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Developing a measurement scale for dynamic capabilities, business model innovation, and business performance: Evidence from Vietnamese enterprises

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Abstract

In today's rapidly changing business environment, firms must develop dynamic capabilities (DC) to sustain competitive advantage through business model innovation (BMI) and improved performance. Despite extensive research on DC, there is a lack of a rigorously validated measurement scale, particularly in the context of Vietnamese enterprises. This study aims to develop and validate a comprehensive measurement scale for DC and BMI in small and medium-sized enterprises (SMEs) in Binh Duong, Vietnam. Using the dynamic capabilities framework, the study conceptualizes DC through five dimensions: absorptive capability, technological capability, adaptive capability, innovative capability, and knowledge management capability. Exploratory Factor Analysis (EFA) is employed to refine and validate the scale, ensuring its reliability and applicability. Unlike previous studies that assess the impact of DC on firm performance, this research focuses on measurement scale development, offering a systematic tool for business leaders, policymakers, and researchers. The findings contribute to both theoretical and practical understandings of innovation-driven strategies, facilitating better decision-making and strategic planning in emerging economies. This study lays the foundation for future empirical research by providing a validated instrument to assess dynamic capabilities and their role in driving business model innovation and firm performance.

Keyword: Dynamic capabilities, business model innovation, business performance, measurement scale, SMEs

Introduction

In today's dynamic and technology-driven business environment, firms are under increasing pressure to enhance their adaptability and innovation in order to maintain and improve performance. Among the critical strategic competencies that support such adaptability, dynamic capabilities (DC) have emerged as a core construct, enabling firms to sense opportunities, restructure resources, and align their business models with changing market demands (Tece, 2007) ^[34]. Recent studies highlight the role of DC not only in improving operational efficiency but also in driving business model innovation (BMI) and sustaining long-term competitive advantage (Nguyen & Nguyen, 2020; Vo, 2020) ^[19].

Despite the growing body of literature on dynamic capabilities in strategic management, there remains a lack of a rigorously validated measurement scale, particularly in the context of Vietnamese enterprises. Prior research often examines DC through isolated components—such as sensing, seizing, and transforming capabilities (Nguyen & Tran, 2019) ^[20]—or focuses on testing its impact on firm performance, without developing a comprehensive and reliable instrument for measuring the construct.

Addressing these gaps, this study aims to develop and validate a measurement scale for DC and BMI in Binh Duong's SMEs. The research will (1) identify key dimensions of DC, (2) develop and refine a measurement scale, and (3) test its validity using Exploratory Factor Analysis (EFA). Unlike prior studies that assess the impact of DC on firm performance, this research focuses solely on measurement scale development, providing a foundation for future empirical testing. The validated scale will contribute to both academic research and practical applications, offering a systematic tool for business leaders, policymakers, and researchers to evaluate innovation-driven strategies.

Theoretical background and literature review

Theoretical background

The theory of DC has emerged as a central framework in strategic management to explain how firms achieve and sustain competitive advantage in volatile environments. Originating from the work of Teece, Pisano, and Shuen (1997), dynamic capabilities refer to a firm's ability to integrate, build, and reconfigure internal and external competences to respond effectively to environmental changes. This perspective extends the traditional resource-based view by emphasizing not just the possession of valuable resources, but also the capacity to transform and adapt them over time (Teece, 2007)^[34].

Teece (2007)^[34] further develops this framework by identifying three key dimensions of dynamic capabilities:

- Sensing – the ability to identify and assess opportunities and threats in the environment.
- Seizing – the ability to mobilize resources to capture value from identified opportunities.
- Transforming (or reconfiguring) – the ability to continuously renew and realign the firm's asset base and operational routines.

These dimensions are particularly relevant in the context of small and medium-sized enterprises (SMEs) operating in emerging economies, where market volatility, institutional uncertainty, and rapid technological change are prevalent. In Vietnam, Nguyen and Tran (2019)^[20] adapted this theoretical foundation by proposing context-specific indicators for measuring DC in SMEs, emphasizing strategic adaptability, innovation responsiveness, and resource reconfiguration capabilities.

