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The influence of management commitment on digital and green transformation in Vietnamese enterprises: Empirical insights

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Abstract: This study explores the multifaceted impact of digital transformation and green initiatives on Vietnamese enterprises, explicitly focusing on the critical role of managerial commitment to information technology. Digital transformation, a catalyst for reshaping operations, strategies, and competitive dynamics, integrates digital technologies into various business aspects. The study investigates key determinants impacting digital transformation and green initiatives: information technology infrastructure, managerial commitment, competitive intensity, employees' digital competencies, and strategic orientation. Utilising Partial Least Squares Structural Equation Modeling (PLS-SEM), the study analyses data from 200 enterprises, highlighting the significant positive effects of these factors on digital transformation and subsequent green initiatives. The findings reveal that managerial commitment and employee digital skills are foundational for successful digital transformation, while competitive intensity and strategic orientation drive green initiatives. This study underscores the necessity of proactive digital managerial and strategic alignment for fostering sustainable and competitive business environments in the digital era. Importantly, it provides practical implications for Vietnamese enterprises, equipping them with actionable insights to navigate the digital and green transformation landscape.

Keywords: Competitive intensity, digital transformation, information technology, green transformation, managerial commitment, strategic orientation.

1. Introduction

Digital transformation (DX) represents a complex and multidimensional process that influences various dimensions of organisations. Multiple factors significantly influence the effectiveness and outcomes of DX drives. Research demonstrates that DX significantly improves organisational agility, facilitating more efficient and adaptive allocation of

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resources (Priyono et al., 2020). The achievement of DX is significantly influenced by the strategic roles of information technology (IT) and, critically, the commitment demonstrated by managers. Leadership commitment is critical in driving successful DX, sectoral relevance and other critical drivers (Ko et al., 2022). The literature identifies four overarching strategies for DX, each differing in leadership style, the importance of skills, risks and challenges, and the consequences of potential failure. Furthermore, DX can significantly enhance international trade, influence geopolitical dynamics, optimise supply chain efficiency, and improve access to digital services (Font-Cot et al., 2023).

The DX of human resource management is propelled by the evolving digital needs of internal stakeholders, advancements in industry-specific digital innovations, competitive pressures, digital innovation governance, and the digital age's overarching demands (Zhang & Chen, 2024). Strong leadership from top management and robust policy support are essential for facilitating DX within construction enterprises (Zhang et al., 2023). Moreover, effective management of proactive DX strategies and the swift execution of these initiatives are essential for ensuring the successful DX of organisations (Laorach et al., 2022). The impact of DX on the competitiveness of small and medium enterprises has also been explored, emphasising the need for a systematic approach to assess the effectiveness of DX (Medennikov, 2020). The success of DX is determined by individuals' proficiency in digital knowledge and skills, the specific DX model implemented, and the identification and management of critical success factors. Challenges such as resource limitations and human capital's strategic management are critical factors organisations must address. DX is a critical driver for advancing the digital economy nationally and globally (Petrova et al., 2022).

To understand the impact of DX on green transformation (GX), it is crucial to examine the interaction between these phenomena. Research shows that DX significantly enhances green innovation within enterprises. Studies have found that DX can boost high-quality green innovation, particularly in high-tech and state-owned companies, by easing financing constraints and enhancing corporate governance (Feng et al., 2022). DX has also been shown to improve green resilience, especially in resource-based provinces, underscoring its positive influence on environmental sustainability (Wang et al., 2024).

The integration of DX with green innovation has been investigated, revealing that digital technologies can notably enhance green technology innovation by alleviating financing constraints and attracting government subsidies (Xue et al., 2022). This integration is essential for improving green technology innovation within organisations and advancing sustainable development goals (Xie et al., 2023). Additionally, the mediating role of DX in optimising resource allocation to promote green technological innovation has been explored, emphasising the importance of leveraging digital tools for environmental sustainability (Liu et al., 2024).

The impact of DX on GX extends beyond innovation to encompass environmental performance and sustainability. Studies have indicated that corporate DX positively affects environmental performance by enhancing total factor productivity, fostering green technology innovation, and optimising corporate governance structures (Xue et al., 2022). This underscores the broader implications of DX in promoting green development and sustainability within organisations.

