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Quantitative Research Article

Behavioral Drivers of Digital Innovation in Vietnamese Import-Export Enterprises

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Abstract

Background: Digital transformation is reshaping global business ecosystems; however, Vietnamese import-export enterprises often struggle to align technological adoption with behavioral and organizational enablers such as culture and leadership.

Objective: Grounded in the organizational learning theory and the behavioral agency theory, this study examines how digital transformation translates into business model innovation through behavioral mechanisms. By linking technology, culture, and leadership, the research addresses the gap in understanding internal drivers of innovation within emerging market contexts.

Design and Methodology: A mixed method design was employed. Qualitative interviews with five experts refined the behavioral constructs, followed by a survey of 148 import–export enterprises. PLS-SEM was used to test the hypothesized relationships, while multigroup analysis explored firm-level differences.

Results: Digital transformation positively affects business model innovation ($\beta = .29$, $p < .001$) and digital culture ($\beta = .69$, $p < .001$). Digital culture strongly mediates the relationship ($\beta = .32$, $p < .001$), while digital leadership moderates it ($\beta = .17$, $p = .01$). The model explains 62% of the variance in business model innovation ($R^2 = .62$). No significant differences were found in the structural relationships among constructs based on various enterprise characteristics.

Conclusion and Implications: Findings highlight that digital transformation outcomes depend on behavioral change processes rather than technology alone. Managers should cultivate organizational learning, foster shared cognitive frames, and strengthen leadership signaling to align human decision-making with strategic digital initiatives.

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Business model innovation, digital leadership capability, digital organizational culture, digital transformation, import-export enterprises

Digital transformation, a hallmark of the fourth industrial revolution, goes beyond technology to reshape how organizations learn, decide, and innovate (Chen et al., 2024). Drawing on organizational learning theory and behavioral agency theory, this study views digital transformation as a process of behavioral adaptation - one that is influenced by leadership signaling, shared cognitive understanding, and collective learning mechanisms. For import-export enterprises, a cornerstone of Vietnam's economic growth (Vietnam Chamber of Commerce and Industry [VCCI], 2025), adapting to the digital era involves not merely adopting modern technologies, but also rethinking how value is created, delivered, and captured through business model innovation. Furthermore, in import-export sector, where relationship-based transactions, and the complexity of cross-border operations remain dominant, digital transformation is reshaping not only how technologies are applied but also how firms think, behave, and innovate in their business models (Chen et al., 2024). Despite the increasing emphasis on digital transformation in national policy and corporate strategy, many Vietnamese import-export enterprises continue to face challenges in effectively innovating their business models (VCCI, 2025). Moreover, successful digital transformation and business model innovation require substantial internal transformation, particularly the development of

the digital organizational culture and digital leadership capability (Kane et al., 2015). Leadership and organizational culture emerge as pivotal yet often underexplored factors influencing the success or failure of business model innovation (Medina & Guerrero, 2017). While leadership determines strategic vision and the allocation of resources, culture shapes organizational receptiveness to change and innovation. In Vietnam, prior studies have not adjudicated whether digital transformation affects business model innovation directly or mostly indirectly through culture, and under what leadership conditions that pathway strengthens or collapses in Vietnamese import-export firms. Therefore, understanding how digital transformation, digital organizational culture and digital leadership capability affect business model innovation is essential.

Theoretically, business model innovation has received growing attention, particularly in the context of digital transformation (Adams, 2025; Foss & Saebi, 2017). Recent research emphasizes that digital transformation serves as a key enabler of business model innovation by reshaping value creation and delivery mechanisms across industries (Liu et al., 2024; Malewska et al., 2024). Digital organizational culture and digital leadership are identified as critical behavioural and managerial dimensions influencing the success of digital transformation initiatives (Chen et al., 2024; Muafi et al., 2024). Factors such as digital organizational culture and digital leadership capability have long been recognized as vital managerial elements and are increasingly understood as behavioral mechanisms that shape how firms internalize digital change. Organizational inertia has been found to positively moderate the relationship between digital capabilities and business model innovation (Liu et al., 2024). However, it remains under-researched. Malewska et al. (2024) is one of the few studies examining the mediating role of digital culture in the relationship between digital transformation and business model innovation, focusing on energy companies in Central and Eastern Europe. Additionally, leadership styles, including transformational, digital, and strategic leadership have been widely recognized as key enablers of innovation (Muafi et al., 2024). As a moderating factor, Chen et al. (2024) emphasized the importance of digital leadership capability in strengthening the link between business model innovation and sustainable performance. Furthermore, most empirical research has examined culture and leadership as isolated factors **(**Malik et al., 2024; Pulgarín-Molina & Guerrero, 2017), rather than investigating their combined influence on business model innovation. This gap underscores the need for integrated frameworks capturing the joint behavioural and digital drivers of business model transformation in emerging economies.

In general, theoretically, the study contributes by advancing an integrated behavioral framework that clarifies the mediating and moderating mechanisms linking digital transformation and business model innovation. Contextually, it enriches understanding of how Vietnam's relationship-oriented, hierarchy-based management context shapes behavioral readiness and leadership dynamics in digital business model transformation. Based on the findings, some practical implications for enterprises are suggested to succeed in business model innovation.

