

How internal factors determine digital transformation: The moderating role of leader's project management competence

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ABSTRACT

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Digital transformation refers to technological application with a comprehensive shift in corporate governance's mindset, structure, and strategy. In particular, digital transformation project management is key in ensuring that digital transformation initiatives are implemented on schedule and achieve the set goals. This study investigates the importance of a leader's project management competence and other internal factors in successfully implementing digital transformation projects. Through Partial Least Squares Structural Equation Modeling (PLS-SEM), data collected from questionnaires administered to 436 small and medium-sized enterprises (SMEs) in Thanh Hoa, Vietnam shows that all four internal factors included in the model directly affect the transform digital ability and indirectly affects the level of digital transformation of SMEs, in which the most decisive influence comes from digital transformation strategy, followed by the influence of corporate culture, technology platform and finally workforce competence. More specifically, this study has demonstrated that an enterprise's digital transformation can be considered a project, and the leader's project management competence determines the project's success. The project management capacity of the enterprise leaders not only directly affects the digital transformation results but also plays a positive moderator in the association between digital transformation capability and the digital transformation level of SMEs. The results suggest several recommendations for leaders of SMEs in Thanh Hoa Province to improve project management capacity, thereby promoting the digital transformation process.

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1. Introduction

Digital transformation (DT) has become a top priority for businesses across industries in the current growing business world. From undertaking emerging technologies and procedures to reforming business models, DT requires careful planning and implementation. DT is broadly defined as the incorporation of technology into operations of an enterprise, from its production to logistics. Therefore, it enhances operational efficiency and ensures long-term sustainability (Li et al., 2018). In today's fiercely competitive market, digital transformation offers a competitive edge and helps businesses reduce costs and increase their capacity to integrate into the global economy (OECD, 2017).

In Vietnam, according to Anh and Nuong (2022), DT in business may improve business efficiency, management efficiency, enhance competitiveness, and create new values. Thus, it is not only the application of technology but also a comprehensive transformation in thinking, structure, and corporate governance strategy, and digital transformation is also a business project with clear business goals. Therefore, digital transformation project management (PRM) plays a key role in ensuring that digital transformation initiatives are implemented on schedule, achieve the set goals, and contribute to building sustainable capacity for the enterprise. When carrying out a DT project, the manager needs to take responsibility for managing and predicting possible obstacles. In other words, for the success of the project, they have to lead and cooperate with team members to accomplish it as scheduled and with the financial capacity. Also, project managers (PTs) are responsible for giving directions and building up team spirit.

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Small and medium enterprises (SMEs) are essential for developing the economy. According to Thanh Hoa Department of Planning and Investment, as of June 30, 2024, Thanh Hoa Province had around 36,000 registered enterprises. Of these, more than 20,000 enterprises operate and generate revenue, and the number of SMEs accounts for about 97.4%, suggesting that DT is an important factor for SMEs in Thanh Hoa to grow further. Nevertheless, different enterprises, to successfully transform digitally, may need to clearly understand the factors affecting the ability to transform digitally, including factors inside and outside enterprises, thereby having directions for improvement and innovation appropriate to each specific stage of the process.

Since most, if not all, enterprises operate through projects, their preparation is generally viewed through the competencies of the PT and team members (Marnewick & Marnewick, 2019). Careful and complex technological plans can yield successful outcomes (Radujković & Sjekavica, 2017). PTs, therefore, may have to satisfy the need for permanent development and acquisition of essential competencies (Ribeiro et al., 2021). Managing digital transformation projects poses many challenges, from coordinating diverse resources to responding to technological and market risks and ensuring that long-term business objectives are not affected by sudden changes. To meet these requirements, PTs need a good understanding of core concepts, sound PRM skills, and the ability to integrate sustainability goals into the project implementation process.

Most previous studies on the digital transformation of SMEs have focused on analyzing the influence of factors (including internal and external factors of the enterprise) on the ability and results of enterprises' digital transformation (e.g., Anh & Nuong, 2022; Man, Trang & Lan, 2024). Some other studies mention the importance of leadership in the DT process from the view of digital leadership capacity, such as the study by De Araujo et al. (2021) and Senadjki et al. (2023). However, enterprises' DT in a business project is underexplored, although the leader's PRM capacity is an important factor moderating the results of DT. Therefore, this study seeks empirical evidence about the influence of internal factors on DT capability and the impact of DT capability on the DT level of SMEs with the moderating role of the PRM capacity of leaders. The study is conducted using data collected from 436 SMEs in Thanh Hoa province, employing the PLS-SEM approach, thus concluding the influence of factors on the DT capabilities of enterprises. Findings can suggest implications for business leaders to improve their project management capabilities. The limitations in the competencies of PTs may be recognized, suggesting other recommendations for businesses to promote the DT process.