In addition to dynamic capabilities, the concept of business model innovation (BMI) is frequently linked to how firms implement and operationalize their dynamic capabilities. According to Vo (2020)^[26], BMI reflects a firm's capacity to rethink how it creates, delivers, and captures value, especially in response to shifts brought about by digital transformation and customer behavior changes. Nguyen and Nguyen (2020)^[19] argue that dynamic capabilities are the foundation that enables BMI, which in turn contributes to improving organizational performance and competitiveness. Overall, the theoretical background for this study is grounded in the dynamic capabilities framework as articulated by Teece (2007) and operationalized in the Vietnamese business context through empirical studies (Nguyen & Tran, 2019; Nguyen & Nguyen, 2020; Vo, 2020)^[20, 19]. This theoretical foundation informs the development of a measurement scale that reflects both the conceptual integrity and the practical applicability of dynamic capabilities and business model innovation.

Literature review

Dynamic Capabilities (DC)

DC describe a firm's ability to integrate, build, and reconfigure resources to respond to change (Teece, 2007)^[34]. Foundational studies view DC as comprising three core functions: sensing opportunities, seizing them, and transforming the organization (Teece *et al.*, 2007)^[34]. In Vietnam, Nguyen and Tran (2019)^[20] proposed a measurement model based on strategic sensing, internal

alignment, and restructuring. Their study emphasized the role of leadership flexibility in SMEs. Nguyen and Nguyen (2020)^[19] expanded this by incorporating elements like knowledge acquisition, human capital flexibility, and digital responsiveness. Their five-factor structure contrasts with the three-factor model of Nguyen and Tran (2019)^[20], highlighting variation in scale design. Vo (2020)^[26], focusing on transformation in digital contexts, treated DC more as an adaptive mechanism shaped by environmental pressures rather than proactive strategic intent.

Other research, such as Le and Pham (2018)^[17], also explored the microfoundations of DC in Vietnamese firms, stressing internal knowledge sharing and cross-functional collaboration. Trinh and Nguyen (2020)^[25] noted that many SMEs lack formalized structures to develop DC systematically, relying instead on experiential learning. Although these studies offer useful insights, they differ in scope, structure, and methodological rigor. None fully validate their scales across contexts or industries, revealing the need for a comprehensive, empirically tested measurement model.

Business Model Innovation (BMI)

BMI involves modifying how firms create, deliver, and capture value. It is often an outcome of dynamic capabilities (Teece, 2007)^[34]. Vo (2020)^[26] defined BMI in terms of digital transformation, customer co-creation, and platform innovation. Nguyen and Nguyen (2020)^[19] empirically showed that DC positively influences BMI, which in turn enhances performance. Le and Pham (2018)^[17] examined innovation in business logic among family-owned firms, finding that ownership structure and risk tolerance shaped how BMI was implemented. Trinh and Nguyen (2020)^[25] pointed out that firms in manufacturing sectors adopted BMI mainly for efficiency, while service firms used it to improve customer engagement.

Despite these efforts, most studies used context-specific measures and lacked formal scale development procedures. Differences in how BMI is defined and measured make cross-study comparison difficult. There is a clear need for a standardized, context-appropriate measurement instrument.

Business Performance of Enterprise

Content

Research Gap

Although dynamic capabilities and BMI are well-theorized, most studies emphasize testing relationships rather than scale development. Nguyen and Tran (2019)^[20] proposed initial measurement dimensions for DC but did not validate them through factor analysis. Vo (2020)^[26] focused on conceptual aspects of BMI but offered no operational tool. Nguyen and Nguyen (2020)^[19] suggested a preliminary scale, yet without testing reliability or construct validity. Le and Pham (2018)^[17] and Trinh and Nguyen (2020)^[25] used qualitative or industry-specific approaches, limiting generalizability. These gaps underscore the lack of a validated, multi-dimensional scale for DC and BMI tailored to Vietnam's SMEs. This study addresses this by developing and testing a measurement scale through exploratory factor analysis.

Conceptual Framework

This study adopts the DCV to explain how firms leverage internal competencies to innovate and perform under dynamic conditions. Teece (2007) [34] emphasized the microfoundations of dynamic capabilities, which enable firms to sense opportunities, seize them, and reconfigure resources. Subsequent research has elaborated this framework and confirmed its multidimensional nature (Barreto, 2010; Schilke, 2014; Wilden & Gudergan, 2015) [23, 29].

The present study conceptualizes dynamic capabilities through five distinct dimensions: absorptive capability, technological capability, adaptive capability, innovative capability, and knowledge management capability. These dimensions reflect contemporary understandings of firm-level capabilities in emerging and knowledge-based economies (Teece, Peteraf, & Leih, 2016; Schilke *et al.*,

2020; Wilden *et al.*, 2023) [24, 30].