Literature Review

Organizational Learning Theory and Behavioral Agency Theory

This study integrates organizational learning theory (Argyris & Schön, 1978) and behavioural agency theory (Wiseman & Gomez-Mejia, 1998) to propose a unified causal mechanism linking digital transformation, digital organizational culture, leadership capability, and business model innovation. Organizational learning theory posits that organizations evolve through continuous learning, reflection, and knowledge sharing, enabling them to adapt to environmental changes and improve performance (Argyris & Schön, 1978). Consequently, digital transformation becomes not merely a technological transition but a process of behavioral adaptation, where collective learning and cognitive reframing translate digital capabilities into innovation-oriented routines. These gradually reshape digital organizational culture by embedding shared digital values, openness to change, and adaptability. Thus, digital transformation serves as a behavioural learning catalyst that translates technological initiatives into collective routines and cultural norms, laying the foundation for business model innovation. Behavioural agency theory was

extended from traditional agency theory by integrating behavioral aspects such as risk perception, loss aversion, and managerial preferences (Wiseman & Gomez-Mejia, 1998). It can be applied to elucidate how leaders' risk perceptions and decision preferences influence whether learning outcomes are transformed into innovation. Together, these theories illuminate how organizational learning routines and behavioral preferences of leaders jointly determine whether digital transformation yields genuine business model innovation.

Digital Transformation and Business Model Innovation

According to Kane et al. (2015), digital transformation is a continuous process involving the development of digital capabilities, big data utilization, improved customer experiences, and innovation in business models. By transforming how employees interpret information and respond to uncertainty, digital transformation establishes a foundation for continuous learning and behavioral change. Thus, it operates as a learning architecture that allows organizations to reinterpret experiences, realign mental models, and generate innovative solutions through iterative adaptation. In this study, digital transformation was adopted from Nasiri et al. (2020). It comprises digital process integration (digitalizing operations and strengthening interposes networking), data-driven capability (collecting and utilizing large volumes of data), and digital connectivity and customer interface (improving communication, information exchange, and customer interaction).

Business model innovation addresses how firms adapt and create value in dynamic environments. Foss and Saebi (2017) conceptualize business model innovation as deliberate organizational efforts to change one or more elements of the current business model to improve competitiveness or adapt to external changes. From a behavioral perspective, business model innovation is not a mechanical process but the outcome of organizational learning and managerial cognition. In dynamic international markets, firms must adapt to local demands, with business model innovation enabling entrepreneurial reconfiguration of structures and value logic. Business model innovation is conceptualized as a reflective-formative construct formed by three elements - namely, value creation, value delivery, and value capture (Latifi et al., 2021). Firstly, value creation was measured by asking participants whether they had introduced new products or services (Giesen et al., 2007). Secondly, value delivery was measured by focusing on a new market segment, shared new responsibilities with business partners, starting to collaborate with new business partners (DG Research and Innovation, 2014). Thirdly, value capturing was measured by introducing a new pricing mechanism and creating a new revenue stream (Johnson et al., 2008). As a second-order reflective-formative construct, a change in one of the lower-order dimensions does not imply a change in any of the others (Latifi et al., 2021).

Digital transformation has profoundly influenced business operations by reshaping how organizations function, compete, and deliver value (Bonnet & Westerman, 2020). Therefore, it represents not only the technological upgrading of processes but also a behavioural reconfiguration of how organizations learn, decide, and innovate. Prior research has shown that enterprises capable of effectively implementing digital transformation often achieve considerable progress in business model innovation (Broccardo et al., 2023). Therefore, the following hypothesis is tested:

H1: Digital transformation has a positive effect on business model innovation.

Digital Transformation and Digital Organizational Culture

Digital organizational culture represents the shared behavioral norms and values that support digital transformation. It requires a crucial development of competencies, characteristics, and attitudes to create acceptance and openness among employees and managers and enable organizations to adapt to the transformation (Kocak & Pawlowski, 2023). Digital organizational culture prioritizes integrating digital tools and mindsets at all organizational levels, which emphasizes the interaction between technology, people, and organizational processes, aiming to help organizations redefine their culture for success (Gerçek & Özveren, 2024). In this study, the construct of digital organizational culture was adapted from Martínez-Caro et al. (2020). It reflects the extent to which an organization fosters cross-functional

collaboration, embraces technological change, embeds digital innovation as a natural part of its culture, and engages employees in shaping and sharing their digital strategy. In doing so, culture transforms digital transformation from a technological project into a collective behavioral capability.

Pfaff et al. (2023) conceptualize digital transformation as a continuous process that necessitates sustained efforts to nurture a digital organizational culture. Digital transformation demands a transformation in mindset, organizational structure, and interpersonal dynamics. From the lens of organizational learning theory, digital transformation activates collective learning mechanisms that gradually embed digital values, such as openness, collaboration into organizational routines. As Malewska et al. (2024) conclude, the behaviour of digital transformation can actively foster the development of a digitally oriented culture. Therefore, the following hypothesis is tested:

H2: Digital transformation has a positive effect on digital organizational culture.

A strong digital culture enhances learning orientation, risk-taking behavior, and cognitive openness, all of which are essential for generating new business models (Matarazzo et al., 2021). As a catalytic force, digital organizational culture facilitates the redesign of value propositions, the transformation of processes, and the effective exploitation of digital technologies (Malewska et al., 2024). Medina and Guerrero (2017) indicate that digital organizational culture is recognized as shared driver of innovation and sources of organizational advantage. Therefore, the following hypothesis is tested:

H3: Digital organizational culture has a positive effect on business model innovation.

The Mediating Role of Digital Organizational Culture

Bresciani et al. (2021) emphasize that firms with a strong digital culture are more capable of experimenting with new business models and adapting flexibly to dynamic digital markets. Therefore, digital organizational culture emerges not only as a behavioural outcome of digital transformation but also as a behavioural enabler of business model innovation. It transforms the way organizations think, behave, and allocate resources to create new value aligned with the digital era. As such, digital organizational culture is expected to serve as a behavioral conduit through which digital transformation influences business model innovation (Malewska et al., 2024). Therefore, the following hypothesis is tested:

H4: Digital organizational culture positively mediates the relationship between digital transformation and business model innovation.