2. Literature Review

2.1. PRM Competence

PRM competency model was first developed with three main competency components: input, personal, and output competency (Crawford, 2005). Görög (2013), in his PRM competency model, defined PT with three main competencies: knowledge, skills, and attitudes. Accordingly, PT competencies, unlike PRM competencies, have personal characteristics that, in reality, affect the performance of the business. These two models, developed by Crawford and Görög, as said, identify themselves to be vertical. As Misbahuddin et al. (2024) noted, PT's capability should include the skills and knowledge to effectively complete projects to the end. Therefore, the capacities are not still developed throughout a project, resulting in the maturation and success of the business (Yazici, 2020).

Gruden and Stare (2018) highlight the role of the manager's behavioral competencies. In particular, they are essential to the accomplishment of a project. In the current business landscape, projects are considered a building block of organizational strategy. To demonstrate the growing complexity of the business sector, Horváth (2019) suggested that the required PRM skill set is constantly changing, therefore, introducing an integrated model depicting the comprehensive PRM abilities. This horizontal model consists of three main dimensions: (1) technical, (2) human, and (3) conceptual and organizational capabilities. The competencies can be vertically divided into four basic levels, comprising abilities and personal characteristics, based on Görög's (2013) argument that the PT's and PRM's competence should be diverged. To go further, Clarke (2012) believes that there are three main components of leadership: (1) style, (2) behaviors, and (3) personalities. Accordingly, leadership can contribute to the productivity of project staff. Also, A successful leader may need to motivate the project's staff to achieve the project's goals. Meyer (2014) believes PTs have behavioral, managerial, and emotional competencies.

As Simion and associates (2018) put it, PRM in the present business world has three main features: digitalization, professionalization, and the utilization of agile approaches. In a similar vein, Industry 4.0 allows for greater flexibility, customization, improved quality, and productivity; meanwhile, projects develop in size, complexity, and structure. PTs and colleagues, as a result, need to be more efficient, flexible, and dynamic (Ribeiro et al., 2021). However, PRM skills and knowledge that have been well documented in the literature are also important. Therefore, leaders in enterprises, especially SMEs, must accept the new role and be ready to develop their skills, prioritizing PRM capability to lead enterprises to implement digital transformation projects successfully. In this study, the authors evaluate the PRM competencies of SME leaders according to the scales based on the vertical approach by Horváth's (2019) competency framework model.

2.1.2. Digital transformation

According to Cichosz (2018), digital transformation enables businesses to change how they operate and deliver services while creating new business models that increase revenue and optimize operational efficiency. Li et al. (2018) suggest that digital transformation represents the highest level of digital skills, where technology fosters innovation and creativity, leading to

significant changes across professional and knowledge fields. Similarly, Teng, Wu, & Yang (2022) expand this by highlighting that digital transformation requires changes in business processes, organizational structures, and strategic models, enabling businesses to adapt effectively to the digital business environment. DT is defined as the integration of digital technology into enterprises, basically shifting its activities ranging from its operations to delivery issues. Therefore, PRM organizes, plans, and manages resources to fulfill earlier determined goals and expectations (Salvini et al., 2022). To better understand the factors influencing digital transformation, they can be categorized into internal and external factors. According to Tarute et al. (2018), internal factors include a business's digital strategy, leadership, workforce, and technological infrastructure. Internal factors are pivotal in shaping a company's ability to implement digital transformation successfully. By aligning these factors, companies can overcome challenges and leverage opportunities associated with digital transformation, ensuring long-term success. Nadkarni and Prügl (2021) conducted a systematic review. Results showed three main foci for the success of a DT project: technology (33%), organization (34%), and organization (33%). Regarding the organization, the four factors mentioned most frequently and impacting the outcomes of DT are (1) management, (2) methods, (3) staff abilities, and (4) culture.

2.2. Hypothesis Development

2.2.1. Technological platform (TP) and DT Capability (DTP)

Salvini et al. (2020) highlighted the importance of technologies in enabling DT, while Magistretti et al. (2019) emphasized AI as a key driver of process automation and innovation. Choosing the right technology that aligns with an enterprise's business model, financial resources, and market trends is critical to the accomplishment of DT (Gopal et al., 2019). For instance, the Internet of Things (IoT) has improved operational efficiency and competitiveness in production and supply chains (Salvini et al., 2020). Li et al. (2018) further demonstrated how digital platform service providers, such as Alibaba, are important to supporting SMEs' DT by catering to necessary IT functionalities and services, even for companies with limited resources. In Vietnam, Anh & Nuong (2022) confirm that technological platforms are decisive factors in enabling businesses to undergo digital transformation successfully. The author proposes a hypothesis about the influence of technology platforms on digital transformation capabilities as follows:

H₁: *Technological platform has a positive relationship with an enterprise's ability to undergo digital transformation.*