Business model innovation (BMI) is incorporated into the framework as a mechanism through which dynamic capabilities are operationalized. BMI represents the reconfiguration of value creation, delivery, and capture mechanisms, and has been shown to mediate the relationship between capabilities and performance (Clauss, 2017; Foss & Saebi, 2017) [9, 11]. Finally, business performance is included as an outcome variable, reflecting both financial and non-financial achievements such as growth, efficiency, and market responsiveness (Teece & Linden, 2017; Wilden *et al.*, 2023) [30].

While prior studies have explored these relationships, the current study is limited to developing and validating a measurement scale for the seven constructs: five dynamic capabilities, business model innovation, and business performance as in Figure 1.

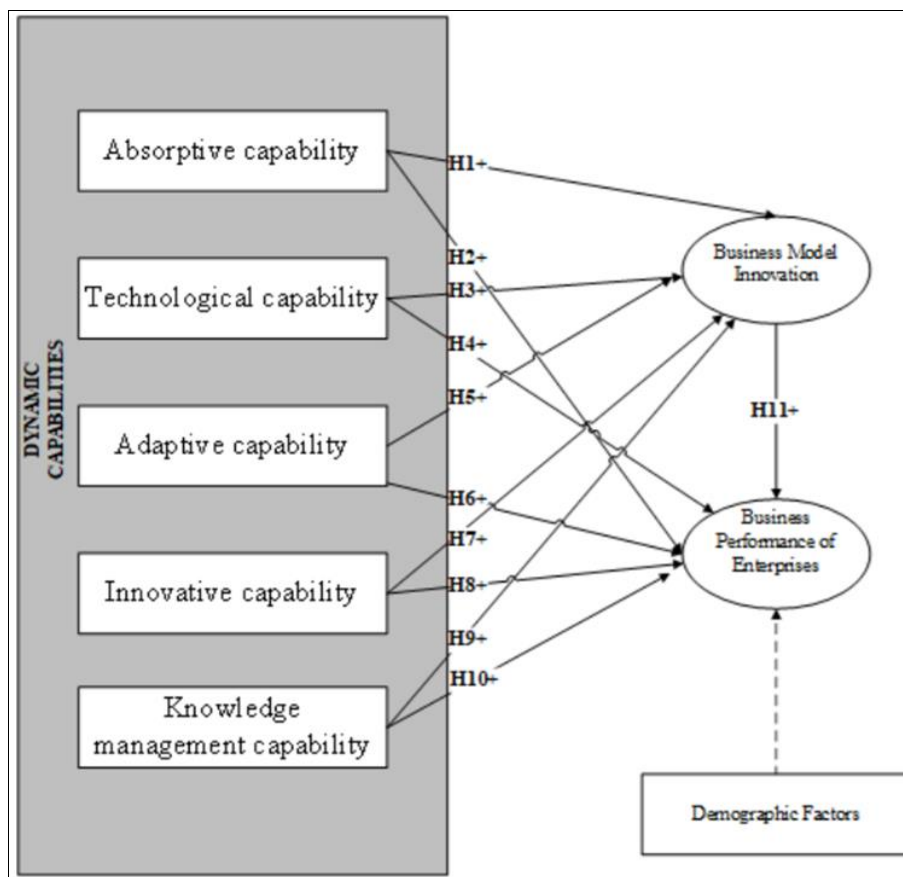


Fig 1: Conceptual framework (Authors' compilation, 2025)

Research Methodology

This study employs a quantitative research design with a focus on developing and validating a measurement scale for dynamic capabilities, business model innovation, and business performance. The research process follows a structured sequence, beginning with the identification of research gaps through literature review, followed by conceptual model development, item generation, expert validation and empirical testing through a multi-phase survey approach.

Nêu trình tự của qui trình kiểm định thang đo sơ bộ: Mô hình, thang đo ban đầu, thang đo sơ bộ, khảo sát sơ bộ, phân tích dữ liệu rồi đến thang đo chính thức (sơ đồ của các mục

từ 4.2, 4.3 đến 4.4 (kết luận thang đo chính thức)

Scale development process

The scale development followed standard procedures for measurement validation. Initially, measurement items were compiled from an extensive literature review related to seven constructs: five dimensions of dynamic capabilities (absorptive, technological, adaptive, innovative, and knowledge management capabilities), business model innovation, and business performance. These items were then refined through expert interviews and focus group discussions.

The qualitative phase involved interviews with business

executives and scholars to assess content validity and ensure contextual appropriateness. Based on expert feedback, ambiguous or redundant items were removed or revised. A scale consisting of 42 items was formed (Absorptive Capability: 6 items, Technological Capability: 6 items, Adaptive Capability: 6 items, Innovative Capability: 7 items, Knowledge Management Capability: 6 items, Business Model Innovation: 6 items, Business Performance: 4 items).