The Moderating Role of Digital Leadership Capability

Digital leadership capability is an evolving construct that encompasses the skills and attributes needed to lead effectively in a digital environment. As organizations continue to face digital disruption, developing digital leadership capabilities becomes increasingly vital for success in the modern business landscape (Tigre et al., 2025). Hence, digital leadership functions as a behavioral catalyst that converts digital knowledge into creative action and business model renewal. In this study, the construct of digital leadership capabilities was based on Benitez et al. (2022). It reflects the cognitive and behavioral capacity of leaders to leverage skilled staff who can exploit emerging IT trends, drive strategic and operational innovation, deploy innovative digital solutions to enhance competitiveness, and lead cross-functional teams while influencing stakeholders across organizational boundaries.

According to Bresciani (2021), digital leadership is pivotal in overcoming technological, cultural, and human barriers, thereby enabling successful digital transformation and sustainable business model innovation. Drawing on behavioral agency theory, in organizations with strong digital leadership capabilities, digital transformation not only enhances internal operations but also contributes to the development of new value propositions, cost structure improvements, and superior customer experiences (Matarazzo et al., 2021). Digital leadership can amplify or diminish the impact of digital transformation behaviour on business model innovation, functioning as a moderating behaviour in this relationship (Addison et al., 2024). Therefore, the following hypothesis is tested:

H5: Digital leadership capability positively moderates the relationship between digital transformation and business model innovation.

Behavioral Differences Across Enterprise Characteristics

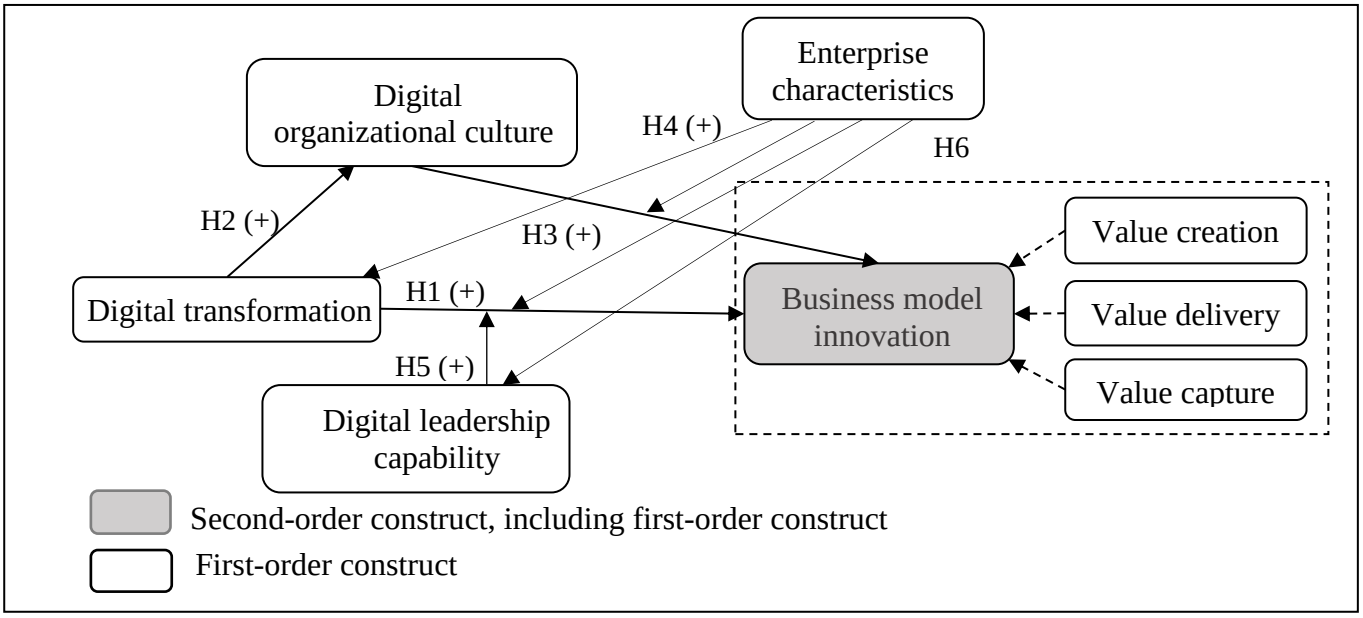
Due to differences in resources, firms organize their activities differently (Singh et al., 2010, cited in Hitt et al., 2001) with different behaviors. According to Morin et al. (2016), assessing the generalizability of research findings entails systematically and quantitatively evaluating the extent to which sample characteristics can be generalized across diverse samples. This approach helps identify significant differences in sample attributes and how these variables vary in their behavioral relationships. Therefore, the following hypothesis is tested:

H6: There are differences in the relationships in the research model based on enterprise characteristics (export method, size of enterprise, length of time in operation).

The proposed research model is shown in Figure 1.

Figure 1

Proposed Conceptual Framework



Method

Research Design

This study applied a mix of qualitative and quantitative methods. The qualitative phase aimed to validate and refine the conceptual framework and measurement scales before the quantitative analysis. The qualitative method was conducted through in-depth interviews with five experts in import-export enterprises who are the senior employees with over five years of experience and managers at the deputy or department head level and above. Participants were selected through purposive sampling based on their involvement in digital transformation projects. A semi-structured interview protocol was developed, focusing on two key objectives: (1) verify the conceptual framework; and (2) adapt measurement items to the Vietnamese business context. The feedback helped refine item wording and remove contextually irrelevant statements. Interviews were conducted face to face in the first week of May 2025. The expert feedback confirmed the conceptual framework and contextual relevance of all constructs, ensuring that the measurement items accurately reflected the managerial realities of digital transformation and innovation in Vietnam's import-export enterprises. After this step, all scales were formed. Next, the main survey was implemented online.

