ANALYSIS OF FACTORS AFFECTING THE DIGITAL TRANSFORMATION CAPACITY OF SMALL AND MEDIUM ENTERPRISES IN THE AGRICULTURAL SECTOR IN QUANG NINH

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Abstract: ***The article focuses on analyzing factors affecting the digital transformation capacity of small and medium enterprises in the agricultural sector in Quang Ninh province. Quantitative research was conducted with 200 survey samples, using SmartPLS 3.2.9 software to test the model using SEM method. The results show that all factors have a positive and significant impact on digital transformation capacity, of which human resource capacity and capital are the two factors with the strongest influence. On that basis, the study proposes solutions to improve the digital capacity of small and medium enterprises, and at the same time provides policy solutions for Quang Ninh province in promoting the digital transformation process in the agricultural sector towards modernity, efficiency and sustainability.***

• Keywords: *digital transformation, small and medium enterprises, digital transformation capacity.*

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1. Introduction

The strong and rapid development of the 4.0 technology revolution has forced businesses in Vietnam to accelerate the digital transformation process.

The dramatic changes in labor productivity, product and service consumption trends, and new business models being formed show the huge role and impact of digital transformation in today's social life. Digital transformation is an inevitable trend, a matter of survival that businesses must implement successfully, especially small and medium enterprises.

Quang Ninh province identifies digital transformation as an inevitable trend, a driving force for breakthroughs in development, and enhances the competitiveness of the economy. The Standing Committee of the Quang Ninh Provincial Party Committee issued a Resolution on comprehensive digital transformation in Quang Ninh province by 2025, with a vision to 2030. In Resolution No. 09-NQ/TU dated February 5, 2022 of the Provincial Party Standing Committee on Comprehensive Digital Transformation of Quang Ninh Province by 2025, with a vision to 2030, the goal is set for 100% of enterprises in the province to be qualified to meet digital transformation requirements.

However, the reality shows that small and medium enterprises in the agricultural sector of the province are facing many limitations in capital, human resources and technology. These difficulties can slow down the implementation of the province's common goals if not studied and resolved promptly. Therefore, it is necessary to analyze the factors affecting the digital transformation capacity of this group of enterprises. The research results will provide an important scientific basis for proposing appropriate solutions. From there, support small and medium enterprises in the agricultural sector to improve their digital capacity, contributing to the development of Quang Ninh's agricultural economy in a modern, effective and sustainable direction.

2. Research overview

Foreign Studies

According to Lanzolla and Anderson (2008), the application of digital technologies has been affirmed as a factor that promotes digital transformation. Digital technologies can include big data, mobile, cloud computing or search-based applications (White, 2012).

Chatterjee et al. (2002) study suggests that for digital transformation to be successful, leaders must believe in the value and benefits of new technologies and support their implementation in the organization's operations.

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Hess et al. (2016) emphasize the role of human factors, especially managers, in promoting transformation processes. At the same time, Hess et al. (2016) also argue that there needs to be a match between human resources capacity and digital technology applications to optimally exploit those technology applications.

In the study by Nadkarni and Prügl (2021), synthesizing from previous studies, it was found that internal factors affecting the digital transformation capability of enterprises are divided into 3 groups: 33% focus on technology, 34% focus on organizational issues and 33% focus on both technology and organizational issues.

Domestic studies

Quyet (2021) researched "Exploring factors affecting successful digital transformation of Vietnamese enterprises". The study pointed out 7 factors affecting the success of digital transformation in Vietnamese enterprises, including: Government's legal policies and support; information security and safety; digitalization process; enterprise's digital transformation strategy; enterprise's human resources; enterprise's organizational structure and business processes; online customer support services.

Duong and Chau (2022) studied "Factors affecting digital transformation of enterprises in Ho Chi Minh City". The study identified 6 factors that help enterprises in Ho Chi Minh City successfully digitally transform: Legal policies and government support; digitalization process; safety and security of enterprise information; enterprise digital transformation strategy; enterprise human resources; organizational structure and business processes of enterprises.

