



Driving Digital Transformation in SMEs: The Role of Transformational Leadership, Organizational Mechanisms, and Government Support

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ABSTRACT

Digital transformation has become a critical strategic priority for small and medium-sized enterprises (SMEs), yet its success remains uneven due to limitations in leadership, organizational capabilities, and institutional support. This study investigates the impact of transformational leadership on digital transformation effectiveness (DTE), with a particular focus on the mediating roles of digital culture, innovation climate, and digital skills, as well as the moderating role of government support for digital transformation. Using survey data from 420 SMEs in Hanoi, Vietnam, and surrounding provinces, the study employs partial least squares structural equation modeling (PLS-SEM) to test a comprehensive research model. The results reveal that transformational leadership has a significant positive effect on digital transformation effectiveness, primarily through indirect pathways. Among the mediating mechanisms, digital culture emerges as the most influential driver, followed by digital skills and innovation climate. In addition, government support significantly strengthens the relationship between transformational leadership and digital transformation outcomes, while resource and organizational factors show limited direct effects. This study contributes to the literature by integrating transformational leadership theory, resource-based view, dynamic capabilities, and institutional theory into a unified framework. It highlights that successful digital transformation is driven not only by leadership but also by the alignment of organizational mechanisms and external support conditions. The findings provide important implications for both scholars and practitioners seeking to enhance digital transformation in SMEs.

Keywords: Transformational leadership, Digital transformation effectiveness, Digital culture, Innovation climate, Digital skills, Government support.

Introduction

Digital transformation has become a strategic imperative for small and medium-sized enterprises (SMEs), particularly in emerging economies such as Vietnam, where increasing competitive pressure and rapid technological change require firms to adapt and innovate continuously (Verhoef *et al.*, 2021; Kraus *et al.*, 2022; Sacavém *et al.*, 2025; Tran & Pham, 2026). Despite substantial investments in digital technologies, many SMEs struggle to translate these investments into tangible performance outcomes. This paradox suggests that digital transformation effectiveness (DTE) is not solely determined by technological adoption but is significantly influenced by leadership capability, organizational readiness, and institutional conditions (Vial, 2019; Ramirez *et al.*, 2025; Amadoru *et al.*, 2026). From a leadership perspective, transformational leadership (TL) has been widely recognized as a critical driver of organizational change due to its ability to articulate a compelling vision (Gairabekov *et al.*, 2024; Wu *et al.*, 2026), foster innovation, and mobilize employees toward strategic goals (Bass, 1985; Bass & Riggio, 2006; Avolio *et al.*, 2009; Belfiore *et al.*, 2024; Oliveira & Favaretto, 2025). However, prior research has largely focused on the direct effects of TL on organizational performance, often overlooking the underlying mechanisms through which leadership facilitates digital transformation. In particular, the roles of digital culture (DC), innovation climate (IL), and employees' digital skills (DS) as mediating pathways remain fragmented and insufficiently integrated into a

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comprehensive framework (Westerman *et al.*, 2014; Kane *et al.*, 2015; Van Laar *et al.*, 2017; Van Roekel, 2025; Wright & Matthews, 2025).

In addition to internal organizational factors, the institutional environment plays a crucial role in shaping digital transformation outcomes. Government support for digital transformation (GSDT) (Prime Minister, 2020), including policy incentives, infrastructure development, and regulatory frameworks, has been shown to significantly influence firms' ability to adopt and implement digital technologies, especially in resource-constrained SMEs (OECD, 2021; World Bank, 2022; Ağaçkiran *et al.*, 2023; World Bank, 2024). At the same time, firm-level resource and organizational factors (ROF), such as resource availability, strategic orientation, and organizational flexibility, may confound these relationships, necessitating their inclusion as control variables based on the Resource-Based View (RBV) and Dynamic Capabilities perspectives (Burns & Stalker, 1961; Barney, 1991; Samyuktha & Syam, 2024). Against this backdrop, this study aims to develop and empirically test an integrated research model that examines the impact of transformational leadership on digital transformation effectiveness through the mediating roles of digital culture (Burns & Stalker, 1961; Westerman *et al.*, 2014; Samyuktha & Syam, 2024; Okhagbuzo & Bello, 2025; Van Roekel, 2025), innovation climate, and employees' digital skills. Furthermore, the study incorporates the moderating role of government support for digital transformation and controls for resource and organizational factors to ensure robust, unbiased estimates. Using survey data from 420 SMEs in Hanoi and surrounding provinces, this study seeks to provide both theoretical contributions and practical insights into how SMEs can achieve effective digital transformation (Kraus *et al.*, 2022; Ahn *et al.*, 2025). Based on the above discussion, the study addresses the following research questions:

RQ1: How does transformational leadership influence digital transformation effectiveness in SMEs?