Data collection and Sample

The pilot study targeted board members, heads or deputy heads of business departments at enterprises operating in Binh Duong Province, Vietnam. These individuals were required to have direct experience in managing or participating in business model innovation activities within their firms. The sample was designed with the following criteria:

- Respondents had to match the target profile.
- They must have experience in firms that had engaged in business model innovation.
- A minimum sample size of 30 observations was required to perform preliminary statistical analyses (Nguyen Van Thang, 2014).

A non-probability sampling approach, specifically convenience sampling, was employed due to the exploratory nature of the study. A total of 50 questionnaires were distributed either in person or via email, depending on the respondent’s preference. Of these, 46 responses were received, but 8 were deemed invalid after data screening and cleaning. Thus, 38 valid responses were retained for analysis, satisfying the minimum sample requirement ($n = 38 > 30$).

The pilot data were then coded and prepared for preliminary reliability testing using Cronbach’s Alpha. The results served as the basis for refining the scale by removing low-performing items and conducting Exploratory Factor Analysis (EFA) to assess unidimensionality, convergent validity, and discriminant validity of the constructs.

Data Analysis

The analysis process involved two main stages to evaluate the preliminary measurement scale: internal reliability testing using Cronbach’s Alpha, followed by Exploratory

Factor Analysis (EFA). First, Cronbach’s Alpha was used to assess the internal consistency of each construct. A Cronbach’s Alpha value ≥ 0.6 was considered acceptable for reliability (Nunnally & Bernstein, 1994), while the ideal range falls between 0.75 and 0.95. Items with corrected item–total correlation less than 0.3 were removed, as they did not sufficiently correlate with the overall construct. Although a high Alpha value suggests reliability, extremely high values ($\alpha > 0.95$) may indicate redundancy, meaning some items measure the same content and should be eliminated.

After ensuring reliability, EFA was applied to explore the underlying structure of the measurement scale and assess unidimensionality, convergent validity, and discriminant validity. EFA was conducted using Principal Axis Factoring with Promax rotation, as the constructs were assumed to be correlated. The following criteria were applied:

- KMO (Kaiser-Meyer-Olkin) statistic ≥ 0.5 and Bartlett’s Test of Sphericity with $p < 0.05$ confirmed sampling adequacy and factorability.
- Factors were extracted based on the Eigenvalue ≥ 1 criterion.
- Factor loadings ≥ 0.5 were considered acceptable; items with cross-loadings or differences < 0.3 across factors were candidates for removal (Hair *et al.*, 1998).
- The cumulative variance explained by the extracted factors had to be at least 50% to ensure that the shared variance outweighed measurement error.

This two-step process ensured that only reliable and valid items were retained for the final measurement model, laying the foundation for further scale validation in subsequent research stages.

Research results

Research measurement scale

Based on an extensive literature review and expert consultation, this study developed a measurement instrument consisting of seven constructs with a total of 42 observed items. Each construct was measured reflectively using multiple items adapted from previous validated studies and refined through expert interviews to ensure contextual relevance for Vietnamese SMEs. The full list of items is available in Table 1.

Table 1: Summary of measurement items after expert interviews and revisions

No.	Observed variables	Sources
Absorptive capability (HT)		
HT1	The firm is capable of acquiring new knowledge from market sources.	Chien & Tsai (2012) ^[8] ; Wang & Ahmed (2007) ^[28] ; Zahra & George (2002) ^[31] ; Lane, Koka & Pathak (2006); Teece, Pisano & Shuen (1997)
HT2	The firm can apply accumulated experience to business operations.	Camisón & Forés (2010) ^[4] ; Lane <i>et al.</i> (2006); Zollo & Winter (2002)
HT3	The firm proactively analyzes and identifies external environmental factors.	Tu <i>et al.</i> (2006); Camisón & Forés (2010) ^[4] ; Lane <i>et al.</i> (2006); Barreto (2010) ^[2]
HT4	The firm can absorb existing knowledge from competitors.	Tu <i>et al.</i> (2006); Camisón & Forés (2010) ^[4] ; Zahra & George (2002) ^[31] ; Volberda, Foss & Lyles (2010) ^[27]
HT5	The firm is able to acquire new knowledge from customers.	Author + Expert interviews
HT6	The firm is capable of leveraging external resources.	Author + Expert interviews
Technological capability (CN)		
CN1	The firm has internal strength to develop technological capabilities.	Clauss (2017) ^[9] ; Wade & Hulland (2004); Grant (1996)