Huong (2023), factors affecting digital transformation of enterprises in Binh Duong province. The study identified 7 factors affecting digital transformation of enterprises in Binh Duong province, which are: Legal policies and government support; safety and security of enterprise information; digitalization process; enterprise digital transformation strategy; logistics services and customer support; enterprise human resources; organizational structure and business processes of enterprises.

3. Theoretical basis and research methods

3.1. Theoretical basis

Based on a system of domestic and foreign research documents on factors affecting the digital transformation capability of enterprises. Based on current reality and characteristics of small and medium enterprises in the agricultural sector. The author proposes 7 factors affecting digital transformation capacity in small and medium enterprises in the agricultural sector, including: (1) Leader, (2) Digital business strategy, (3) Staff capacity (4) Corporate culture; (5) Technology platform; (6) Legal policies and support from the government and locality; (7) Capital sources. From there, the author proposes hypotheses H1 to H7 as follows:

H1. Leader positively impacts the digital transformation capacity of enterprises.

H2. Digital business strategy positively impacts the digital transformation capacity of enterprises.

H3. Staff capacity positively impacts the digital transformation capacity of enterprises.

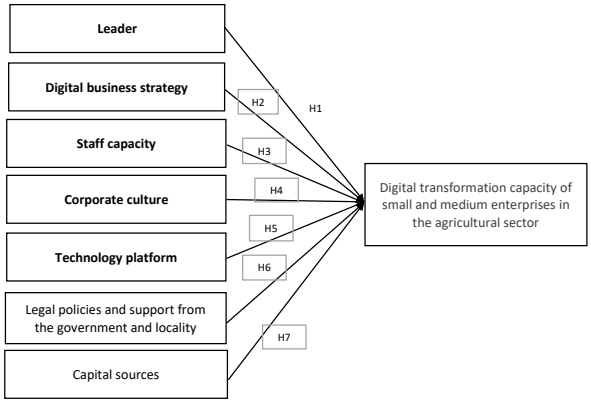
H4. Corporate culture positively impacts the digital transformation capacity of enterprises.

H5. Technology platform positively impacts the digital transformation capacity of enterprises.

H6. Legal policies and support from the government and localities positively impact the digital transformation capacity of enterprises.

H7. Capital sources positively impacts the digital transformation capacity of enterprises. The proposed research model is shown in Figure 1.

Figure 1: Proposed research model



Source: Author's proposal

3.2. Research methods

3.2.1. Research data and data processing methods

The official research was conducted by the author using quantitative research methods, aiming to re-verify the scales in the research model through a questionnaire surveying managers of small and medium enterprises in the agricultural sector in Quang Ninh province. All data in the questionnaire was processed by the author with the support of

Smart PLS 3.2.9 software. The number of samples was 200.

In this study, Smart PLS 3.2.9 software was used for structural equation modeling (SEM). This technique was chosen due to its proven effectiveness in predicting model structures and contributing to theory building. In addition, PLS-SEM is famous for its ability to manage complex variable associations, including multiple indicators and analyze direct and indirect effects between variables in the model. To strengthen the reliability and validity of the study, the measurement model underwent rigorous estimation, an important step that confirms the robustness and accuracy of the structural measurements. The structural model was then thoroughly examined to confirm its validity and calculate the coefficient of determination (R2).

3.2.2. Scale of variables in the research model

The scale of variables in the research model is mainly based on previous studies, the scale is shown in Table 1

Table 1. Scale of factors affecting digital transformation capacity of small and medium enterprises in the agricultural sector