RQ2: To what extent do digital culture, innovation climate, and employees' digital skills mediate the relationship between transformational leadership and digital transformation effectiveness?

RQ3: How does government support for digital transformation moderate the relationship between transformational leadership and digital transformation effectiveness?

RQ4: What is the role of resource and organizational factors in shaping digital transformation outcomes in SMEs?

Theoretical Framework and Research Hypotheses

Theoretical Framework

This study develops a comprehensive theoretical foundation by integrating five complementary perspectives to explain how transformational leadership drives digital transformation effectiveness (DTE) in SMEs. These include: (i) Transformational Leadership Theory, (ii) Dynamic Capabilities Theory, (iii) Sociotechnical Systems Theory, (iv) Organizational Culture and Climate Theory, and (v) Institutional Theory. The integration of these frameworks enables a multi-level explanation that captures leadership influence, organizational mechanisms, technological alignment, and institutional context.

Transformational Leadership Theory provides the core explanatory mechanism for leadership-driven organizational change. Transformational leaders influence outcomes through four key dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1985; Avolio *et al.*, 2009; Özkan Alakaş, 2024).

Dynamic Capabilities Theory explains how firms adapt to rapidly changing environments by developing capabilities to sense opportunities, seize them, and reconfigure internal resources (Teece, 2007). Digital transformation is inherently dynamic and requires continuous adaptation to technological advancements and market shifts. In this study, transformational leadership acts as a catalyst that enhances firms' dynamic capabilities, enabling SMEs to effectively deploy digital technologies and translate them into improved performance outcomes (Özkan Alakaş, 2024; Aubakirova *et al.*, 2026).

Sociotechnical Systems Theory emphasizes the joint optimization of social and technical subsystems within organizations. Digital transformation is not merely a technological upgrade but involves fundamental changes in work processes, organizational structures, and employee roles. The effectiveness of transformation depends on the alignment between technological systems and human factors such as skills, collaboration, and engagement.



Organizational Culture and Climate Theory highlights the role of shared values, norms, and perceptions in shaping organizational behavior (Hambrick & Mason, 1984; Schein, 2010). Digital culture (DC) reflects the extent to which organizations embrace data-driven decision-making, continuous learning, and technological innovation. In contrast, innovation climate (IL) captures the degree of organizational support for creativity and experimentation (Cohen & Levinthal, 1990; Schneider, 1990; Anderson & West, 1998; Westerman *et al.*, 2014; Dewi & Surini, 2024). These constructs represent critical internal mechanisms through which transformational leadership influences digital transformation outcomes.

Institutional Theory provides a macro-level perspective by emphasizing the role of external pressures in shaping organizational behavior (DiMaggio & Powell, 1983; Scott, 2014; Marhana *et al.*, 2025). In emerging economies such as Vietnam, government support for digital transformation (GSDT) constitutes a key institutional force that can either facilitate or constrain firms' transformation efforts. As a form of coercive institutional pressure, GSDT influences how effectively leadership initiatives are translated into digital outcomes by providing policy incentives, infrastructure, and regulatory support (OECD, 2021; Le *et al.*, 2026).

Research Hypotheses

Transformational Leadership and Digital Transformational Effectiveness

Transformational leadership (TL) plays a pivotal role in enabling organizations to navigate complex and uncertain environments. In the context of digital transformation, TL is particularly critical as it aligns digital initiatives with strategic objectives and reduces resistance to technological change. Digital transformation effectiveness (DTE) is conceptualized as a multidimensional construct, including operational efficiency, data-driven decision-making, customer and market outcomes, innovation performance, and organizational agility (Vial, 2019; Verhoef *et al.*, 2021; Alrabiah *et al.*, 2024; Amadoru *et al.*, 2026).

H1a: Transformational leadership positively influences operational efficiency (DTE_OP).

H1b: Transformational leadership positively influences data-driven decision-making (DTE_DT).

H1c: Transformational leadership positively influences customer and market outcomes (DTE_CU).

H1d: Transformational leadership positively influences innovation outcomes (DTE_IN).