The second phase of the quantitative method was conducted through an online survey of experts from import-export enterprises, particularly senior employees, and managers. The collected data were used to assess measurement model, structural model and multigroup analysis.

Instruments

The PLS-SEM was applied to test hypotheses. Scales were adopted from previous studies. In the qualitative phase, all collected scales were adjusted to be suitable for the context in Vietnam. Digital transformation, digital organizational culture, and digital leadership capability are first-order constructs. Digital transformation was adopted from Nasiri et al. (2020), measuring the extent to which a firm integrates digital technologies into its strategic orientation, internal processes, and external interactions. It includes 5 items. Digital organizational culture was based on Martínez-Caro et al. (2020). This scale assesses the extent to which an organization has integrated, encouraged, and implemented a culture oriented toward innovation and digital transformation. There are 4 items on this scale. Digital leadership capability was adapted from Benitez et al. (2022). This scale measures the ability to leverage technology, foster innovation, coordinate human resources, and lead the organization in adapting to the digital environment. It includes 4 items. Business model innovation is the second-order construct, including the first-order constructs of value creation, value delivery, and value capture which was adapted from Latifi et al. (2021). This scale assesses the organization's capacity for business model innovation through the utilization of technology, creative approaches to operations and governance, and agile adaptation to transformations in the digital age. It has 7 items, including 2 items in the construct of value creation, 3 items in the construct of value delivery and 2 items in the construct of value capture. A five-point Likert scale (1 = strongly disagree to 5 = strongly agree) was applied.

Sampling

Survey samples are experts who are senior employees and managers in import-export enterprises. Due to restricted access to enterprise management, the sample-taking method is convenient. These firms represent export manufacturers and traders. To ensure representativeness, enterprises were drawn from key export city and provinces - Ho Chi Minh City, Binh Duong, Dong Nai. Enterprises were further categorized in Table 1 below. The survey process was conducted through a Google Form, disseminated via Zalo and email in May and June 2025. A total of 580 invitations were distributed. After screening for eligibility, requiring respondents to have at least five years of experience in import-export management and to be directly involved in digital transformation projects, 148 valid responses were collected, yielding a response rate of 26%. The PLS-SEM is applied because it is suitable for small sample sizes. The PLS-SEM requires a minimum sample size equal to 10 times the largest number of causal (predictor) indicators used to measure a construct, or ten times the greatest number of structural paths directed at a particular construct in the model (Chin, 1998). The largest number of causal indicators is digital transformation with seven indicators, so the minimum sample size is seventy; eventually, data from 148 Vietnamese import-export enterprises were collected, which meets the required sample size.

Results

Sample Characteristics

Table 1 below indicates that most enterprises (58.1%) engage in export trading, while 41.9% are involved in export manufacturing, indicating a higher number of export trading enterprises compared with export manufacturing enterprises. In terms of size, nearly half of enterprises (48.6%) employ from 50 to below 100 people, followed by 30.4% with 10 to below 50 employees, and 20.9% with over 100 employees, suggesting a dominance of medium-sized enterprises. Regarding years in operation, 41.2% of enterprises have been active for 5 to 10 years, 30.4% for less than 5 years, and 28.4% for more than 10 years, reflecting a nearly balanced distribution between newer and more established exporters.

Table 1
Characteristics of Research Samples

No.	Sample characteristics	Number of samples	Percentage
1	*Export method*	148	100.0
	Export manufacturing	62	41.9
	Export trading	86	58.1
2	*Size of enterprise* (number of people)	148	100.0
	From 10 to below 50	45	30.4
	From 50 to below 100	72	48.6
	Above 100	31	20.9
3	*Length of time in operation* (number of years)	148	100.0
	Below 5	45	30.4
	From 5 to 10	61	41.2
	Above 10	42	28.4

Model Fit

Table 2 below reports the model fit indices, for both the saturated model and the estimated model.

Table 2
Model Fit

	Saturated Model	Estimated Model
SRMR	.09	.09
d_ULS	3.02	3.39
rms Theta		.19

Note. SRMR = standardized root mean square residual, d_ULS = unweighted least squares discrepancy, rms Theta = root mean square Theta

The SRMR values for the saturated (.09) and estimated (.09) models fall below the conservative threshold of.10, indicating that the model achieves an acceptable level of fit (Hair et al., 2022). The d_ULS values for the saturated (3.02) and estimated (3.39) models fall within a reasonable range, suggesting no substantial inconsistencies between the empirical and model-implied correlation matrices. The RMS Theta value of 0.19 indicates an acceptable level of model fit for the measurement model (Hair et al., 2022). Overall, the model demonstrates an acceptable fit, supporting the continuation of the analysis toward evaluating the measurement and structural models.

Model Evaluation Procedure

The process of measurement model is evaluated as follows: First, the second-order construct of business model innovation is estimated. Applying the repeated indicator approach, the reliability, convergent validity, and discriminant validity of all indicators are estimated. All items from the three first-order dimensions were assigned to the higher-order construct, allowing the model to capture shared variance between the dimensions and the overarching business model innovation. Reliability and validity were assessed at both levels to ensure measurement consistency and absence of construct drift between theoretical conceptualization and empirical representation. Second, the measurement model including the second-order construct of business model innovation (BM) and the first-order constructs of digital transformation (DT), digital organizational culture (DC) and digital leadership capability (DL) are estimated. Third, the structural model is evaluated. Lastly, multigroup analysis is conducted.