Vietnam's digital and green transitions are increasingly recognised as critical pathways for sustainable development. Research indicates that integrating digital technologies into various sectors, including agriculture, healthcare, and supply chains, enhances efficiency and sustainability. For instance, a survey revealed that while the adoption of Industry 4.0 technologies is still low among Vietnamese supply chain firms, there is significant potential for digital technologies such as the Internet of Things (IoT) to improve supply chain sustainability (Akbari & Hopkins, 2022). This transition is supported by various policies that foster green investments and sustainable practices across sectors. The literature highlights the importance of growing digital enterprises and digitalising traditional businesses in Vietnam's digital economy. This entails the integration of digital technologies into products, the transformation of business models into

digital platforms, and the modification of production processes through the utilisation of digital data, automation, and virtualisation (Hang et al., 2021). Research suggests that administrative reforms at the provincial level in Vietnam can have the potential to enhance operational efficiency significantly and competency through DX strategies and that DX and administrative reforms should be pursued concurrently for optimal results (Thanh, 2021).

2. Literature review

2.1. The role of IT and DX

The pivotal role of information technology (IT) in DX cannot be overstated, as it profoundly influences organisational structures, routines, information flow, and the ability to adapt to new technologies. DX is an ongoing process involving adopting emerging digital technologies, where agility is recognised as a pivotal mechanism for strategic renewal, influencing an organisation's business model, collaborative practices, and cultural dynamics (Warner & Wäger, 2019). IT infrastructure's impact on an enterprise's DX is indirect, with the DX strategy serving as a full mediator (X. Zhang et al., 2023). This mediation highlights DX's role in linking relational and cognitive embeddedness to enterprise performance, emphasising its complex relationship with organisational dynamics (Li & Fei, 2023). It substantially strengthens corporate innovation and absorptive capacity, with absorptive capacity serving as a mediating factor in the relationship between DX and corporate innovation (Wang, 2022). DX's connection to digitalisation demonstrates how organisations use digital initiatives to improve organisational workflows and create customer value, underscoring its importance in shaping the modern business landscape (Marks & Al-Ali, 2022).

H1: The role of IT positively impacts DX.

2.2. The managerial commitment and DX

Managerial commitment is crucial for successful DX. It is a significant moderating factor in the relationship between IT infrastructure and DX strategy, as well as between DX strategy and organisational performance (Zhang et al., 2023). This underscores the critical importance of proactive engagement and unwavering support from top management in facilitating and advancing DX initiatives. Factors related to organisational commitment significantly impact business performance during DX, underscoring the vital significance of commitment in attaining successful outcomes (Phuong et al., 2023). Moreover, digital leadership impacts innovation management by fostering dynamic capability, emphasising the importance of leadership in driving innovation within DX contexts (Mihardjo et al., 2019). The broader organisational implications of DX, such as its effect on lean production systems and supply chain management, highlight the essential role of managerial commitment in integrating and tailoring digital technologies for optimisation within production and supply chain processes. Additionally, research on small and medium-sized ports within the TEN-T network highlights the necessity of enhancing managerial capacity in environmental accountability and digital efficiency, emphasising the pivotal role of managerial commitment in fostering sustainable and digitally integrated port service ecosystems (Gerlitz & Meyer, 2021).

H2: The managerial commitment positively impacts DX.

2.3. The competitive intensity and DX

Competitive intensity plays a multifaceted and significant role in DX, influencing various dimensions of organisational performance and strategic positioning. The literature indicates that competitive intensity significantly influences the perceived benefits of DX, with evidence suggesting that competitive pressure positively enhances the perceived advantages of DX, particularly within the textile industry (Tsai & Su, 2022). This intricate interaction between competitive forces and the advantages of DX initiatives underscores the critical necessity for organisations to embrace digital innovation as a means of adaptation. The impact of DX on the competitiveness of small and medium-sized enterprises (SMEs) in the agro-industrial sector underscores its critical role in strengthening competitive advantages within highly dynamic and challenging market environments (Medennikov, 2020). Furthermore, DX's role in mitigating financial risk is more pronounced in

competitive industries, enhancing organisational resilience and stability amid intense market dynamics (You & Zhao, 2023). The impact of DX on sustainable supply chain management and organisational sustainability highlights its potential to enhance sustainability practices and competitive advantage (Stroumpoulis & Kopanaki, 2022). In conclusion, competitive intensity significantly impacts DX, shaping organisational strategies, competitive positioning, and sustainability efforts, highlighting the strategic need for leveraging DX in dynamic market environments.