2.2.2. Digital transformation strategy (DTS) and DTP

A good definition of digital strategy is important for guiding a company through its DT journey. Khan et al. (2022) argue that a digital strategy serves as a detailed roadmap, outlining the methods and tools a business will employ to achieve seamless digital transformation and address challenges effectively. A strong digital strategy ensures that transformation initiatives align with overall business objectives. Min and Kim (2021) further demonstrate that companies enhance their digital strategy by leveraging innovative technologies to restructure existing business models and processes, thereby increasing their digital capabilities. A well-executed digital strategy gives businesses a competitive edge, allowing them to adapt effectively to technological advancements. Additionally, Anh and Nuong (2022) confirm that a robust digital strategy is a key determinant of a business's ability to navigate DT. These researchers propose a hypothesis about the association between DTS and DT ability as follows:

H₂: *Digital transformation strategy positively relates to an enterprise's ability to undergo digital transformation.*

2.2.3. Workforce competence (WC) and DTP

Kane (2019) asserts that while technology is necessary for transformation, people are the key to success. Employees must have the skills to use and apply digital technologies effectively. Butschan et al. (2019) argue that having a workforce with strong digital competencies is essential for driving digital transformation within management processes. Similarly, Solberg et al. (2024) suggest that employees' digital thinking and skills influence their engagement with or resistance to digital transformation initiatives. Pelletier and Cloutier (2019) further highlighted the necessity of developing a mutual understanding of digital difficulties among different stakeholders, including the workforce, to enhance the considerations of digital transformation initiatives, particularly in SMEs. Scotto et al. (2023) emphasize the need for continuous workforce development to maintain competitiveness in the digital age. Furthermore, Anh & Nuong (2022) confirm that the capabilities of both leaders and employees are important for measuring the success of DT. From the current literature, we propose the following hypothesis:

H₃: *Workforce competence is positively related to an enterprise's ability to undergo digital transformation.*

2.2.4. Corporate culture (CC) and DTP

DT requires the culture of an organization characterized by continuous validation and sharing (Cardoso et al., 2023). This fosters workflow and business operations transparency and promotes a data-centric mindset among employees. As Busco et al. (2023) suggested, corporate culture is an intangible asset supporting a business's DT. A business that highly appreciates open-mindedness toward reforms can easily accept, undertake, process, and succeed in DT (Kane et al., 2015). Therefore, cultural values should be set early and prioritized to ensure the success of a DT project as DT usually requires the enterprise's creative mindset and desire for growth (Hamdani et al., 2021), aligning with Kane et al.'s (2015) perspective. Therefore, we hypothesize as follows:

H4: Corporate culture positively impacts DT ability.

2.2.5. DT Capability and Digital Transformation Level (DTL)

According to Yu et al. (2022), DT capability is referred to as the enterprise's capacity to utilize high-technology platforms such as information, communication, and control mechanisms, integrating platforms of digital production technologies to effectively and extensively link stakeholders, such as technology providers, manufacturing factories, supply chains, and service providers. Organizations with a DT capability may obtain short-cycle, multiple-variety, and personalized digital operation performance. Digital transformation is a process, and the term "digital maturity" can be explicitly predicted by the state of an enterprise's DT from the level of capability to outcomes achieved in DT (Chanias & Hess, 2016). Teichert (2019) proposed the Capability Maturity Model to describe the maturity level of digital transformation expressed by the specific manifestations of digitalization of enterprises. Digital transformation capability is a prerequisite for businesses to achieve the results set out (Teichert, 2019). When a business has enough capabilities for digital transformation from the internal environment, such as human resources, capital, strategy, technology, and leadership factors, strategies and the external environment of the business, such as support from the government along with the determination of the board of directors and the entire business, the digital transformation results will be shown by five specific levels of digital transformation (Ministry of Information & Communications, 2023). Hypothesis H5 is proposed as follows:

H5: DT Capability has a positive relationship with DTL.

2.2.6. The impact of Leader's project management competence (LPMC) on DTL and Moderating effects of LPMC

Leadership is a significant factor affecting the success of DT projects. Mazzei and Noble (2017) noted that leaders must embrace digital thinking and adapt their decision-making processes using real-time data and open information. Sia et al. (2016) emphasized the importance of continuous learning for leaders to stay ahead of digital trends. According to Scuotto et al. (2023), leadership with a digital mindset is essential for guiding an organization through the complexities of digital transformation. Moreover, Anh and Nuong (2022) highlight that leadership is one of the most critical factors determining digital transformation success within enterprises.

Leaders, as bearers of DT and LPMC, are at the center of an enterprise's DT. Therefore, their knowledge, skills, and styles in PRM strongly influence the organization's sustainability in the technological age (Silvius & Schipper, 2014). LPMCs are used to develop flexible but quality strategies for achieving the enterprise's goals (Ford & Bhargav, 2006). Another study by Carujo et al. (2022) also demonstrated that the shifts related to DT make it difficult to obtain predetermined objectives. Consequently, adopting a PRM method is probably pivotal for the accomplishment of DT projects. Gonçalves et al. (2023) further elaborated on the link between DT and PRM. Accordingly, they proposed that the DT process has a strong connection to PRM, and it is essential to understand the employment of digital technologies in line with business strategies supported by PRM. In the same vein, situated in the core component of this association is the relevance of the managers as they recognize and utilize the knowledge and skills necessary for realizing the needs of DT. Thus, PMs are important in orienting and influencing DT initiatives. From the literature review, we propose the following hypotheses:

H6: LPMC has a positive relationship with DTL.