CN2	The firm can integrate new technologies with existing systems.	Clauss (2017) ^[9] ; Khin & Ho (2019) ^[16] ; Tushman & Anderson (1986)
CN3	The firm consistently updates technological resources.	Clauss (2017) ^[9] ; Zahra & George (2002) ^[31] ; Rosenbloom (2000) ^[22]
CN4	The firm utilizes new technological potential to expand product/service offerings.	Clauss (2017) ^[9] ; Cepeda & Vera (2007) ^[5] ; Tripsas (1997)
CN5	The firm applies technology to interact with and support customers online.	Author + Expert interviews
CN6	The firm maintains secure and protected information systems.	Author + Expert interviews
Adaptive capability (TN)		
TN1	The firm proactively adjusts plans to fit different business stages.	Zhou & Li (2010) ^[32] ; Eisenhardt & Martin (2000); Teece (2007) ^[34]
TN2	The workforce can coordinate well in response to external changes.	Zhou & Li (2010) ^[32] ; Teece (2007) ^[34] ; Leonard-Barton (1992)
TN3	The firm quickly adapts to regulatory and policy shifts.	Bùi Quang Tuyén (2017); Eisenhardt & Martin (2000); Bogner & Bansal (2007) ^[3]
TN4	Employees accept job reassignment as needed.	Zhou & Li (2010) ^[32] ; Teece (2007) ^[34] ; Zollo & Winter (2002)
TN5	The firm swiftly adapts to environmental changes.	Zhou & Li (2010) ^[32] ; Eisenhardt & Martin (2000); Teece, Pisano & Shuen (1997)
TN6	The firm is capable of evaluating and managing risks.	Author + Expert interviews
Innovative capability (ST)		
ST1	The firm continually improves and innovates business processes.	Wang & Ahmed (2004) ^[28] ; Crossan & Apaydin (2010) ^[10] ; Damanpour (1991)
ST2	The firm modifies existing products/services to meet customer needs.	Grawe <i>et al.</i> (2009) ^[12] ; Keupp & Gassmann (2009) ^[15] ; O'Reilly & Tushman (2004) ^[21]
ST3	The firm encourages new business ideas and initiatives.	Covin & Slevin (1989); Keh <i>et al.</i> (2007) ^[14] ; Crossan & Apaydin (2010) ^[10] ; Nonaka & Takeuchi (1995)
ST4	The firm establishes specific plans and programs for product/service innovation.	Clauss (2017) ^[9] ; Keupp & Gassmann (2009) ^[15] ; Damanpour (1991)
ST5	The firm actively addresses unmet customer needs.	Clauss (2017) ^[9] ; Crossan & Apaydin (2010) ^[10] ; Nonaka & Takeuchi (1995)
ST6	The firm is creative in approaching and interacting with customers.	Author + Expert interviews
ST7	The firm invests in research and development activities.	Author + Expert interviews
Knowledge management capability (QT)		
QT1	The firm develops human resources to meet new business conditions.	Jansen <i>et al.</i> (2006) ^[13] ; Camisón & Forés (2010) ^[4] ; Nonaka & Takeuchi (1995); Leonard-Barton (1992)
QT2	The firm uses various methods to transfer new knowledge.	Clauss (2017) ^[9] ; Teece (2007) ^[34] ; Grant (1996)
QT3	Employees receive regular training to develop new competencies.	Jansen <i>et al.</i> (2006) ^[13] ; Camisón & Forés (2010) ^[4] ; Nonaka & Takeuchi (1995); Leonard-Barton (1992)
QT4	Employees possess updated knowledge and skills.	Jansen <i>et al.</i> (2006) ^[13] ; Camisón & Forés (2010) ^[4] ; Teece (2007); Zollo & Winter (2002)
QT5	The firm is capable of creating knowledge-based value.	Author + Expert interviews
QT6	The firm can manage knowledge-based human resources.	Author + Expert interviews
Business model innovation (DM)		
DM1	The firm consistently seeks new partners for collaboration.	Clauss (2017) ^[9] ; Zott & Amit (2010) ^[23] ; Chesbrough & Rosenbloom (2002) ^[7]
DM2	The firm significantly improves internal processes.	Clauss (2017) ^[9] ; Foss & Saebi (2017) ^[11] ; Massa, Tucci & Afuah (2017) ^[18]
DM3	The firm targets new or underserved market segments.	Clauss (2017) ^[9] ; Zott & Amit (2010) ^[23] ; Chesbrough & Rosenbloom (2002) ^[7]
DM4	The firm explores new customer segments and markets for its offerings.	Clauss (2017) ^[9] ; Teece (2018); Massa <i>et al.</i> (2017) ^[18]
DM5	The firm adopts new distribution channels for products/services.	Clauss (2017) ^[9] ; Zott & Amit (2010) ^[23] ; Chesbrough (2010) ^[6]
DM6	The firm develops new revenue opportunities.	Clauss (2017) ^[9] ; Foss & Saebi (2017) ^[11] ; Amit & Zott (2012) ^[11]
Business Performance (BP)		
BP1	The firm achieves high revenue.	Torres <i>et al.</i> (2018)
BP2	The firm achieves high profit.	Torres <i>et al.</i> (2018)
BP3	The firm maintains a high growth rate.	Torres <i>et al.</i> (2018)
BP4	The firm has greater market share than its competitors.	Torres <i>et al.</i> (2018)