H3: The competitive intensity positively impacts DX.

2.4. The digital knowledge and skills of employees and DX

Employee digital competencies are essential for achieving successful DX. Existing research underscores the critical influence of employee knowledge and skills on the DX process, highlighting their pivotal role in addressing the complexities of digitalisation and enhancing organisational preparedness for the digital era. DX is an ongoing process that requires agility and the development of dynamic capabilities, with employee knowledge and skills instrumental in adapting to new technologies, reshaping business models, and fostering a collaborative culture (Warner & Wäger, 2019). Acquiring digital knowledge and competencies is crucial for effectively implementing DX strategies, as transformational insights depend on employees' development and application of digital competencies (Matt et al., 2015). Moreover, employee intentions to learn and adopt digital technology play a significant role, with findings underscoring the importance of understanding these intentions and challenges in embracing digital technology (Chaudhuri et al., 2023). The COVID-19 pandemic further highlighted the need for employees to acquire new digital competencies, emphasising organisational investment in developing their workforce's digital skills to navigate DX challenges (Bikse et al., 2021).

H4: The digital knowledge and skills of employees positively impact DX.

2.5. The strategic orientation and GX.

Strategic orientation, mainly green entrepreneurial orientation, is crucial for driving green innovation and improving environmental performance (Makhloufi et al., 2021). Studies show that strategic green orientation fosters innovation and collaboration among firms, improving green performance outcomes (L. Li et al., 2018). Moreover, strategic organisational orientation is vital for implementing green supply chain management practices and enhancing firm sustainability performance (Habib et al., 2021). The digital economy, as part of DX, contributes significantly to green development and the quality of green innovation in enterprises (Huang, 2024), with its environmentally friendly characteristics propelling industrial GX (Wang et al., 2024). Integrating DX with supply chain management practices enhances green design and manufacturing processes (Minh et al., 2023).

H5: The strategic orientation positively impacts GX.

2.6. The competitive intensity and GX

The relationship between competitive intensity and green transformation can be understood through various mechanisms, including the influence of market pressures, corporate social responsibility (CSR) initiatives, and adopting sustainable practices. Firstly, competitive intensity can drive firms to adopt more environmentally friendly practices to differentiate. This competitive pressure can improve environmental performance as companies recognise the potential for green initiatives to enhance customer loyalty and market share (Gani, 2023). Moreover, the intensity of competition can influence the strategic orientation of firms towards sustainability. In environments characterised by high competitive intensity, firms may prioritise sustainable manufacturing practices to gain a competitive edge. Adopting green practices can enhance operational capabilities and improve sustainable performance, reinforcing the firm's competitive position in the market. This is particularly relevant in sectors where consumers increasingly demand sustainable products and

practices, prompting firms to innovate and invest in green technologies (Chen & Liu, 2018).

H6: The competitive intensity positively impacts GX.

2.7. The DX and GX

Digital transformation significantly shapes green transformation by bolstering organisations' capabilities in sustainable innovation, operational efficiency, and regulatory compliance. Digital technologies such as big data, artificial intelligence, and cloud computing facilitate developing and implementing advanced green solutions. Moreover, digital transformation enhances information flow and corporate governance, which is crucial for environmental sustainability. Streamlined communication and decision-making processes enable firms to address environmental challenges and meet regulatory requirements more efficiently (Xie, 2023). The interplay between digital transformation and regulatory frameworks further catalyses green innovation. Firms in regions with stringent environmental regulations must adopt digital solutions to ensure compliance while fostering innovation. This "Porter compensation effect" demonstrates how regulatory pressures drive firms to integrate digital transformation for competitive advantage in sustainability (Chen, 2024).

H7: The DX positively impacts GX.