H7: LPMC significantly moderates the effect of DT capability and the enterprise's DT results (level).

Based on an extensive literature review, we developed a research model to examine the effects of internal factors on the DT of SMEs with LPMC as a moderator. This model is structured to explore how internal factors, including technological platform, DT strategy, workforce competence, and LPMC, determine digital transformation and to investigate the influence of LPMC on the link between DT capability and DT outcomes of SMEs, providing a conceptual framework for this study.

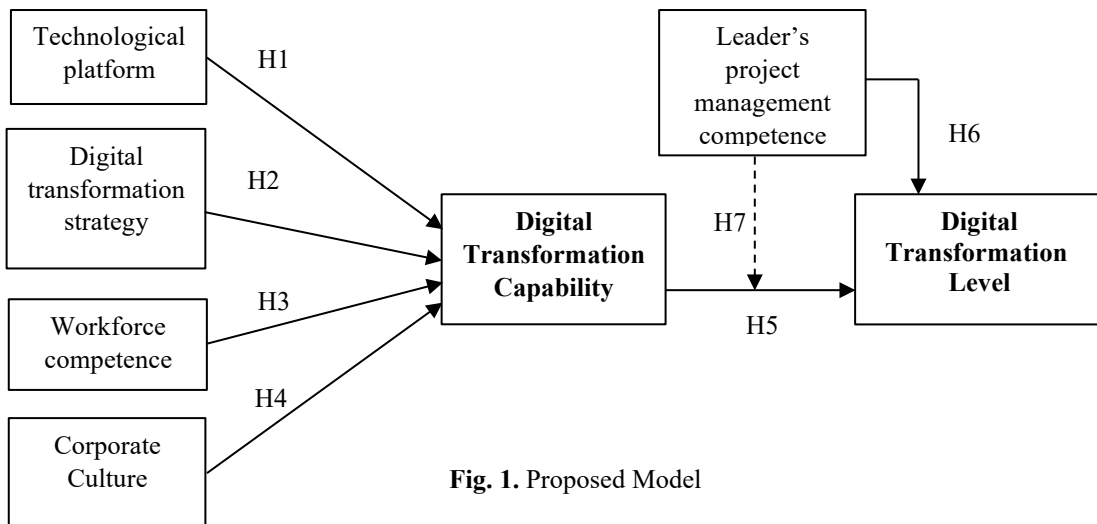


Fig. 1. Proposed Model

3. Methodology and Scales

3.1. Methodology

The present study employed the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. It was used to test hypotheses about the associations between internal factors and the DT level of SMEs. The sample size for data collection was based on Slovin's (1960) formula to increase the generalizability of the population, with:

$$n = \frac{N}{1+N \cdot e^2} \quad (1)$$

where n , N and e are needed sample, target population and margin of error, set at 0.05, respectively. As this study was conducted in the second quarter of 2024, the number of active SMEs in Thanh Hoa Province was 16,508. Accordingly, the minimum sample size needed was calculated to be 391 enterprises. Also, the sample size needed for regression analysis was determined to apply to $50+8m$, with m representing the number of independent variables (Tabachnick & Fidell, 1996). Therefore, as this study had 25 observed variables, the sample size required for regression analysis was at least 250 ($50 + 8.25$) observations. We selected a formal quantitative sample of 450 questionnaires to ensure objectivity and reliability. Data collection procedure: Questionnaires were administered in person and by email, depending on the respondents' availability. The managers in SMEs in Thanh Hoa Province were invited to answer the questionnaires. They were key leaders in the DT process. The 5-point Likert scale expressed their agreement with the given statements. The respondents were given adequate time to complete the questionnaires. They were requested to sign a consent form and given a full description of the ethical issues applied to this study. Collected data were projected into SMART PLS 3.0 for analysis, using several techniques to ensure robust results. We employed several tests. First, the reliability values of the scales were achieved through the use of internal coefficient consistency (Cronbach's alpha). Second, we deployed the Average Variance Extracted (AVE) and Heterotrait-Monotrait Ratio (HTMT) matrix to examine Convergent and discriminant validity. Third, the outer Variance Inflation Factor (VIF) / inner VIF was utilized to explore the collinearity of the observed variables. Finally, we tested the hypotheses by using the PLS-SEM structural model.

3.2. Measurement Scales for Variables in the Research Model

An extensive survey of the literature review suggested the development of measurement scales for the variables used in the research model, as shown in Table 1.