(Source: Authors' compilation, 2025)

Sample descriptive statistics

The pilot study was conducted with 38 valid responses from senior personnel at small and medium-sized enterprises in Binh Duong Province. Among the respondents, 52.6% were male and 47.4% were female. In terms of position, 57.9% held director or deputy director roles, while 42.1% were

department managers. Regarding experience, 21.1% had less than 5 years, 44.7% had 5–10 years, and 34.2% had more than 10 years of working experience in business management. These characteristics ensure the representativeness and relevance of the sample for evaluating the measurement scale.

Table 2: Sample descriptive statistics

Variable	Category	Frequency	Percentage	Cumulative frequency	Cumulative percentage
Gender	Male	20	52.6	20	52.6
	Female	18	47.4	38	100
	Total	38	100		
Position	Director / Deputy Director	22	57.9	22	57.9
	Department Manager	16	42.1	38	100
	Total	38	100		
Years of Experience	< 5 years	8	21.1	8	21.1
	5–10 years	17	44.7	25	65.8
	> 10 years	13	34.2	38	100
Total	Total	38	100		

(Source: Authors' compilation, 2025)

Reliability analysis (Cronbach’s Alpha)

A reliability analysis was conducted on the measurement scales using Cronbach’s Alpha to assess internal consistency and identify items for removal. Six constructs were tested, and items with corrected item–total correlations below 0.3 were eliminated (Table 3). The results are as follows:

- Absorptive Capability: After removing two items (HT4, HT5) with low item–total correlations, the remaining four items (HT1, HT2, HT3, HT6) achieved an acceptable Cronbach’s Alpha of 0.827.
- Technological Capability: One item (CN5) was removed. The revised five-item scale (CN1, CN2, CN3, CN4, CN6) yielded a Cronbach’s Alpha of 0.806.
- Adaptive Capability: One item (TN4) was excluded. The five retained items (TN1, TN2, TN3, TN5, TN6) reached a reliability score of 0.791.
- Innovative Capability: Two items (ST3, ST6) were

removed. The final five-item scale (ST1, ST2, ST4, ST5, ST7) recorded a Cronbach’s Alpha of 0.734.

- Knowledge Management Capability: One item (QT2) was deleted. The remaining five items (QT1, QT3, QT4, QT5, QT6) achieved a Cronbach’s Alpha of 0.836.
- Business Model Innovation: Two items (DM2, DM6) were removed. The four-item scale (DM1, DM3, DM4, DM5) showed a reliability coefficient of 0.792.
- Business Performance: The four-item scale (DM1, DM3, DM4, DM5) showed a reliability coefficient of 0.812.

All revised scales demonstrated acceptable reliability levels ($\alpha \geq 0.7$) and were retained for subsequent exploratory factor analysis.

Table 3: Reliability Test Results (Cronbach’s Alpha) for Measurement Scales

Observed Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item–Total Correlation	Cronbach’s Alpha if Item Deleted
HT1	9.5526	5.281	.695	.763
HT2	9.1842	5.073	.684	.767
HT3	9.4211	5.710	.555	.824
HT6	9.3421	5.258	.681	.769
Cronbach's Alpha = 0.827				
CN1	13.7895	8.333	.679	.742
CN2	13.7368	9.280	.533	.786
CN3	13.8947	7.610	.680	.740
CN4	13.9211	8.994	.603	.767
CN6	13.8158	9.289	.478	.803
Cronbach's Alpha = 0.806				
TN1	15.2632	4.632	.500	.789
TN2	15.2632	5.064	.573	.750
TN3	15.1316	5.415	.622	.743
TN5	15.0526	5.240	.454	.790
TN6	15.1842	4.857	.818	.685
Cronbach's Alpha = 0.791				
ST1	14.9474	7.186	.408	.727
ST2	14.9211	7.102	.719	.622
ST4	16.1842	6.641	.368	.771