Code	Factor/Scale
LD	**Leader**
LD1	Business leaders are very interested in digital transformation.
LD2	Leaders have a positive attitude towards digital transformation of the business
LD3	Leaders use new technology applications in interaction
LD4	Leaders continuously learn to develop their capabilities to meet the requirements of digital transformation
LD5	Leaders strongly support proposals to apply technology to digitize operational and management processes in businesses
CLKD	**Digital business strategy**
CLKD1	Digital transformation goals are mentioned in the business strategy of the enterprise.
CLKD2	Enterprises have deployed and used database systems
CLKD3	Corporate strategy towards changing operating model
CLKD4	Businesses aim to optimize customer experience on digital platforms
NNL	**Staff capacity**
NNL1	Employees use information technology applications well
NNL2	The business train employees to use digital applications
NNL3	Employees have a positive attitude towards new technology applications
NNL4	Businesses with specialized staff in the field of information technology
VHDN	**Corporate culture**
VHDN1	Each individual in the business is willing to share knowledge and experience with each other.
VHDN2	The spirit of mutual learning is always promoted.
VHDN3	Each individual is always proactive in work.
VHDN4	The coordination of work within the enterprise is very good.
NTCN	**Technology platform**
NTCN1	Businesses are using websites to deliver information.
NTCN2	Businesses allow employees to use personal electronic devices for work purposes
NTCN3	Businesses are using internal interaction systems to reduce direct assignment
NTCN4	Businesses using cloud computing technology in internal management
NTCN5	Businesses have created digital workspaces.
CS	**Legal policies and support from the government and locality**
CS1	The government and localities have policies to support digital services.
CS2	Government and localities have a digitalization roadmap for businesses
CS3	Government and localities create infrastructure for businesses to transform digitally
NV	**Capital sources**
NV1	Enterprises ensure sufficient capital to cover digital transformation technology infrastructure costs
NV2	Businesses that can afford to pay for high-quality employees to meet digital transformation
NV3	Enterprises ensure payment to digital transformation service providers
CDS	**Digital transformation capacity of small and medium enterprises in the agricultural sector**
CDS1	Businesses can absolutely bring new values and experiences to customers on digital technology platforms.
CDS2	Businesses are fully capable of successful digital transformation.
CDS3	Businesses can achieve higher business efficiency after digital transformation.

Source: Author's Proposal

4. Research results and discussion

4.1. Measurement Model Verification

The study was conducted by the author using quantitative research methods, aiming to re-examine the scales in the research model through a questionnaire surveying managers of small and medium enterprises in the agricultural sector in Quang Ninh province.

This study proposes a measurement model including eight factors: Staff capacity (NNL_{NN}), Capital resources (NV_{NN}), Legal policies and support of the government and locality (CS_{NN}), Technology platform ($NTCN_{NN}$), Leader (LD_{NN}), Digital business strategy ($CLKD_{NN}$), Corporate culture ($VHDN_{NN}$) and Digital transformation capacity of small and medium enterprises in the agricultural sector in Quang Ninh province (CDS_{NN}). The reliability and validity of the model were assessed using several statistical methods. First, an analysis of the outer loading factor was used on the model items, the minimum value = 0.591 all exceeded the acceptable threshold of 0.5 (Hair et al., 2016) thereby verifying the adequacy of all items. The reliability of the questionnaire was next assessed, using the Cronbach alpha method, which yielded values greater than 0.7. According to Devellis (2016) values equal to or above 0.7 are acceptable, thus indicating good reliability of the questionnaire in the study. Composite reliability (CR) and Average Variance Extracted (AVE) scores were used to assess the validity of the questionnaire. All CR values exceeded 0.7 (Bagozzi and Yi, 1988) and all AVE values were greater than 0.5 (Hair et al., 2014) indicating strong internal consistency and validity, thus acceptable for the model constructs.