H1e: Transformational leadership positively influences organizational agility (DTE_AG).

Transformational Leadership and Digital Culture, Innovation Climate, Digital Skills

TL fosters digital culture (DC) by embedding values such as innovation, data orientation, and continuous learning (Westerman *et al.*, 2014; Kane *et al.*, 2015; Okhagbuzo & Bello, 2025). Leaders who actively promote digital transformation create a shared mindset that supports technology adoption and organizational change. TL enhances the innovation climate (IL) by encouraging creativity, risk-taking, and knowledge sharing (Scott & Bruce, 1994; Anderson & West, 1998; Alwabel & Ahmed, 2025). Through intellectual stimulation and supportive leadership behaviors, employees are empowered to experiment with new digital solutions. TL contributes to the development of employees' digital skills (DS) by supporting training initiatives and fostering a learning-oriented environment (Van Laar *et al.*, 2017; Flores *et al.*, 2026).

H2: Transformational leadership positively influences digital culture (DC).

H3: Transformational leadership positively influences innovation climate (IL).

H4: Transformational leadership positively influences employees' digital skills (DS).

Digital culture and Digital Transformational Effectiveness

Digital culture (DC) enhances the integration of digital technologies by promoting data-driven decision-making, collaboration, and openness to change (Vial, 2019; Edziri *et al.*, 2024). Organizations with strong digital cultures are more likely to achieve improvements in efficiency, decision quality, customer experience, innovation, and agility.

H5a: Digital culture positively influences operational efficiency (DTE_OP).

H5b: Digital culture positively influences data-driven decision-making (DTE_DT).

H5c: Digital culture positively influences customer outcomes (DTE_CU).

H5d: Digital culture positively influences innovation outcomes (DTE_IN).



H5e: Digital culture positively influences organizational agility (DTE_AG).

Innovation Climate and Digital Transformational Effectiveness

Innovation climate (IL) supports experimentation and the development of new ideas, which are essential for digital transformation success (Anderson & West, 1998; Al Sanjary, 2025).

H6a: Innovation climate positively influences operational efficiency (DTE_OP).

H6b: Innovation climate positively influences data-driven decision-making (DTE_DT).

H6c: Innovation climate positively influences customer outcomes (DTE_CU).

H6d: Innovation climate positively influences innovation outcomes (DTE_IN).

H6e: Innovation climate positively influences organizational agility (DTE_AG).

Employees' Digital Skills and Digital Transformational Effectiveness

Employees' digital skills (DS) enable effective use of digital technologies and improve both operational and strategic performance (Ng, 2012; European Commission, 2016; Kibizov *et al.*, 2026).

H7a: Digital skills positively influence operational efficiency (DTE_OP).

H7b: Digital skills positively influence data-driven decision-making (DTE_DT).

H7c: Digital skills positively influence customer outcomes (DTE_CU).

H7d: Digital skills positively influence innovation outcomes (DTE_IN).

H7e: Digital skills positively influence organizational agility (DTE_AG).

Building on Organizational Culture and Climate Theory and Dynamic Capabilities Theory, this study posits that DC, IL, and DS act as mediators in the relationship between TL and DTE. Prior research suggests that leadership effects are often indirect and operate through organizational mechanisms (Avolio *et al.*, 2009; Ng, 2012; Al-Mubarak *et al.*, 2024). In digital transformation contexts, these mediators are critical in translating leadership vision into measurable performance.

H8a: Digital culture mediates the relationship between TL and DTE.

H8b: Innovation climate mediates the relationship between TL and DTE.

H8c: Digital skills mediate the relationship between TL and DTE.

Institutional Theory suggests that external pressures significantly shape organizational behavior (Ng, 2012; Scott, 2014). Government support for digital transformation (GSDT) represents a key institutional factor that influences firms' ability to implement digital initiatives.

H9: Government support for digital transformation positively moderates the relationship between TL and DTE, such that the relationship is stronger when GSDT is high.

Resource and organizational factors (ROF) are included as control variables based on the Resource-Based View (Barney, 1991) and Dynamic Capabilities Theory (Teece, 2007; Okhagbuzo & Bello, 2025; Raghunathan & Chaudhry, 2025). Although ROF may influence DTE directly, they are not the primary focus of this study. Including ROF as a control variable ensures that the estimated effects of TL, DC, IL, DS, and GSDT are not confounded by underlying resource differences.