Evaluation of the Measurement Model

The second-order construct and its first-order dimensions were evaluated first (Table 4). The higher-order construct of business model innovation (BM) was specified using the repeated indicators approach (Hair et al., 2022). All indicators of the first-order constructs (value creation, value delivery, value capture)

were assigned to the higher-order construct of business model innovation. According to Hair et al. (2022), values of Cronbach's alpha and Composite reliability above .70 indicate acceptable internal consistency, while values above .80 demonstrate good reliability. Hence, second-order construct exhibits strong internal consistency. Convergent validity was evaluated through average variance extracted (AVE) and outer loadings. AVE values exceeded the .50 threshold is confirming that each construct explained more than 50% of the variance in its indicators (Fornell & Larcker, 1981). Additionally, most of outer loadings were above .70, suggesting satisfactory convergence and construct representation. Discriminant validity was assessed using the heterotrait–monotrait (HTMT) ratio. All HTMT values were below .85 for establishing discriminant validity (Henseler et al., 2015). These results confirm that each construct is statistically distinct from the others. Therefore, the second-order construct demonstrates adequate reliability, convergent validity, and discriminant validity.

Next, the second-order construct is evaluated with first-order constructs (Table 3). The result in Table 3 indicates that all constructs exhibit strong internal consistency. Related to outer loadings, most of outer loadings were above .70, suggesting satisfactory convergence and construct representation. Only the indicator DT4 had an outer loading of .57 but it is acceptable for social research which this value is below .7 (Hulland, 1999). All HTMT values were below .85 for establishing discriminant validity (Henseler et al., 2015). Overall, the measurement model demonstrated adequate reliability, convergent validity, and discriminant validity, ensuring the appropriateness of the constructs for subsequent structural model analysis.

Table 3

Measurement Model Assessment of First- and Second-Order Constructs

			Cronbach's Alpha	Composite Reliability	Loadings	AVE	HTMT ratio
DT	DT1	We aim to digitalize everything that can be digitalized	.83	.88	.86	.60	DT-CR: .63 DT-DE: .80
	DT2	We collect massive volumes of data from different sources			.81		DT-CA: .64 DT-DC: .80
	DT3	We aim to create stronger networking between the different business processes with digital technologies			.83		DT-DL: .17
	DT4	We aim to enhance an efficient customer interface with digitality			.59		
	DT5	We aim to achieve information exchange with digitality			.73		
DC	DC1	Teams collaborate functionally in initiatives for innovation and digital transformation	.85	.89	.79	.68	DC-CR: .80 DC-DE: .77 DC-CA: .62
	DC2	There is a clear orientation towards digital technology changes inside the company's culture			.82		DC-DT: .80 DC-DL: .10
	DC3	The culture of digital innovation and change takes place as a natural process within the company			.87		
	DC4	The digital strategy is shared with staff and takes into consideration their suggestions			.83		

Table 3 *(Continued)*

			Cronbach's Alpha	Composite Reliability	Loadings	AVE	HTMT ratio
DL	DL1	We have ability to exploit skills and new IT trends	.85	.89	.84	.67	DL-CR: .15 DL-DE: .08
	DL2	We have ability to innovate in technological aspects, develop skills and IT implementation in the company			.88		DL-CA: .06 DL-DC: .10 DL-DT: .17
	DL3	We have the ability to coordinate staff with different skills			.84		
	DL4	We have and the ability to influence stakeholders to adapt to change and advances in technology			.72		
BM	CR	Value creation	.88	.90	.83	.59	DC-BM: .83
	DE	Value delivery			.90		DL-BM: .11
	CA	Value capture			.82		DT-BM: .79

Note. AVE = average variance extracted, HTMT = heterotrait-monotrait, DT = digital transformation, DC = Digital organizational culture, DL = Digital leadership capability, BM = business model innovation - second-order construct, including CR, DE, CA.

Table 4

Measurement Model of the Second-Order Construct BM and Its First-order Dimensions (CR, DE, CA)

			Cronbach's Alpha	Composite Reliability	Loadings	AVE	HTMT ratio
CR	BM1	We have introduced new products as a new value proposition	.76	.89	.77	.86	CR-DE: .71 CR-CA: .71
	BM2	We have introduced new services as a new value proposition			.77		CR-DT: .63 CR-DC: .80 CR-DL: .15
DE	BM3	We have started to collaborate with new business partners	.84	.90	.81	.76	DE-CR: .71 DE-CA: .76
	BM4	We have shared new responsibilities with business partners			.81		DE-DT: .80 DE-DC: .77 DE-DL: .08
	BM5	We have focused on a completely new market segment			.73		
CA	BM6	We have created new revenue streams	.76	.89	.72	.81	CA-CR: .71 CA-DE: .76
	BM7	We have introduced a new pricing mechanism			.75		CA-DT: .64 CA-DC: .62 CA-DL: .06

Note. AVE = average variance extracted, HTMT = heterotrait-monotrait, CR = value creation, DE = value delivery, CA = value capture, BM = business model innovation - second-order construct, including CR, DE, CA.

Evaluation of Structural Model

The structural model is evaluated with the following criteria: collinearity assessment between constructs (VIF); structural model path coefficients; coefficient of determination (R^2 value); effect size (f^2); blindfolding and predictive relevance (Q^2); effect size (q^2) (Hair et al., 2022).

Collinearity Assessment

To analyze possible collinearity, the variance inflation factor (VIF) values are examined. The result shows that all VIFs for the independent variables are below 5 (DC = 1.9; DL = 1.04; DT = 2.20), indicating that the estimates are not adversely affected by collinearity, consistent with the guidelines of Hair et al. (2022).