Based on the eight hypotheses mentioned above, the theoretical framework was built as below:

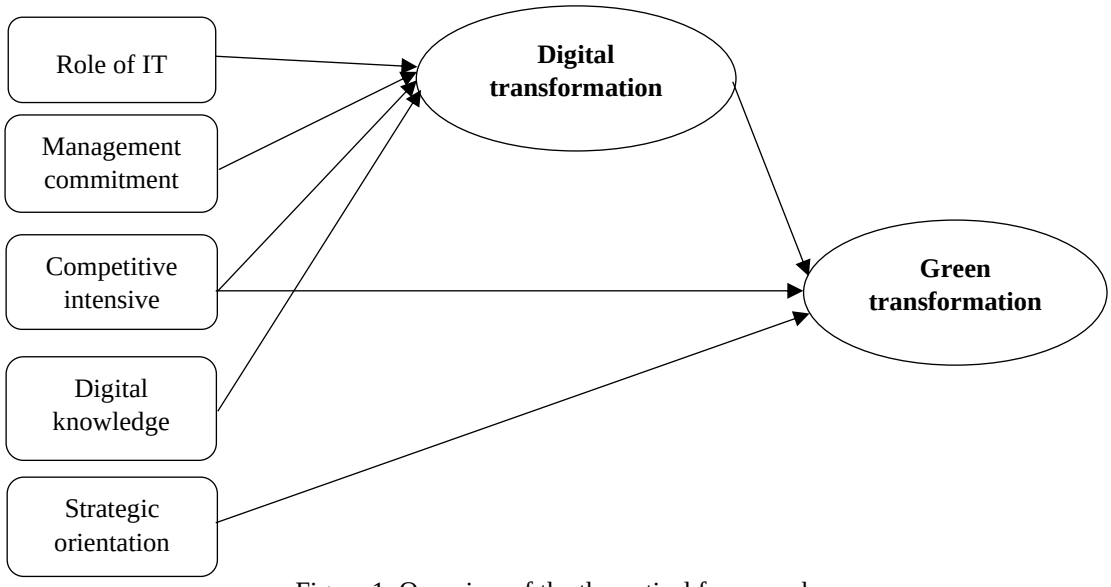

Figure 1: Overview of the theoretical framework
Source: Authors' own work.

3. Methodology

The study population comprises enterprises, approached using a simple random sampling method. To gather feedback from accountants, chief accountants, CFO, CEO, and managers of other operational departments in these enterprises, 350 questionnaires were distributed. Of these, 231 valid responses were received, resulting in a response rate of 66%. After data cleaning, 200 responses were analysed using SmartPLS 4.1.0.0 software.

The study examines the relationship between four independent variables and the dependent variable, DIGI (Digital Transformation), utilising the following model:

$$DIGI_i = \alpha + \beta_1 ROIT_i + \beta_2 MANA_i + \beta_3 COMP_i + \beta_4 KNOW_i + \varepsilon,$$

The study examines the relationship between three independent variables and the dependent variable, GREEN (Green Transformation), utilising the following analytical model:

$$GREEN_i = \alpha + \beta_5 COMP_i + \beta_6 STRA_i + \beta_7 DIGI_i + \varepsilon,$$

Where:

- $DIGI_i$ stands for Digital transformation
- $GREEN_i$ stands for Green Transformation
- α: constant term
- β_i: coefficient of variables
- ε_i: Residual

The independent variables in this study include ROIT (Role of IT), MANA (Managerial commitment), COMP (Competitive intensity), KNOW (Digital knowledge and skills of employees), and STRA (Strategic orientation). These variables are hypothesised to impact Vietnamese enterprises' DX and GX.

The research utilises the Partial Least Squares (PLS) path model for testing. The minimum sample size was determined using Cohen's (1992) guidelines, which suggest an 80% statistical power, a 5% significance level, and a minimum R2 value of 0.1. As a result, the study necessitates a minimum sample size of 100.

In particular, the Role of IT symbols is ROIT (5 observed variables), Managerial commitment symbols are MANA (6 observed variables), Competitive intensive symbols are COMP (5 observed variables), Digital knowledge symbols are KNOW (4 observed variables), Strategic orientation symbols are STRA (5 observed variables), DX symbols are DIGITAL (5 observed variables), and GX symbols are GREEN (5 observed variables).