Table 1

The scales and variables

Code	Scale details	Source
DTL	Digital Transformation Level	
DTL1	Strategic direction	
DTL2	Customer experience and omnichannel sales	
DTL3	Supply chain	Ministry of Information & Communications (2023)
DTL4	Information systems and data management	
DTL5	Network security and risk management	
DTL6	Financial, accounting, planning, legal and human resources management	
DTL7	People and organizations	
DTC	Digital Transformation Capability	
DTC1	The business can digitize all business processes and management.	
DTC2	The business can provide new values and experiences to customers via digital platforms.	
DTC3	The business can optimize resource distribution and usage via digital platforms.	Anh & Nuong (2022)
DTC4	The business is capable of successfully implementing digital transformation.	Man, Trang, & Lan (2024)
LPMC	Leader's project management competence	
LPMC1	The leader has a background in project management and a strong understanding of technology and digital tools.	Silvius & Schipper (2014)
LPMC2	Leaders have the skills to plan, organize, and manage enterprise digital transformation projects.	Horváth (2019)
LPMC3	Leader always holds a positive attitude towards the business's digital transformation.	Man, Trang, & Lan (2024)
LPMC4	The leader has competency in guiding and motivating employees in the business and stakeholders in implementing	Horváth (2019)
LPMC5	A leader is someone with a transformational leadership style who can adapt well to the development of technology	Zaman, Nawaz & Nadeem
TP	Technology platform	
TP1	The business uses a website to provide information	Anh & Nuong (2022)
TP2	The business uses an internal interaction system to reduce direct task assignments.	
TP3	The business has created a digital working space.	Man, Trang, & Lan (2024)
TP4	The business uses cloud computing for internal management.	Salvini et al. (2020)
DTS	Digital Transformation Strategy	
DTS1	Digital transformation goals are included in the business strategy	Khan et al. (2022)
DTS2	The business deploys the use of database systems.	
DTS3	The business strategy focuses on changing the operational model	Anh & Nuong (2023)
DTS4	The business aims to optimize customer experience on digital platforms.	Man, Trang, & Lan (2024)
WC	Workforce competence	
WC1	Employees have good knowledge and skills related to digital transformation.	
WC2	Employees can use digital applications proficiently.	Man, Trang, & Lan (2024)
WC3	Employees are ready to learn to improve their capabilities for digital transformation.	
WC4	Employees are provided with resources and opportunities to improve their capabilities for digital transformation.	Anh & Nuong (2022)
CC	Corporate Culture	
CC1	Each individual in the business is willing to share knowledge and experience.	Hamdani et al. (2021)
CC1	Each individual is always proactive in work.	Anh & Nuong (2022)
CC1	Archived information is the common property of the enterprise.	
CC1	The organization invests in targeted digital education and training for all employees.	Cardoso et al. (2023)

Source: compiled from the authors

All indicators of internal factors, including LPMC and DT capability presented in the table, are measured using the 5-point Likert scale (1=strongly disagree; 5 = strongly agree). The level of DT in SMEs was assessed using 7 main pillars (According to Decision 2158/QD-BTTTT of the Minister of Information & Communications, 2023), including Strategic orientation, customer experience, and multi-channel sales, information systems and data management, and people and organization. The level of DT of the enterprises was divided into five cut-off levels as follows: *Level 1: Basic* - enterprises have almost no digital transformation activities); *Level 2 - Developing*: Enterprises have digital transformation goals, business leaders have recognized the role of digital transformation); *Level 3: Developing* - Digital transformation is an indispensable part of the enterprise's strategy; *Level 4: Advanced*: Digital transformation is integrated into all business operations, but many departments still face difficulties. *Level 5: Leading - Pioneering* enterprises, leading in innovation and DT (see Table 1).

4. Results and Discussion

4.1. Measurement Model Evaluation

The findings show that the outer loading coefficients of all variables were greater than 0.7 ($\alpha > 0.7$). This indicated that the data could be further analyzed in the following steps. As Hair et al. (2022) proposed, this value was satisfactory, and the value of 0.4 recommends a rejection.

All the internal coefficient consistency (Cronbach's alpha) of each scale was greater than 0.8. Composite reliability values varied between 0.8 and 0.79. Also, the convergent validity, as shown in the Average Variance Extracted (AVE) index, was all greater than 0.7, meaning that the latent variable explains higher than 70% of the variance). According to Hair et al. (2022), these values indicated acceptability, suggesting further analysis of the data due to the acceptability of the convergent validity of the construct.

Table 2
Reliability and Convergent Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Corporate Culture	0.883	0.893	0.919	0.741
Digital Transformation Capability	0.908	0.915	0.935	0.783
Digital Transformation Level	0.938	0.940	0.950	0.729
Digital Transformation Strategy	0.899	0.919	0.929	0.767
Leader's project management competence	0.899	0.908	0.926	0.714
Technology platform	0.857	0.863	0.903	0.700
Workforce competence	0.847	0.862	0.896	0.682

Source: Results of primary data processing

The discriminant validity of the scales was high enough. The high value of Heterotrait-Monotrait Ratio (HTMT) reflects discriminant validity. According to Henseler et al. (2015), the threshold value is 0.90. The ratio value greater than 0.9 indicated the absence of discriminant validity. In this study, all HTMT values (see Table 3) are lower than the threshold value of 0.9. Therefore, all scales ensure discriminant validity.