Table 2. Results of testing the scales in the model of factors affecting digital transformation capacity for small and medium enterprises in the agricultural sector in Quang Ninh province

Factors	Scale symbols	External load factor	Cronbach's Alpha	Composite reliability (CR)	Average variance (AVE)
Digital transformation capacity of small and medium enterprises in the agricultural sector	CDS_{NN} 1	0.939	0.966	0.966	0.978
	CDS_{NN} 2	0.984			
	CDS_{NN} 3	0.980			
Digital business strategy	$CLKD_{NN}$ 1	0.726	0.745	0.752	0.840
	$CLKD_{NN}$ 2	0.742			
	$CLKD_{NN}$ 3	0.700			
	$CLKD_{NN}$ 4	0.842			
Legal policies and support from the government and locality	CS_{NN} 1	0.888	0.894	0.898	0.934
	CS_{NN} 2	0.928			
	CS_{NN} 3	0.909			
Leader	LD_{NN} 1	0.848	0.867	0.867	0.905
	LD_{NN} 2	0.841			
	LD_{NN} 3	0.841			
	LD_{NN} 4	0.854			
	LD_{NN} 5	0.654			
Staff capacity	NNL_{NN} 1	0.963	0.958	0.961	0.970
	NNL_{NN} 2	0.927			
	NNL_{NN} 3	0.940			
	NNL_{NN} 4	0.941			
Technology platform	$NTCN_{NN}$ 1	0.868	0.895	0.942	0.919
	$NTCN_{NN}$ 2	0.769			
	$NTCN_{NN}$ 3	0.849			
	$NTCN_{NN}$ 4	0.890			
	$NTCN_{NN}$ 5	0.785			
Capital sources	NV_{NN} 1	0.918	0.921	0.927	0.950
	NV_{NN} 2	0.916			
	NV_{NN} 3	0.953			
Corporate culture	$VHDN_{NN}$ 1	0.591	0.728	0.747	0.831
	$VHDN_{NN}$ 2	0.793			
	$VHDN_{NN}$ 3	0.775			
	$VHDN_{NN}$ 4	0.802			

Source: Author's survey results

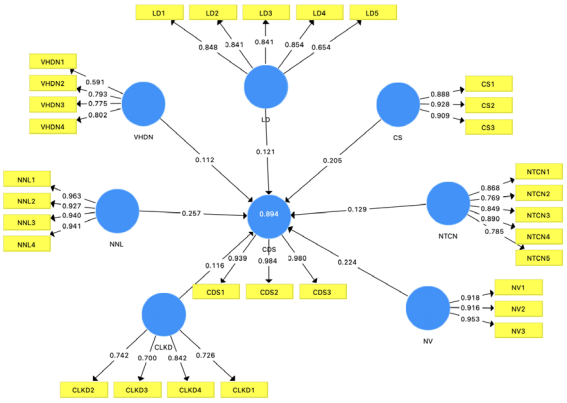
4.2. Structural Model Validation

A thorough examination of the structural model in the investigation involves a multifaceted approach, examining the magnitude and significance of the path coefficients, verifying the absence of multicollinearity through VIF scores between constructs, and assessing the extent of predictive relevance. The magnitude of the relationships in the model was determined through the path coefficients along with their corresponding p-values to confirm statistical significance. In addition, the R2 values associated with each construct exceeded the minimum threshold of 0.10, according to the guidelines given by Hair et al. (2011), indicating an acceptable level of explanatory power. In addition, the Q2 values were greater than 0, reflecting that the endogenous constructs of the model met the predicted relevance (Sarstedt et al., 2021). Taken together, these assessments validated the reliability and effectiveness of the structural model in providing insight into the tested constructs.

Table 3. Results of the impact of variables in the model of factors affecting digital transformation capacity for small and medium enterprises in the agricultural sector in Quang Ninh province

Hypothesis	Coefficient Beta	Sample mean	Standard deviation	Coefficient T	Significance level P	Conclude
$CLKD_{NN}$ -> CDS_{NN}	0.116	0.114	0.044	2.618	0.009	Significant
CS_{NN} -> CDS_{NN}	0.205	0.203	0.053	3.876	0.000	Significant
LD_{NN} -> CDS_{NN}	0.121	0.119	0.032	3.752	0.000	Significant
NNL_{NN} -> CDS_{NN}	0.257	0.257	0.047	5.437	0.000	Significant
$NTCN_{NN}$ -> CDS_{NN}	0.129	0.127	0.037	3.492	0.001	Significant
NV_{NN} -> CDS_{NN}	0.224	0.228	0.037	6.011	0.000	Significant
$VHDN_{NN}$ -> CDS_{NN}	0.112	0.112	0.050	2.218	0.027	Significant