Structural Model Path Coefficients

The result in Table 5 shows that all hypotheses are accepted in which digital transformation has a positive direct effect on business model innovation (β = .29, $p < .001$). Specifically, digital organizational culture plays an important mediating role, strengthening the behavioral pathway between digital transformation and business model innovation. Digital transformation enhances the development of a digital organizational culture within firms (β = .69, $p < .001$), which in turn significantly promotes business model innovation (β = .47, $p < .001$). The mediation effect is confirmed by the significant indirect path (β = .32, $p < .001$, 95% CI [.22; .45]). The persistence of a significant indirect effect while the direct path remains significant confirms that the mediation is partial, suggesting that digital transformation not only fosters digital organizational culture that promotes innovation but also exerts a standalone effect on business model innovation. Furthermore, digital leadership capability positively moderates the relationship between digital transformation and business model innovation (β = .17, $p < .05$), implying that leadership moderation reflects behavioral sense-making and motivational signaling. These relationships collectively suggest that technological investment alone is insufficient to stimulate sustainable innovation in business models unless supported by behavioral and cultural enablers within the firm.

Table 5

Result 0f Structural Model Evaluation

Hypotheses	Relationships	Path Coefficients	95% CI (Bootstrap)	*p*-value	Result
H1 (+)	DT →BM	.29	[.13, .45]	$p < .001$	Accepted
H2 (+)	DT → DC	.69	[.57, .78]	$p < .001$	Accepted
H3 (+)	DC →BM	.47	[.34, .61]	$p < .001$	Accepted
H4 (+)	DT→DC→ BM	.32	[.22, .45]	$p < .001$	Accepted
H5 (+)	DL*DT →BM	.17	[-.03, .27]	$P = .01$	Accepted

Note. Confidence intervals were generated using 5,000 bootstrap samples in SmartPLS (two-tailed, 95% confidence level). All path coefficients are significant at p < .05.

Figure 2

Moderating Effect

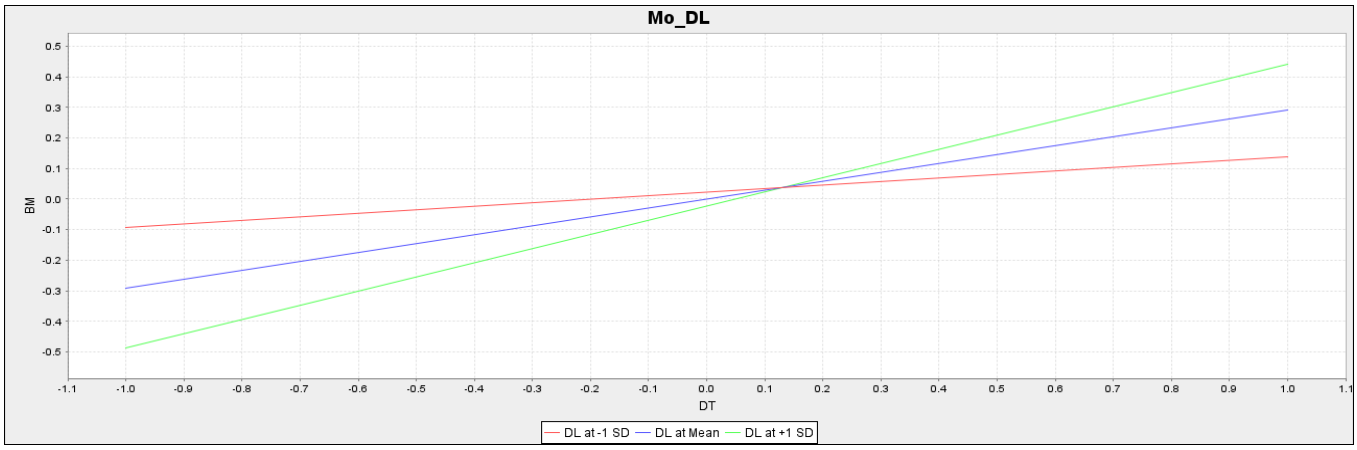


Figure 2 shows the moderating effect of digital leadership capability on the relationship between digital transformation and business model innovation. The slope for high digital leadership capability (+1 SD, green line) is steeper, indicating that digital transformation has a stronger positive effect on business

model innovation when digital leadership capability is high. In contrast, the slope flattens at low digital leadership capability (−1 SD, red line), suggesting that digital transformation generates limited innovation without sufficient leadership capability.

Coefficient of Determination (R^2 Value)

The coefficient represents the exogenous latent variables' combined effects on the endogenous latent variable. That is the coefficient represents the amount of variance in the endogenous constructs explained by all the exogenous constructs linked to it, where values of .75 are substantial, .50 are moderate and .25 are weak (Hair et al., 2022). The result shows that the mediators' R^2 coefficient (business model innovation) is .62 so this value is above moderate which means the digital transformation, and digital organizational culture accounted for 62 percent of business model innovation variations. In addition, regarding R^2 coefficient of digital organizational culture is .47, showing that digital transformation accounted for 47 percent of the digital organizational culture variation.

Effect Size (f^2)

In addition to evaluating the R^2 value of all endogenous constructs, the change in the R^2 value, when a specified exogenous construct is omitted from the model, can be used to evaluate whether the omitted construct has a substantive impact on the endogenous constructs or not. Guidelines for assessing f^2 are those values of .02, .15, and .35, respectively, representing small, medium, and large effects (Cohen, 1988) of the exogenous latent variable. Effect size values of less than .02 indicate that there is no effect. The result in Table 6 shows that f^2 value of digital transformation on business model innovation is .1 which shows the medium effect of digital transformation on business model innovation; f^2 value of digital organizational culture on business model innovation is .30 which shows the nearly medium effect of digital organizational culture on business model innovation; f^2 value of moderating role of digital leadership capability on the relationship between digital transformation and business model innovation is .06 which shows the nearly medium effect of digital leadership capability moderating role.

Blindfolding and Predictive Relevance (Q^2)

In addition to evaluating the magnitude of R^2 values as a criterion of predictive accuracy, researchers should also examine Stone-Geisser's Q^2 value (Geisser, 1974). This measure is an indicator of the model's out-of-sample predictive power or predictive relevance. Q^2 values larger than 0 suggest that the model has predictive relevance for a certain endogenous construct. The result in Table 6 shows that the dependent constructs are higher than zero for business model innovation and digital organizational culture which supports the predictive capacity of our model.