H10: Resource and organizational factors are controlled for their influence on digital transformation effectiveness.

The proposed research model is shown in **Figure 1**.



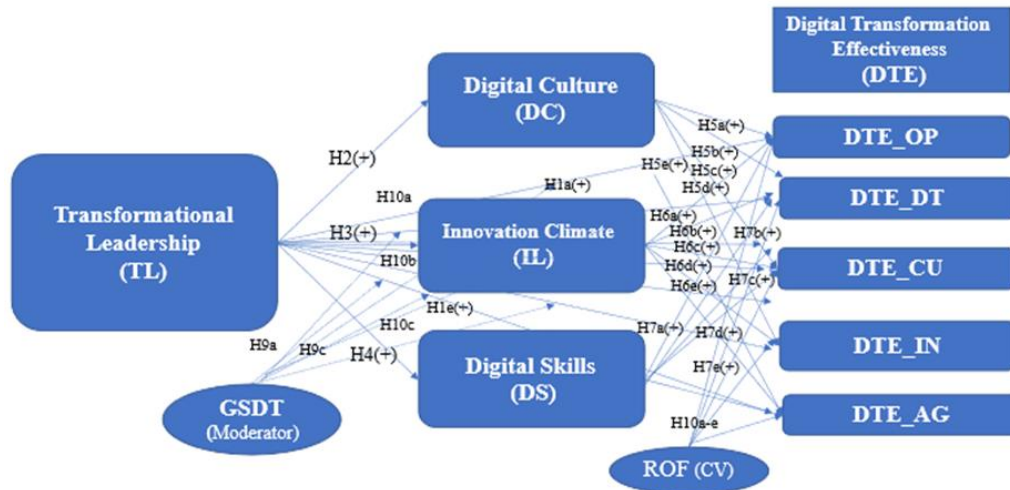


Figure 1. Proposed research model

Materials and Methods

Research Design and Data Collection

A cross-sectional survey was conducted among 420 SMEs located in Hanoi and surrounding provinces. The sample size satisfies both the “10-times rule” and statistical power requirements for PLS-SEM, ensuring robust parameter estimation (Hair *et al.*, 2022). Respondents include middle and senior managers involved in digital transformation, thereby enhancing data reliability and contextual validity.

Before participation, all respondents were informed about the objectives of the study, the voluntary nature of participation, the confidentiality of their responses, and the use of the collected data exclusively for academic research purposes.

Participants were assured that their identities would remain anonymous and that all responses would be reported only in aggregated form. Data were collected through a structured questionnaire distributed both online and in person between Jan 2026 and Feb 2026. A total of 420 valid responses were obtained and retained for subsequent analysis. The descriptive statistics results of the study sample are shown in **Table 1**.

Table 1. Sample profile by demographic and organizational factors

Factor	Category	Frequency	Percentage (%)
Gender	Male	229	54.5
	Female	177	42.1
	Other	11	2.6
	Prefer not to say	3	0.7
Age	< 25	38	9.0
	25-34	121	28.8
	35-44	183	43.6
	45-54	52	12.4
	≥ 55	26	6.2
Education	College/Vocational	75	17.9
	Bachelor's degree	116	27.6
	Master's degree	150	35.7
	Doctorate	49	11.7
	Other	30	7.1
Position	Staff	90	21.4
	Supervisor/Team leader	102	24.3



	Middle management	120	28.6
	Top management	69	16.4
	Other	39	9.3
Tenure	1-3 years	30	7.1
	4-6 years	135	32.1
	7-10 years	159	37.9
	>10 years	96	22.9
Department	IT/Digital transformation	85	20.2
	Operations	115	27.4
	Business/Marketing	94	22.4
	Finance/Accounting	48	11.4
	HR	41	9.8
	Other	37	8.8
Firm size (employees)	<10	83	19.8
	10-49	105	25.0
	50-99	129	30.7
	100-199	74	17.6
	200-300	29	6.9
Industry	Manufacturing	115	27.4
	Trade & Services	127	30.2
	Logistics	48	11.4
	Construction	53	12.6
	Other	77	18.3
Location	Hanoi	191	45.5
	Bac Ninh	67	16.0
	Hung Yen	32	7.6
	Phu Tho	28	6.7
	Ninh Binh	30	7.1
	Hai Phong	34	8.1
	Other	38	9.0
Years of digital transformation	Not implemented	75	17.9
	<1 year	96	22.9
	1-3 years	136	32.4
	4-6 years	72	17.1
	>6 years	41	9.8
Digital transformation priority	Low	66	15.7
	Medium	112	26.7
	High	117	27.9
	Very high	125	29.8
Dedicated DT unit	None	176	41.9
	<1 year	164	39.0
	≥2 years	80	19.0