Figure 2: PLS-SEM model results of factors affecting digital transformation capacity for small and medium enterprises in the agricultural sector in Quang Ninh province



Source: Author's survey results

Table 3 and Figure 2 depict a full assessment of the relationships between the variables in the structural model. Thereby demonstrating that Staff capacity creates the most direct, largest and significant impact on the digital transformation capability of the Enterprise ($\beta = 0.257$, significance level $p < 0.001$), confirming the significant link between these two variables. The second most influential factor or variable on the digital transformation capacity of an Enterprise is Capital with the value of $\beta = 0.224$, p value < 0.001, reinforcing the direct and strong impact of Capital. The third most influential factor or variable on the digital transformation capacity of an Enterprise is Legal policies and support from the government and locality with the value of $\beta = 0.205$, p value < 0.001. The fourth most influential factor or variable on the digital transformation capability of an Enterprise is Technology Platform with the value of $\beta = 0.129$, p value $= 0.001$. The fifth most influential factor or variable on the digital transformation capability of an Enterprise is Leadership with the value of $\beta = 0.121$, p value < 0.001. The sixth most influential factor or variable on the digital transformation capability of an Enterprise is

the Business Strategy factor with the value of β = 0.116, p value = 0.009. The seventh most influential factor or variable on the digital transformation capability of an Enterprise is the Corporate Culture factor with the value of β = 0.112, p value = 0.027.

4.3. Regression analysis results

The R2 coefficient is 0.894, which means that the independent variables in the research model explain 89.4% of the change in the dependent variable, which is the digital transformation capacity of small and medium enterprises in the agricultural sector in Quang Ninh province. It can be seen that the research model with the author's independent variables meets the research requirements. Beta regression coefficients of independent variables have a positive or negative impact on the dependent variable, which is the digital transformation capacity of small and medium enterprises in the agricultural sector in Quang Ninh province. All beta coefficients are positive, indicating a positive impact of the independent variables on the dependent variable. Thus, the research hypotheses H1, H2, H3, H4, H5, H6, H7 are all confirmed. This result is consistent with previous studies by authors Stoianova & colleagues (2020), Singhdong et al. (2021), Chu Ba Quyet (2021), Khan et al. (2022). When employee capacity; capital; legal policies and support from the government and locality; technology platform; leadership; business strategy; corporate culture are perfected, it will promote the digitalization of businesses.

Conclusion

The research results show that all factors including staff capacity, capital, legal policies and support from the government, locality, technology platform, leadership, business strategy and corporate culture have a positive and statistically significant impact on the digital transformation capacity of small and medium-sized enterprises in the agricultural sector in Quang Ninh province. In particular, staff capacity is the factor with the strongest impact, followed by capital, showing the key role of human resources and finance in the digital transformation process. To improve employee capacity, small and medium-sized enterprises in the agricultural sector need to focus on training and developing human resources, while effectively using and mobilizing financial resources to invest in digital technology. As for Quang Ninh province, the province needs to develop training programs and foster digital human resources associated with agricultural production practices, and at the same time issue policies to encourage the attraction and retention of high-quality workers. Next, there needs to be a financial support mechanism such as a support fund, preferential credit packages or loan guarantee policies to enable businesses to invest in digital infrastructure. At the same time, the development of shared digital infrastructure (high-speed internet, open data platforms, digital logistics) needs to be focused on to reduce investment costs for businesses. In addition, local authorities need to strengthen communication, digital strategy consulting and build pilot models of digital agricultural enterprises for replication.

Thus, the synchronous combination of businesses' efforts and timely and effective support policies from Quang Ninh province will create a solid foundation, contributing to promoting the digital transformation process in small and medium-sized enterprises in the agricultural sector, towards modern, effective and sustainable development in the period of the 4.0 industrial revolution.

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