Observed Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item–Total Correlation	Cronbach’s Alpha if Item Deleted
ST5	14.8158	7.506	.639	.652
ST7	15.4474	7.605	.540	.678
Cronbach's Alpha = 0.734				
QT1	14.7368	8.523	.670	.796
QT3	14.5789	10.142	.714	.792
QT4	14.8421	8.947	.726	.777
QT5	14.8158	10.154	.597	.814
QT6	14.7105	9.346	.543	.834
Cronbach's Alpha = 0.836				
DM1	10.0000	6.703	.574	.755
DM3	10.1053	6.421	.750	.670
DM4	10.1842	6.641	.538	.777
DM5	10.2105	7.252	.568	.758
Cronbach's Alpha = 0.792				
BP1	10.4211	6.23	.612	.766
BP2	10.3421	6.514	.698	.731
BP3	10.2368	6.379	.585	.781
BP4	10.2105	6.101	.633	.749
Cronbach's Alpha = 0.812				

(Source: Authors' compilation, 2025)

Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) was conducted to examine the construct validity of the proposed measurement model. The original instrument consisted of 42 observed variables measuring seven conceptual constructs. After the reliability analysis using Cronbach’s Alpha, 9 items (HT4, HT5, CN5, TN4, ST3, ST6, QT2, DM2, DM6) were eliminated due to low item–total correlations or poor theoretical alignment. As a result, 33 items remained for EFA.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.56, and Bartlett’s Test of Sphericity was

significant (Sig. = 0.000), indicating that the data were appropriate for factor analysis. Based on the eigenvalue > 1 criterion, seven factors were extracted, with the smallest eigenvalue being 1.778. The cumulative variance explained was 78.358%, surpassing the 50% threshold and indicating strong explanatory power of the extracted components.

All retained items had factor loadings greater than 0.5, with cross-loadings well below the 0.3 threshold, supporting the unidimensionality, convergent validity, and discriminant validity of the constructs. These results confirm the robustness of the proposed measurement model for subsequent (Table 4).

Table 4: Summary of measurement items after expert interviews and revisions

No.	Observed variables	Sources
Absorptive capability (HT)		
HT1	The firm is capable of acquiring new knowledge from market sources.	Chien & Tsai (2012) ^[8] ; Wang & Ahmed (2007) ^[28] ; Zahra & George (2002) ^[31] ; Lane, Koka & Pathak (2006); Teece, Pisano & Shuen (1997)
HT2	The firm can apply accumulated experience to business operations.	Camisón & Forés (2010) ^[4] ; Lane <i>et al.</i> (2006); Zollo & Winter (2002)
HT3	The firm proactively analyzes and identifies external environmental factors.	Tu <i>et al.</i> (2006); Camisón & Forés (2010) ^[4] ; Lane <i>et al.</i> (2006); Barreto (2010) ^[2]
HT6 => HT4	The firm is capable of leveraging external resources.	Author + Expert interviews
Technological capability (CN)		
CN1	The firm has internal strength to develop technological capabilities.	Clauss (2017) ^[9] ; Wade & Hulland (2004); Grant (1996)
CN2	The firm can integrate new technologies with existing systems.	Clauss (2017) ^[9] ; Khin & Ho (2019) ^[16] ; Tushman & Anderson (1986)
CN3	The firm consistently updates technological resources.	Clauss (2017) ^[9] ; Zahra & George (2002) ^[31] ; Rosenbloom (2000) ^[22]
CN4	The firm utilizes new technological potential to expand product/service offerings.	Clauss (2017) ^[9] ; Cepeda & Vera (2007) ^[5] ; Tripsas (1997)
CN6 => CN5	The firm maintains secure and protected information systems.	Author + Expert interviews
Adaptive capability (TN)		
TN1	The firm proactively adjusts plans to fit different business stages.	Zhou & Li (2010) ^[32] ; Eisenhardt & Martin (2000); Teece (2007) ^[34]
TN2	The workforce can coordinate well in response to external changes.	Zhou & Li (2010) ^[32] ; Teece (2007) ^[34] ; Leonard-Barton (1992)