Table 3
Discriminant Validity- Heterotrait- monotrait ratio (HTMT)- Matrix

	CC	DTC	DTL	DTS	LPMC	TP	WC
CC							
DTC	0.364						
DTL	0.376	0.597					
DTS	0.299	0.551	0.593				
LPMC	0.317	0.544	0.592	0.694			
TP	0.357	0.323	0.397	0.305	0.322		
WC	0.265	0.261	0.228	0.233	0.229	0.150	

Source: Results of primary data processing

4.2. Evaluation of PLS-SEM Structural Model

4.2.1. Multicollinearity check for independent variables (Inner VIF)

Regarding the structural equation model, the present research used VIP values to explore the multicollinearity of the independent variables. The value of VIF value lower than 5 shows the possibility of collinearity between the independent variables, and the model is no longer reliable for testing the research hypotheses. However, the value of VIF within a range of 3.3 and 5 suggests a potential multicollinearity issue (Hair et al., 2022). In the present research, all VIF values are lower than 3.3. That means multicollinearity did not exist considering the variables in the structural model.

4.2.2. Evaluation of independent variables' explanatory level on dependent variables

R-square was utilized to assess the impact of the independent variables on the dependent variable (see Table 4). The findings indicate that the R-square of the DT capability model was 0.320, suggesting that the internal factors, including technology platform, corporate culture, digital transformation strategy, and workforce competence, were vital determinants in the DT capability of enterprises (contributing 32% of the variation in digital transformation capability). In reality, external factors and government support also affect enterprises' digital transformation capability. Also, to promote successful digital

transformation, SMEs need to start with the internal factors of the enterprise. The results also show that the R-square of the DT level model is 0.421. This means that internal factors, LPMC, and DT capability in this model explained 42.1% of the variance in the level of DT. This shows that in addition to the four internal factors mentioned above that indirectly affect the level of digital transformation, the leader's project management competence is also a direct factor explaining the change in digital transformation results and digital transformation capabilities.

Table 4

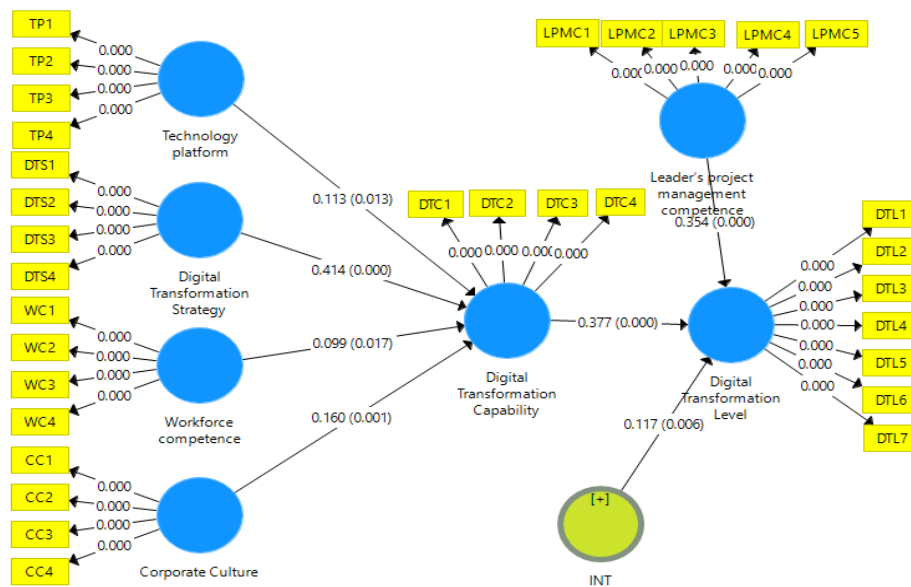
R-square of the models

Dependent variables	R Square	R Square Adjusted
Digital Transformation Capability	0.320	0.314
Digital Transformation Level	0.421	0.417

Source: Results of primary data processing

4.2.3. The results of model estimation

The structural model was estimated to consist of at most iterations of 5000 and a stopping criterion of 0.00000001. The associations (paths) statistically indicated the high levels of regression weights and p -values. The findings indicate that at a 5% significance level (95% confidence level), internal factors, including technology platform, DT strategy, workforce competence, and corporate culture, all affect the DT capability of SMEs in Thanh Hoa Province (p -values in the paths of the structural model are all <0.05). Besides, digital transformation capability as well as the leader's project management competence both impact the digital transformation level, and especially the relationship between the moderator variable (INT) and digital transformation level has been proven to be statistically significant, meaning the leader's project management competence that impacts the link between DT capability and DT level.