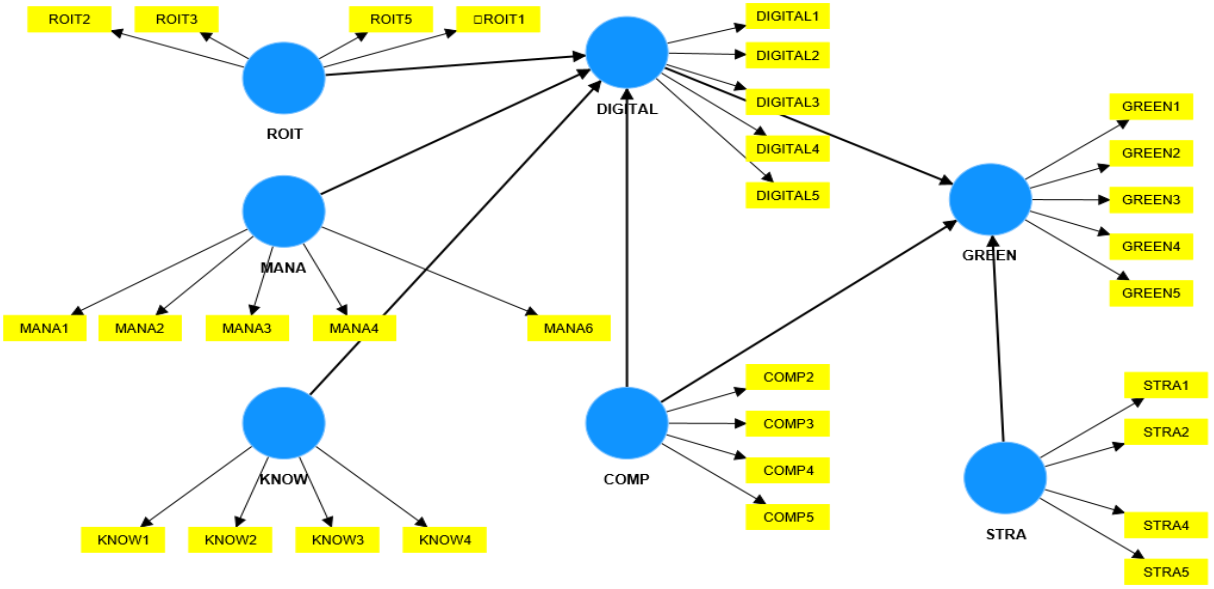

Figure 2: Overview of the detailed theoretical framework
Source: Authors' own work.

4. Result

Using SmartPLS 4.1.0.0 software, we assessed our measurement model, and the outcomes are presented in Tables 1 and 2. After excluding four variables (COMP1, MANA5, ROIT4, and STRA3) due to their low and insufficient outer-loading indicators, the results show that the outer loading coefficients of the remaining observed variables surpass the established thresholds. In particular, Cronbach's Alpha and Composite Reliability values each exceed 0.8, indicating high reliability. This confirms the scale's dependability, supports the appropriateness of the observed variables, and affirms their alignment with the intrinsic attributes of the latent variables.

Additionally, the indicators of convergent validity are vital, as shown by Average Variance Extracted (AVE) values above 0.6. These findings underscore the significant construct validity in our model, proving that the observed variables accurately represent the latent constructs they are meant to measure.

The discriminant analysis conducted via the Heterotrait-Monotrait (HTMT) ratio method reveals that the highest confidence values for all constructs are below the threshold value of 0.797. This finding substantiates that the latent constructs within the simplified PLS-SEM model possess discriminant validity, confirming that each construct is distinct and sufficiently divergent from the others, as outlined in the methodology proposed by Hair et al. (2022).

Table 1: Outcomes from assessing the reliability coefficients

	Cronbach's Alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
COMP	0.771	0.771	0.854	0.593
DIGITAL	0.838	0.844	0.885	0.608
GREEN	0.838	0.850	0.885	0.608
KNOW	0.842	0.845	0.894	0.679
MANA	0.838	0.845	0.885	0.607
ROIT	0.778	0.782	0.857	0.599
STRA	0.845	0.853	0.896	0.683

Source: Authors' own work.