(Source: Data collection results of the authors)

Measurement Development

All constructs were operationalized using validated multi-item scales adapted from prior studies to ensure content validity and comparability. Specifically, TL was measured using the MLQ framework (Bass & Avolio, 1994), while DC, IL, and DS were adapted from established digital transformation and innovation literature (Anderson & West, 1998; Westerman *et al.*, 2014; Van Laar *et al.*, 2017). DTE was conceptualized as a multidimensional construct capturing operational, strategic, and innovation outcomes (Vial, 2019; Verhoef *et al.*, 2021). Government support

(Prime Minister, 2020) (GSDT) and resource-organizational factors (ROF) were incorporated to reflect institutional and firm-level conditions (Barney, 1991; OECD, 2021).

Data Analysis

Data were analyzed using SmartPLS 4 following a two-stage approach (Hair *et al.*, 2022). Firstly, the measurement model was evaluated in terms of indicator reliability, internal consistency (CA, CR), convergent validity (AVE), and discriminant validity (HTMT) (Fornell & Larcker, 1981; Henseler *et al.*, 2015). Secondly, the structural model was assessed through collinearity diagnostics (VIF), path significance via bootstrapping (5,000 resamples), explanatory power (R^2), effect size (f^2), predictive relevance (Q^2), and model fit (SRMR).

Mediation effects were examined using bootstrapped indirect effects and Variance Accounted For (VAF), allowing differentiation between partial and full mediation (Hair *et al.*, 2022). The moderating role of GSDT was tested via interaction terms and complemented by multi-group analysis (MGA) to assess boundary conditions.

Results and Discussion

Measurement Model Assessment

The measurement model was first assessed to ensure the reliability and validity of all constructs. All indicator loadings are acceptable, with the majority exceeding the recommended threshold of 0.70, indicating satisfactory indicator reliability. A small number of items with slightly lower loadings were retained due to their theoretical relevance and acceptable contribution to construct validity.

Internal consistency reliability is confirmed in **Table 2**, where all constructs exhibit Cronbach's Alpha and Composite Reliability values above 0.80, indicating strong reliability (Chin, 1998; Hair *et al.*, 2022). Convergent validity is also established, as all AVE values exceed the threshold of 0.50 (Fornell & Larcker, 1981). Discriminant validity is supported by the HTMT results, with all values below 0.85 (Henseler *et al.*, 2015), and further confirmed by the Fornell-Larcker criterion, where the square root of AVE exceeds inter-construct correlations.

Overall, the results demonstrate that the measurement model meets all reliability and validity criteria, providing a solid basis for structural analysis. All indicators load acceptably on their respective constructs. Most loadings exceed 0.70, indicating satisfactory indicator reliability. A few items fall slightly below 0.70 but remain above 0.65 and can be retained because the constructs still meet composite reliability and AVE requirements. Overall, the measurement items adequately represent their latent variables.



Table 2. Reliability and convergent validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
DC	0.909	0.909	0.926	0.610
DS	0.919	0.921	0.934	0.640
DTE_AG	0.802	0.803	0.884	0.717
DTE_CU	0.817	0.818	0.891	0.731
DTE_DT	0.807	0.808	0.886	0.721
DTE_IN	0.801	0.804	0.883	0.716
DTE_OP	0.818	0.818	0.892	0.733
GSDT	0.898	0.921	0.921	0.661
IL	0.921	0.921	0.935	0.644
ROF	0.868	0.887	0.894	0.630
TL	0.892	0.894	0.911	0.508

(Source: Data processing results from Smart PLS 4.0 by the authors).

Structural Model Results

The structural relationships were assessed using a bootstrapping procedure with 5,000 resamples to evaluate the significance of path coefficients, indirect effects, and moderating effects. The detailed results are shown in **Figure 2**.

Bootstrapping allows for robust estimation of standard errors, t-values, and p-values without relying on distributional assumptions (Hair *et al.*, 2022). The results of the bootstrapping analysis are presented in **Table 3**.