**Fig. 2.** PLS-SEM Model Estimation Results

Source: Results of primary data processing

4.3. Hypothesis Testing Results and Discussion

Results of hypothesis testing indicated that seven hypotheses were accepted, employing the PLS-SEM model, at the 5% significance level (see Table 5). The results show that internal factors, including technology platform (TP), digital transformation strategy (DTS), workforce competence (WC), and corporate culture (CC), all affect digital transformation capability (DTC) directly. Of these, digital transformation strategy strongly influences digital transformation capability (influence coefficient is 0.414). Next is the influence of corporate culture (influence coefficient is 0.160); the third factor influencing digital transformation capability is technology platform and workforce competence.

For the digital transformation level (DTL) model, all three variables, the leader's project management competence, digital transformation capability, and INT variable, had a positive effect on DTL. Which DT capability had the most significant impact on DTL, followed by the impact of LPMC. The coefficient of influence of the moderating variable on DTL is 0.117 (p -value <0.05), which means accepting the hypothesis H7 that the LPMC moderated the association between DT capability and DT level, and when LPMC increased, the independent variable DTC had a higher effect on the dependent variable DTL. The research results also confirmed the mediating role of DTC in the relationship between four internal factors and DTL. All four internal factors indirectly affected the DT level, with the impact of DTS on DTL through DTC being the largest and the impact of WC on DTL through DTC being the smallest.

Table 5
Results of Hypothesis Testing

Hypothesis	Relationship	Original Sample	P. Values	Results of Hypothesis Testing	Interpretation
Direct effect					
H1	TP → DTC	0.113	0.013	Supported	Weak effect
H2	DTS → DTC	0.414	0.000	Supported	Strongest effect
H3	WC → DTC	0.099	0.017	Supported	Least effect
H4	CC → DTC	0.160	0.001	Supported	Weak effect
H5	DTC → DTL	0.377	0.000	Supported	Strong effect
H6	LPMC → DTL	0.354	0.000	Supported	Strong effect
H7	INT → DTL	0.117	0.006	Supported	Positive moderating effect
Indirect effect					
	TP → DTC → DTL	0.043	0.032		Weak indirect effect
	DTS → DTC → DTL	0.156	0.000		Strongest indirect effect
	WC → DTC → DTL	0.037	0.027		Least indirect effect
	CC → DTC → DTL	0.060	0.004		Weak indirect effect

Source: Results of primary data processing

The results of data analysis collected from 436 SMEs in Thanh Hoa Province show that digital transformation strategy has the most significant impact among the four internal factors that directly and positively impact the ability to transform digitally. This means that the first factor that businesses need to focus on is strategy, which needs to be put forward and linked to the business development strategy of the business, specifically DT goals are included in the business strategy; the business deploys the use of database systems; the business strategy focuses on changing the operational model, and the business aims to optimize customer experience on digital platforms. This result is also similar to the conclusion of Anh and Nuong (2022), which confirmed that a robust digital strategy is a key determinant of an enterprise's ability to navigate DT. Other studies by Khan et al. (2022) and Min and Kim (2021) have also shown that a digital strategy serves as a detailed roadmap and outlines the methods and tools for businesses to achieve seamless DT and address challenges effectively. DT strategy not only had the most significant impact on the DT capability of the enterprise but also indirectly had the most significant impact on the enterprise's DT level (with an indirect impact coefficient of 0.156). Thus, DT strategy constituted DT capability and indirectly affected the level of DT. Hence, SMEs needed to have a specific and clear strategy from the beginning to guide the DT process for the enterprise.

The second factor that directly and indirectly affects SMEs' DT capability and transformation results in Thanh Hoa is corporate culture, which directly affected the DT capability more strongly. Corporate culture in this study is reflected in the fact that individuals in the enterprise were willing to share knowledge and experience (Hamdani et al., 2021), each individual is always proactive in work, and the enterprise always considers stored information as an ordinary asset for everyone to share and work together (Anh & Nuong, 2022), and the businesses invested in intended technological education and training for their staffs (Cardoso et al., 2023). These factors contribute significantly to the capability and results of digital transformation. This research result is also similar to the previous conclusion by Cardoso et al. (2023) about the importance of culture in DT. The results support the view that organizational culture is viewed as an asset necessary for business acceptance and transformation of digital technologies (Busco et al., 2023).

The next factor within the enterprise that directly impacts the ability to transform digitally and indirectly impacts the results of digital transformation is the digital technology platform. This factor is demonstrated by SMEs using a website to provide information to businesses, customers, and related partners to create a digital working space inside and outside the enterprise, use an internal interaction system to decrease direct assignments, and use cloud computing to manage workloads. There have been many previous studies that confirm that the digital technology platform is a factor that constitutes the ability to transform digitally and determines the level of DT of enterprises, as proposed by Salvini et al.'s (2020) study, which highlighted the role of technologies in enabling digital transformation. Magistretti et al. (2019) emphasized that choosing the right technology that aligns with an enterprise's operation model, financial resources, and market trends is critical to the success of digital transformation. The study by Anh & Nuong (2022) confirmed that technological platforms are decisive factors in enabling businesses to undergo digital transformation successfully.