Table 2: Results of outerloading

	COMP	DIGITAL	GREEN	KNOW	MANA	ROIT	STRA
COMP2	0.797						
COMP3	0.772						
COMP4	0.742						
COMP5	0.769						
DIGITAL1		0.720					
DIGITAL2		0.791					
DIGITAL3		0.767					
DIGITAL4		0.785					
DIGITAL5		0.831					
GREEN1			0.766				
GREEN2			0.761				
GREEN3			0.842				
GREEN4			0.728				
GREEN5			0.797				
KNOW1				0.844			
KNOW2				0.823			
KNOW3				0.830			
KNOW4				0.797			
MANA1					0.828		
MANA2					0.729		
MANA3					0.776		
MANA4					0.785		
MANA6					0.773		
ROIT2						0.780	
ROIT3						0.795	
ROIT5						0.746	
STRA1							0.806
STRA2							0.829
STRA4							0.812
STRA5							0.858
ROIT1						0.775	

Source: Authors' own work.

Table 3: Discriminant value through HTMT

	COMP	DIGITAL	GREEN	KNOW	MANA	ROIT	STRA
COMP							
DIGITAL	0.533						
GREEN	0.506	0.797					
KNOW	0.435	0.561	0.563				
MANA	0.405	0.636	0.634	0.368			
ROIT	0.330	0.621	0.603	0.470	0.581		
STRA	0.251	0.619	0.540	0.302	0.332	0.227	

Source: Authors' own work.

To investigate the relationships between the determinants of audit committee effectiveness and the resulting impact of this effectiveness on the quality of financial reporting, we employed the SmartPLS 4.1.0.0 software for data analysis. Our methodological approach involved assessing multicollinearity using the Variance Inflation Factor (VIF) and employing bootstrapping techniques to determine the statistical significance of the path coefficients.

Following the guidelines set forth by Hair et al. (2022), a Variance Inflation Factor (VIF) below 3 signifies minimal concerns regarding multicollinearity. In our analysis, all calculated VIF coefficients fell below 2, indicating a negligible likelihood of multicollinearity within our model. The results, which detail the interactions among the factors under study, are systematically presented in Table 3.

The influence of the independent variables —COMP, KNOW, MANA, ROIT, STRA and DIGITAL - is evidenced by p-values lower than 0.05, indicating their statistical significance. This result supports the hypothesis that CULT, COMP, FIRM, MANA, and EMP positively impact CSR. Additionally, the variables MANA and CULT are shown to positively affect EMP, all within a 95% confidence interval.

Table 4: Results of inner VIF value

	VIF
COMP -> DIGITAL	1.215
COMP -> GREEN	1.230
DIGITAL -> GREEN	1.618
KNOW -> DIGITAL	1.283
MANA -> DIGITAL	1.373
ROIT -> DIGITAL	1.390
STRA -> GREEN	1.373

Source: Authors' own work.

The adjusted R-squared (R2) value for the model assessing the DIGITAL is calculated to be 0.461. This figure indicates that the independent variables collectively explain 46.1% of the variability in the digital transmission variable. Furthermore, the adjusted R-squared value for the GREEN model stands at 0.489, implying that the independent variables, including the competitive intensity, the strategic orientation and the DX, account for 48.9% of the variation observed in the GX variable.

Table 5: Results of the research hypothesis test

Hypothesis		Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
H3	COMP -> DIGITAL	-0.195	-0.195	0.060	3.249	0.001	Accepted
H6	COMP -> GREEN	-0.153	-0.153	0.069	2.197	0.028	Accepted
H7	DIGITAL -> GREEN	0.535	0.535	0.099	5.425	0.000	Accepted
H4	KNOW -> DIGITAL	0.226	0.229	0.064	3.518	0.000	Accepted
H2	MANA -> DIGITAL	0.298	0.300	0.062	4.822	0.000	Accepted
H1	ROIT -> DIGITAL	0.235	0.234	0.063	3.713	0.000	Accepted
H5	STRA -> GREEN	0.153	0.156	0.067	2.264	0.024	Accepted

Source: Authors' own work.

Table 6: R square and R square Adjusted

	R-square	R-square adjusted
DIGITAL	0.472	0.461
GREEN	0.497	0.489

Source: Authors' own work.