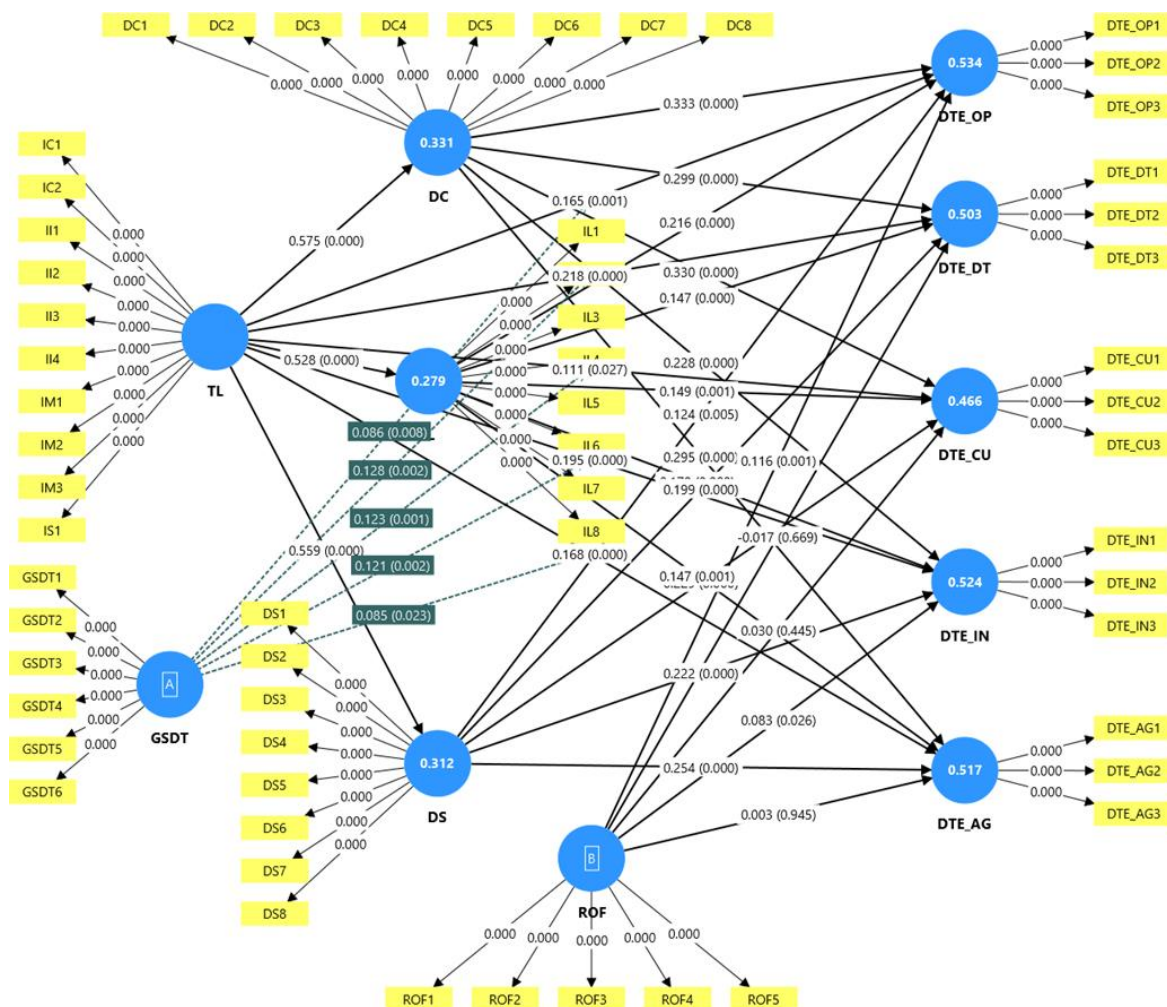


Figure 2. SEM-PLS Bootstrapping 5000 resamples results
(Source: Data processing results from Smart PLS 4.0 by the authors).

