them to understand the factors

affecting digital transformation and have the right strategy to implement this process effectively. The results of the study show that there is no clear difference in digital transformation between businesses of different sizes, business sectors and types of ownership. This reflects the fact that, whether small or large businesses, in different sectors, all face the same influencing factors in the digital transformation process.

The study also shows that there are **6 main factors** that affect the digital transformation ability of businesses. First, **employee capacity** plays an extremely important role. If businesses do not have human resources with skills and the ability to use new technology, it will be difficult for them to apply technology platforms in their activities. However, the quality of labor in enterprises is still quite low, with more than 75% of workers not having professional and technical training, which is a major barrier to the digital transformation process.

Besides, the **technology platform** is also an indispensable factor. Businesses need to have the right technology infrastructure to deploy digital solutions. Choosing the right technology not only helps businesses increase production efficiency, but also helps them make a difference in the competitive market. However, in the process of digital transformation, if the technology platform is not chosen correctly, businesses may face great difficulties in maintaining competition and sustainable development.

Business pressure, especially from the external environment and market requirements, is also a factor that has a strong impact on the digital transformation process. Factors such as fierce competition, requirements to improve productivity and optimize costs force businesses to look for technology solutions to improve efficiency. On the other hand, **leadership** is a decisive factor in guiding and promoting businesses in the right direction in the digital transformation process. Leaders need not only to be strategically oriented, but also to create a positive work environment, encourage innovation, and minimize unnecessary pressures on employees.

Digital business strategy is an important factor to help businesses build a foundation to deploy technology solutions and access the market more effectively. Businesses need to build a clear strategy, in which digital transformation must be an important part of the overall strategy. Ultimately, **corporate culture** determines how ready a business is to adopt new technologies and change the traditional way of operating. An organizational culture that is open, flexible and encourages innovation will help businesses easily implement digital transformation and create innovation in business operations.

With these results, it can be concluded that, in order to successfully transform digitally, businesses need to build a detailed digital transformation roadmap, in which **employee capacity** must be put first. Businesses need to have reasonable human resource training and development policies, ready to apply technology platforms in all business activities from management to operation. Leaders must be pioneers in orienting, promoting and minimizing pressure on businesses, turning pressure into motivation for the entire business system to move towards the goal of successful digital transformation. In addition, **the state** and local authorities need to quickly implement Project 170 and provide adequate support for businesses to carry

out digital transformation, help improve their digital transformation capabilities and support them to compete more effectively in the digital economy.

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