Employee capacity is the final factor that directly affects the ability to transform digitally and indirectly affects SMEs' digital transformation results. In this study, employee capacity is measured by digital transformation knowledge and skills in using digital platforms at work, such as employees being well-trained in digital transformation knowledge and using digital applications proficiently. In addition, employees are always enthusiastic and proactive in applying digital technology in work and daily communication. Although not the most significant factor determining digital transformation in enterprises, the research results have shown the important role of the human factor in the digital transformation process. This research result is also similar to the results shown in Kane's study (2019), which asserted that people are the key to the accomplishment of DT. Butschan and associates (2019) and Solberg and colleagues (2024) also argued that having a workforce with strong digital competencies is essential for driving digital transformation. Likewise, Anh and Nuong (2022) confirmed that the capabilities of both leaders and employees are crucial in determining the success of DT.

The current study is to demonstrate the role of LPMC in the DT of enterprises through both direct impact on DT results as well as playing a moderating role in the relationship between DT capability and the level of DT achieved by SMEs. In this study, LPMC was demonstrated by knowledge, skills, attitude, and personal features and leadership styles (Horváth, 2019).

In particular, leaders were the key actors in PRM and a good knowledge of digital technology; skills in planning, organizing and managing digital transformation projects of enterprises; leader always holds a positive attitude towards the business's digital transformation and has competency in guiding and motivating employees in the enterprise and stakeholders in implementing the transformation project as well as leaders are people with transformational leadership style, can adapt well to the development of technology and digital tools. These factors directly determine the enterprise's digital transformation level with an impact coefficient of 0.354. In contrast, the digital transformation capability, determined by the four internal factors mentioned above, affects the enterprise's digital transformation level with a slightly higher impact coefficient (0.377). This result proves that in an organization, leadership is always an important factor in leading and determining the success of the DT process (Anh & Nuong, 2022). In the same vein, Liu and associates (2024) also emphasized that leadership influences how digital transformation is managed within the organization. In addition, the results in this study also emphasized the positive moderating role of the variable LPMC on the relationship between DT capability and DT level, and the more LPMC is improved, the stronger the influence of DT capability on the DT outcomes of the enterprise. The conclusions from this study confirm the previous research by Carujo et al. (2022) and Gonçalves and colleagues (2023). That means, in the procedure of undertaking a DT project, the project management capacity of the business leadership team is an important factor that promotes the digital transformation capability of the business to achieve success in digital transformation with specific results.

5. Conclusion, Recommendation and Limitation

5.1. Conclusion

The present study has catered to empirical findings on the importance of internal factors in the DT capability of enterprises. The findings indicate that all four internal factors directly affected the DT capability and indirectly influenced the level of DT of enterprises, in which the most decisive influence comes from digital transformation strategy, followed by the influence of corporate culture, technology platform, and finally workforce competence. More specifically, this study has demonstrated that the digital transformation of enterprises can be considered a project, and LPMC is a key predictor of the project's success. The project management capacity of business leaders not only directly affects the digital transformation results but also plays a positive moderator in the association between DT capability and DT results of SMEs. The more the project management capacity of business leaders is improved, the more it promotes the DT ability of the business to achieve specific results in the DT project.

5.1. Recommendation

The research results emphasize the importance of a leader's project management competence and other internal factors in successfully implementing digital transformation projects. Therefore, the study has proposed several recommendations for leaders of SMEs in Thanh Hoa Province as follows:

First, business leaders, who are also digital transformation PTs, need to understand core concepts, be proficient in modern management tools and methods, and be able to integrate sustainability goals into the digital transformation project implementation process. Second, business leaders must set goals and provide a clear roadmap to achieve digital goals effectively. For businesses to digitally transform effectively without wasting time and money, business leaders need to clearly understand the results they want to achieve, identify areas that need improvement, prioritize investment, and allocate resources effectively. Third, business leaders must continuously learn to master the use of digital devices and applications and have experience managing change and ensuring the digital transformation process takes place smoothly. Fourth, business leaders need to create a digital-ready culture that promotes agility, collaboration, and continuous learning across the entire business to drive successful digital transformation. Finally, business leaders also need to enhance their business's digital transformation capabilities by improving other internal factors, such as gradually improving digital infrastructure and enhancing digital capabilities for employees through training, fostering, and linking digital transformation strategies with the business's production and business strategies.

5.3. Limitation

This study was carried out with sample data from SMEs in Thanh Hoa Province without expanding the scope to other provinces of Vietnam or SMEs worldwide. Therefore, it is recommended that further studies be implemented on LPMC in SMEs across other countries and territories to provide a broader and global perspective.

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