Table 3. Direct effects and hypothesis testing

Hypothesis	Path	β	t-value	p-value	Decision
H2	TL $\rightarrow$ DC	0.575	18.103	<0.001	Supported
H3	TL $\rightarrow$ IL	0.528	14.714	<0.001	Supported
H4	TL $\rightarrow$ DS	0.559	16.410	<0.001	Supported
H1a	TL $\rightarrow$ DTE_OP	0.165	3.378	<0.001	Supported
H1b	TL $\rightarrow$ DTE_DT	0.218	4.643	<0.001	Supported
H1c	TL $\rightarrow$ DTE_CU	0.111	2.214	0.027	Supported
H1d	TL $\rightarrow$ DTE_IN	0.195	4.165	<0.001	Supported
H1e	TL $\rightarrow$ DTE_AG	0.168	3.686	<0.001	Supported
H5a	DC $\rightarrow$ DTE_OP	0.333	7.306	<0.001	Supported
H5b	DC $\rightarrow$ DTE_DT	0.299	6.840	<0.001	Supported
H5c	DC $\rightarrow$ DTE_CU	0.330	6.560	<0.001	Supported
H5d	DC $\rightarrow$ DTE_IN	0.228	4.911	<0.001	Supported

H5e	DC → DTE_AG	0.295	6.610	<0.001	Supported
H6a	IL → DTE_OP	0.216	4.788	<0.001	Supported
H6b	IL → DTE_DT	0.147	3.504	<0.001	Supported
H6c	IL → DTE_CU	0.149	3.363	<0.001	Supported
H6d	IL → DTE_IN	0.178	4.188	<0.001	Supported
H6e	IL → DTE_AG	0.147	3.376	<0.001	Supported
H7a	DS → DTE_OP	0.124	2.821	0.005	Supported
H7b	DS → DTE_DT	0.199	4.559	<0.001	Supported
H7c	DS → DTE_CU	0.229	4.492	<0.001	Supported
H7d	DS → DTE_IN	0.222	5.066	<0.001	Supported
H7e	DS → DTE_AG	0.254	5.748	<0.001	Supported
H10a	ROF → DTE_OP	0.116	3.233	0.001	Supported
H10b	ROF → DTE_DT	-0.017	0.428	0.669	Not supported
H10c	ROF → DTE_CU	0.030	0.764	0.445	Not supported
H10d	ROF → DTE_IN	0.083	2.224	0.026	Weakly supported
H10e	ROF → DTE_AG	0.003	0.068	0.945	Not supported

(Source: Data processing results from Smart PLS 4.0 by the authors).

Transformational leadership has strong positive effects on digital culture, innovation climate, and digital skills, supporting its role as the key antecedent in the model. All three mediators also significantly and positively influence the dimensions of digital transformation effectiveness. Among them, digital culture appears to be the most influential and consistent predictor. The direct effects of TL on the DTE dimensions remain significant, but they are smaller than many indirect paths, suggesting that much of leadership's influence is transmitted through organizational mechanisms. ROF shows only limited direct effects, indicating that it functions mainly as a control variable rather than as a core explanatory driver.

The explanatory power of the model is indicated by the R^2 values, which show moderate explanatory power for the mediators (DC, IL, DS) and substantial explanatory power for the DTE dimensions, ranging from 0.466 to 0.534. The model explains between 27.9% and 33.1% of the variance in the mediators and between 46.6% and 53.4% of the variance in the DTE dimensions. These values indicate moderate to substantial explanatory power, especially for DTE_OP, DTE_IN, and DTE_AG.

The moderating role of government support for digital transformation (GSDT) is examined in **Table 4**. The results indicate that at low levels of government support, the effects of TL on DTE are weak or insignificant, whereas at higher levels of GSDT, these effects become substantially stronger and highly significant. These findings suggest that government support functions as a critical enabling condition that amplifies the effectiveness of leadership.

Table 4. Moderating effects of GSDT

Hypothesis	Interaction Path	β	t-value	p-value	Decision
H9a	GSDT×TL → DTE_OP	0.086	2.658	0.008	Supported
H9b	GSDT×TL → DTE_DT	0.128	3.119	0.002	Supported
H9c	GSDT×TL → DTE_CU	0.123	3.350	<0.001	Supported
H9d	GSDT×TL → DTE_IN	0.121	3.149	0.002	Supported
H9e	GSDT×TL → DTE_AG	0.085	2.268	0.023	Supported

(Source: Data processing results from Smart PLS 4.0 by the authors).

The findings of this study provide strong empirical evidence for the central role of transformational leadership (TL) in enhancing digital transformation effectiveness (DTE) in SMEs. Consistent with prior literature, TL significantly influences organizational outcomes by inspiring vision, fostering innovation, and enabling organizational change



(Bass, 1985; Judge & Piccolo, 2004; Özkan Alakaş, 2024). The results confirm that TL exerts strong positive effects on digital culture (DC), innovation climate (IL), and digital skills (DS), thereby reinforcing its role as a key antecedent in shaping the internal conditions necessary for digital transformation.