Table 5 presents the effect sizes (f2) corresponding to each structural model. In Model 1, Digital Transmission (DIGI) results provide additional evidence supporting the conclusion that digital transmission in Vietnamese enterprises is most influenced by managerial commitment (MANA, f2 = 0.122). These results restate hypothesis No. 2 - The managerial commitment positively impacts DX. Other influencing factors include the role of IT (ROIT, f2 = 0.075), digital knowledge and skills of employees (KNOW, f2 = 0.075), and competitive intensity (COMP, f2 = 0.059). These results are appropriate with suggested hypotheses, including hypotheses No. 1, No. 3, and No. 4.

In Model 2, the green transformation (GREEN) strongly impacts the DX (DIGITAL, f2 = 0.351). These results restate hypothesis No.7: The DX positively impacts the GX.

Other influencing factors include competitive intensity (COMP, f2 = 0.038) and strategic orientation (STRA, f2 = 0.034). These results align with the suggested hypotheses, including hypothesis No. 5 - Competitive intensity positively impacts GX and hypothesis No. 6 - Strategic orientation positively impacts GX.

Table 5: Effect size f^2

	f-square
COMP -> DIGITAL	0.059
COMP -> GREEN	0.038
DIGITAL -> GREEN	0.351
KNOW -> DIGITAL	0.075
MANA -> DIGITAL	0.122
ROIT -> DIGITAL	0.075
STRA -> GREEN	0.034

Source: Authors' own work.

5. Discussion

This study presents several inferred conclusions. Firstly, the findings underscore that managerial commitment is a critical determinant of the successful implementation of DX initiatives. They offer strategic leadership and a clear vision essential for effectively addressing the complexities associated with digitalisation. A dedicated managerial team can propel an organisation toward a future in which digital technology is integral to its strategic framework, operational processes, and competitive positioning. This integration of managerial practices and DX strategically positions the organisation for success in the digital era, aligning with the findings of prior research by Mihardjo et al. (2019).

Secondly, the role of IT and employees' digital competencies and expertise serve as critical foundations for the successful implementation of DX initiatives. The technical expertise, a forward-thinking IT department, and a digitally proficient workforce significantly enhance the seamless integration of new technologies, fostering innovation, advancing operational efficiencies, and promoting transformative cultural change. This investment in employee skill development extends beyond addressing the immediate requirements of digital projects. The findings of prior studies conducted by Chaudhuri et al. (2023) have been referenced.

Thirdly, the intensity of competition significantly impacts the strategic approach, implementation pace, and overall success of organisational DX initiatives. Although the advantages of this dynamic can be significant, it necessitates meticulous strategic planning and execution to ensure that DX initiatives remain sustainable and aligned with the organisation's long-term objectives. Competitive intensity fundamentally influences the DX trajectory, highlighting the essential interplay between innovation, strategic alignment, and operational excellence. Furthermore, this study corroborates the findings of Tsai and Su (2022).

Lastly, the interplay between competitive intensity, strategic orientation, and DX is vital for advancing GX. DX significantly impacts GX by guiding green processes, shaping organisational culture, and ensuring scalability and sustainability. This approach ensures a lasting impact, as research highlights the positive effects of competitive intensity, strategic orientation, and DX on GX capabilities (Wang et al., 2024).

6. Conclusion

This study highlights the roles of managerial engagement, IT, competitive intensity, digital knowledge, and strategic direction in driving DX and GX in Vietnamese enterprises. The findings confirm that managerial commitment is vital for guiding organisations through the complexities

of digitalisation, offering leadership and vision to integrate digital technologies into strategic operations and competitive frameworks. This is consistent with Mihardjo et al. (2019), who emphasised leadership's role in DX success. The research also underscores the importance of IT and employees' digital expertise. As Chaudhuri et al. (2023) noted, investing in digital skills ensures adaptability and strategic advantage in the digital age. Competitive intensity drives enterprises to accelerate DX efforts to maintain market positions. Furthermore, the synergy between competitive intensity, strategic orientation, and GX enables enterprises to leverage digital technologies for green innovation and improved environmental performance, aligning with Wang et al. (2024). In conclusion, cohesive strategies integrating leadership, skilled human capital and competitive intensity are essential for successful DX and GX, ensuring sustainability and resilience in Vietnam's digital economy.

The research has limitations, including restricted time and resources, which hindered the exploration of other factors affecting the DX and GX of Vietnamese enterprises. Future studies should explore additional factors not addressed in this research, such as government support, digital and GX costs, and managers' qualifications.

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