Effect Size (q^2)

Like the f^2 effect size approach for assessing R^2 values, the relative impact of predictive relevance can be compared by means of the measure to the q^2 effect size. As a relative measure of predictive relevance, values of .02, .15, and .35 indicate that an exogenous construct has a small, medium, or large predictive relevance, respectively, for a certain endogenous construct. The result in Table 6 indicates that q^2 value of digital transformation on business model innovation is .08.; q^2 value of digital organizational culture on business model innovation is .08 which shows digital transformation and digital organizational culture have nearly medium predictive relevance for business model innovation.

Table 6

Result of Effect Size (f^2), Blindfolding and Predictive Relevance (Q^2), and Effect Size (q^2)

Constructs	f^2	Q^2	q^2
Digital transformation			.08
Digital organizational culture	.30	.31	.08
Digital leadership capability	.06		
Business model innovation	.10	.35	

Note. f^2 = effect size; Q^2 = predictive relevance; q^2 = cross-validated redundancy

Multigroup Analysis

Before conducting the multi-group analysis (MGA), the measurement invariance of the composites was evaluated using the *measurement invariance assessment* (MICOM) procedure proposed by Henseler et al. (2016). The MICOM assessment followed the three-step approach: (1) configural invariance; (2) compositional invariance; and (3) equality of composite means and variances. As partial measurement invariance was achieved, the subsequent multi-group analysis (PLS-MGA) was performed to assess whether structural relationships differed significantly between the groups.

Table 7 indicates that there is no significant difference in the relationships among factors in the research model based on various enterprise characteristics. This suggests that in the current digital transformation context, human and organizational factors - specifically innovative leadership capabilities and a supportive culture for innovation play a more decisive role than structural characteristics. This finding also reflects a trend toward integration and the standardization of innovation strategies in the import-export sector, where enterprises regardless of export methods, size or age facing similar pressures from global competition and the need to quickly adapt to digital technologies.

Table 7

Result of Multigroup Analysis

Grouping variable	Group comparison	Path	Path coefficient difference	*p*-value	Significance
Export method	Export manufacturing vs. export trading	DT → BM	-.02	.91	ns
		DT → DC	.02	.79	ns
		DC→ BM	-.01	.92	ns
		DL→ BM	-.08	.54	ns
		Mo_DL→BM	-.08	.51	ns
Size of enterprise (employees)	From 10 to below 50 vs from 50 to below 100	DT →BM	-.05	.81	ns
		DT→ DC	-.16	.24	ns
		DC→BM	-.17	.35	ns
		DL→BM	.28	.23	ns
		Mo_DL→BM	.05	.79	ns
	From 10 to below 50 vs above 100	DT →BM	-.01	.99	ns
		DT →DC	-.22	.14	ns
		DC→BM	-.16	.54	ns
		DL→BM	.07	.78	ns
		Mo_DL→BM	.11	.68	ns
	From 50 to below 100 vs above 100	DT→ BM	-.04	.85	ns
		DT→ DC	.06	.57	ns
		DC→ BM	-.00	.98	ns
		DL→ BM	.20	.43	ns
		Mo_DL→BM	-.06	.8	ns
Length of time in operation (years)	Below 5 vs from 5 to 10	DT →BM	.35	.06	ns
		DT →DC	-.22	.08	ns
		DC→BM	-.14	.37	ns
		DL→BM	.18	.26	ns
		Mo_DL→BM	-.08	.63	ns
	From 5 to 10 vs above 10	DT →BM	-.06	.81	ns
		DT →DC	.01	.88	ns
		DC→BM	-.09	.65	ns
		DL→BM	-.00	.66	ns
		Mo_DL→ BM	.27	.12	ns
	Below 5 vs above 10	DT →BM	-.3	.92	ns
		DT →DC	.21	.04	ns
		DC→BM	.20	.11	ns
		DL→BM	-.11	.72	ns
		Mo_DL→BM	-.19	.85	ns

Note. ns = non-significant

Discussion and Conclusion

Discussion of Main Results

This study is grounded in the integration of organizational learning theory and behavioral agency theory by emphasizing behavioral mechanisms rather than purely structural or technological determinants of business model innovation. Organizational learning theory grounds the learning and capability-building aspects of digital organizational culture and digital transformation, while behavioral agency theory underpins the decision-making and behavioral mechanisms linking digital leadership capability to business model innovation. It suggests that digital transformation success depends not only on technology adoption but also on digital organizational culture and digital leadership capability.

The findings for H1 indicate that the behavioral mechanism of how organizations to innovate from digital tools and platforms facilitate. This result corroborates with that of Broccardo et al. (2023), who demonstrated that digital tools could assist companies in their business models. The findings for H2 reveal a positive and substantial effect of digital transformation on digital organizational culture, consistent with Malewska et al. (2024), who argue that digital transformation not only presupposes a supportive cultural foundation but also actively reshapes behavioral norms. The findings for H3 confirm that behavioral norms in digital organizational culture positively affect business model innovation, echoing Medina et al. (2017), who contend that business model innovation is sustainable only when embedded within a flexible and open cultural environment.

The evidence for H4 shows a positive indirect effect of digital transformation on business model innovation via digital organizational culture. This result aligns with Malewska et al. (2024), who posit that digital transformation fundamentally alters employees' cognitive frames and interaction patterns, thereby fostering more comprehensive and enduring business model innovation. In addition, the results indicate the essential mediating role of digital organizational culture. Both the direct path from digital transformation to business model innovation ($\beta = .29$, $p < .05$) and the indirect path through digital organizational culture ($\beta = .32$, $p < .05$) are significant, confirming partial mediation. This suggests that digital organizational culture partially transmits the influence of digital transformation on business model innovation rather than fully accounting for it. In behavioral terms, digital transformation stimulates exploratory learning and cognitive reframing, which gradually become institutionalized through shared digital culture. This culture reinforces learning processes, reduces uncertainty, and aligns organizational cognition around innovative goals.