Among the mediating variables, digital culture emerges as the most influential and consistent mechanism in translating leadership into digital transformation outcomes. The results indicate that DC has strong and stable effects across all dimensions of DTE, including operational efficiency, decision-making quality, customer engagement, innovation, and organizational agility. This finding aligns with prior research emphasizing that digital transformation is fundamentally a cultural transformation rather than merely a technological one (Westerman *et al.*, 2014; Kane *et al.*, 2015).

Innovation climate significantly influences decision-making and operational aspects of DTE, suggesting that a supportive environment for creativity and knowledge sharing enhances organizational adaptability. This is consistent with organizational climate theory, which posits that shared perceptions of support for innovation foster creative behavior and performance outcomes (Schneider, 1990; Scott & Bruce, 1994).

Digital skills exhibit strong effects on innovation and agility-related outcomes, highlighting the importance of employee capabilities in implementing digital transformation initiatives. This finding is consistent with human capital theory, which emphasizes the role of skills and knowledge in improving organizational performance (Sunde & Zimmermann, 2014), as well as absorptive capacity theory, which highlights the importance of learning and knowledge application in dynamic environments (Cohen & Levinthal, 1990).

In addition, A key contribution of this study lies in identifying government support for digital transformation (GSDT) as a significant moderating factor. The results indicate that GSDT strengthens the relationship between TL and DTE across all dimensions. This finding is consistent with institutional theory, which emphasizes the role of external environmental factors in shaping organizational behavior (Scott, 2014).

However, Contrary to expectations, resource and organizational factors (ROF) show limited direct effects on digital transformation effectiveness. This finding suggests that the availability of resources alone does not guarantee successful transformation. From an RBV perspective, this reinforces the argument that competitive advantage depends not only on resource possession but also on how resources are deployed and managed (Barney, 1991).

Conclusion

This study investigates the impact of transformational leadership (TL) on digital transformation effectiveness (DTE) in SMEs, with particular emphasis on the mediating roles of digital culture (DC), innovation climate (IL), and digital skills (DS), as well as the moderating role of government support for digital transformation (GSDT). Using a PLS-SEM approach based on survey data from 420 SMEs in Hanoi and surrounding provinces, the study provides robust empirical evidence supporting the proposed research model.

The findings confirm that transformational leadership plays a pivotal role in driving digital transformation, primarily through indirect pathways. Specifically, TL significantly enhances digital culture, innovation climate, and digital skills, which in turn positively influence multiple dimensions of digital transformation effectiveness, including operational efficiency, decision-making, customer engagement, innovation capability, and organizational agility. Among these mediating mechanisms, digital culture emerges as the most influential and consistent driver, highlighting the central importance of cultural transformation in achieving digital outcomes.

Furthermore, the results demonstrate that government support for digital transformation significantly strengthens the relationship between transformational leadership and digital transformation effectiveness. This suggests that external institutional support enhances the effectiveness of internal organizational capabilities. In contrast, resource and organizational factors (ROF) exhibit limited direct effects, indicating that resource availability alone is insufficient to ensure successful digital transformation. Instead, the effective deployment and orchestration of organizational capabilities play a more critical role.

Overall, this study contributes to the literature by integrating transformational leadership theory, resource-based view, dynamic capabilities, and institutional theory into a unified framework for understanding digital transformation in SMEs. It highlights that successful digital transformation is not driven solely by technology or resources, but by the interaction between leadership, organizational mechanisms, and external support conditions.



Despite these contributions, the study has several limitations. Firstly, the use of cross-sectional data limits the ability to infer causal relationships. Future research could adopt longitudinal designs better to capture the dynamic nature of digital transformation processes. Secondly, the study focuses on SMEs in Vietnam, which may limit the generalizability of the findings to other contexts. Future studies could extend the model to different countries or industries to validate its robustness. Thirdly, although the study incorporates multiple mediators and a moderator, additional variables such as digital strategy, organizational learning, or technological readiness could be included to enrich the model further.

In conclusion, the study underscores the critical role of transformational leadership in enabling digital transformation and highlights the importance of organizational culture, innovation climate, and digital skills as key mechanisms. It also emphasizes the need for alignment between internal capabilities and external institutional support to achieve sustainable digital transformation outcomes.

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