The result of H5 shows that leaders with strong digital vision and self-efficacy facilitate strategic alignment, while those lacking behavioral signaling and motivational framing often fail to convert digital investment into innovation. The moderating role of digital leadership capability clarifies that it strengthens the relationship between digital transformation and business model innovation. Specifically, when digital leadership capability is higher, leaders are more effective at integrating digital vision, strategy, and culture, thereby amplifying the impact of digital transformation on innovative outcomes. Conversely, when leadership capability is lower, the positive effect of digital transformation on business model innovation becomes weaker, as leaders may lack the behavioral capacity to align technological initiatives with strategic renewal. This result is consistent with Addison et al. (2024), shedding light on its multifaceted impacts and the role of digital leadership capability in maximizing the effectiveness of digitalization strategies. Many organizations possess advanced technologies but lack leaders with a digital mindset, leading to technological investments that fail to drive business model innovation. In contrast, organizations with strong digital leadership capability tend to effectively align digital strategies with new business models.

The result of H6 shows no significant differences in the structural relationships of the research model across groups based on export method, enterprise size, and length of operation. This finding contrasts with traditional perspectives that associate innovation capacity primarily with organizational scale and structural resources (Foss & Saebi, 2017). Instead, it aligns with more recent digital-era research suggesting that leadership cognition and cultural learning capacity outweigh structural attributes in driving business model

innovation (Li, 2020). Thus, regardless of enterprise characteristics, the ability to translate digital transformation into innovative outcomes depends more on digital organizational culture and leadership capability than on firm-specific structural characteristics.

Limitations

This study has some limitations. The single-informant, cross-sectional design restricts causal inference and may involve common-method variance, though procedural controls were applied to reduce bias. Future research should adopt multi-informant or longitudinal designs to validate the behavioral mechanism by which digital transformation drives business model innovation through culture and under specific leadership conditions. In addition, expanding the sample and applying stratified random sampling could enhance generalizability and allow examination across other industries such as logistics, transportation, or tourism.

Implications for Behavioral Science

Based on the results, some managerial implications are suggested for Vietnamese import-export enterprises. First, enterprises should implement behavioral activation strategies to facilitate effective digital transformation. The direct effect of digital transformation on business model innovation highlights the importance of translating technological initiatives into consistent behavioural actions. Managers need to set precise micro-behavioural goals for digital tasks and apply reinforcement mechanisms such as structured recognition or performance feedback to reduce resistance and strengthen engagement. Presenting early digital accomplishments can generate reinforcing loops that stabilize employee commitment and increase the durability of transformation behaviours.

Second, enterprises should employ behavioral learning mechanisms to cultivate a strong digital organizational culture. The mediating role of digital organizational culture indicates that innovation-related behaviours depend on a cultural environment shaped by behavioural learning. Norm-shaping practices and habit-formation routines can encourage cooperation and openness toward digital change. Micro-learning activities and continuous feedback systems support incremental learning and build psychological ownership, thereby enhancing intrinsic motivation and promoting consistent behavioural alignment across units.

Third, enterprises should strengthen digital leadership as a behavioral amplifier. The moderating influence of digital leadership demonstrates that leaders function as critical behavioural signals within the organization. Effective digital leaders exemplify key adaptive behaviors, including curiosity, experimentation, and confidence in leveraging digital technologies. Leadership development initiatives should strengthen digital self-efficacy and create cross-functional mentorship structures that facilitate the diffusion of shared behavioural norms and enhance organizational coherence in digital adoption.

Fourth, enterprises should implement behavioral design principles to accelerate and stabilize business model innovation. The indirect effect of digital transformation on business model innovation suggests that business model innovation emerges from adaptive behavioural processes rather than solely structural adjustments. Establishing test-and-learn cycles can normalize experimentation and reduce perceived risk in trying new value propositions. Behavioural contracts with partners help maintain trust and accountability, while behaviourally informed pricing mechanisms increase responsiveness to customer decision patterns. These interventions support more stable behavioural foundations for innovation.

Fifth, enterprises should adopt an integrative behavioral framework for innovation. Overall, the results point to an integrated behavioural innovation framework in which digital transformation initiates behavioural change, digital organizational culture maintains behavioural continuity, and digital leadership amplifies these effects. Applying behavioural science principles enables firms to transform digital initiatives into collective routines and shared habits. This behavioural ecosystem supports continuous learning, adaptive responses, and long-term competitiveness in international markets.

Conclusion

Beyond the structural and technological mechanisms, this study underscores the behavioral dynamics underlying digital transformation in Vietnamese import-export enterprises. Digital transformation directly and indirectly enhances business model innovation, with digital organizational culture emerging as a particularly strong mediating mechanism. Digital leadership, in turn, reinforces motivation and trust in digital processes, creating a positive behavioural cycle that accelerates business model innovation. These findings contribute to the behavioral perspective of organizational digitalization, demonstrating that innovative success is as much about shaping collective behaviors as it is about adopting new technologies. By integrating behavioral insights with digital strategy, the study highlights that sustainable innovation depends not only on digital capability but also on cultivating the behavioral systems that enable enduring organizational change.

Declarations

Conflict of Interest: The authors declare no conflicts of interest.
Ethical Approval Statement: The study was conducted in accordance with the approval of the Human Research Ethics Committee of the University of Finance - Marketing, Ho Chi Minh City, Vietnam (2178/QĐ-ĐHTCM-ĐTSĐH, dated 11/07/2025).
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