TN3	The firm quickly adapts to regulatory and policy shifts.	Bùi Quang Tuyền (2017); Eisenhardt & Martin (2000); Bogner & Bansal (2007) ^[3]
TN5 => TN4	The firm swiftly adapts to environmental changes.	Zhou & Li (2010) ^[32] ; Eisenhardt & Martin (2000); Teece, Pisano & Shuen (1997)
TN6 => TN5	The firm is capable of evaluating and managing risks.	Author + Expert interviews
Innovative capability (ST)		
ST1	The firm continually improves and innovates business processes.	Wang & Ahmed (2004) ^[28] ; Crossan & Apaydin (2010) ^[10] ; Damanpour (1991)
ST2	The firm modifies existing products/services to meet customer needs.	Grawe <i>et al.</i> (2009) ^[12] ; Keupp & Gassmann (2009) ^[15] ; O'Reilly & Tushman (2004) ^[21]
ST4 => ST3	The firm establishes specific plans and programs for product/service innovation.	Clauss (2017) ^[9] ; Keupp & Gassmann (2009) ^[15] ; Damanpour (1991)
ST5 => ST4	The firm actively addresses unmet customer needs.	Clauss (2017) ^[9] ; Crossan & Apaydin (2010) ^[10] ; Nonaka & Takeuchi (1995)
ST7 => ST5	The firm invests in research and development activities.	Author + Expert interviews
Knowledge management capability (QT)		
QT1	The firm develops human resources to meet new business conditions.	Jansen <i>et al.</i> (2006) ^[13] ; Camisón & Forés (2010) ^[4] ; Nonaka & Takeuchi (1995); Leonard-Barton (1992)
QT3 => QT2	Employees receive regular training to develop new competencies.	Jansen <i>et al.</i> (2006) ^[13] ; Camisón & Forés (2010) ^[4] ; Nonaka & Takeuchi (1995); Leonard-Barton (1992)
QT4 => QT3	Employees possess updated knowledge and skills.	Jansen <i>et al.</i> (2006) ^[13] ; Camisón & Forés (2010) ^[4] ; Teece (2007) ^[34] ; Zollo & Winter (2002)
QT5 => QT4	The firm is capable of creating knowledge-based value.	Author + Expert interviews
QT6 => QT5	The firm can manage knowledge-based human resources.	Author + Expert interviews
Business model innovation (DM)		
DM1	The firm consistently seeks new partners for collaboration.	Clauss (2017) ^[9] ; Zott & Amit (2010) ^[23] ; Chesbrough & Rosenbloom (2002) ^[7]
DM3 => DM2	The firm targets new or underserved market segments.	Clauss (2017) ^[9] ; Zott & Amit (2010) ^[23] ; Chesbrough & Rosenbloom (2002) ^[7]
DM4 => DM3	The firm explores new customer segments and markets for its offerings.	Clauss (2017) ^[9] ; Teece (2018); Massa <i>et al.</i> (2017) ^[18]
DM5 => DM4	The firm adopts new distribution channels for products/services.	Clauss (2017) ^[9] ; Zott & Amit (2010) ^[23] ; Chesbrough (2010) ^[6]
Business Performance (BP)		
BP1	The firm achieves high revenue.	Torres <i>et al.</i> (2018)
BP2	The firm achieves high profit.	Torres <i>et al.</i> (2018)
BP3	The firm maintains a high growth rate.	Torres <i>et al.</i> (2018)
BP4	The firm has greater market share than its competitors.	Torres <i>et al.</i> (2018)

(Source: Authors' compilation, 2025)

Conclusion

This study was conducted with the aim of developing and validating a measurement scale to assess key drivers of innovation and performance among enterprises. Drawing on a comprehensive review of prior studies, seven conceptual constructs were identified: absorptive capability, technological capability, adaptive capability, innovative capability, knowledge management capability, business model innovation, and business performance. A total of 42

observed variables were initially proposed. Through expert interviews, pilot testing, and preliminary quantitative analysis, 9 items were removed based on low internal consistency or weak theoretical alignment. Exploratory factor analysis was subsequently performed on the remaining 33 items. The results confirmed that the measurement model met the required thresholds for reliability and validity. All retained items had factor loadings above 0.5, with cumulative variance explained

reaching 78.358%, indicating strong structural coherence among the constructs.

The final scale provides a reliable and multidimensional instrument for assessing dynamic capabilities, business model innovation, and performance outcomes in the context of Vietnamese enterprises. By focusing solely on scale development and validation, this study lays the groundwork for future empirical research using Structural Equation Modeling (SEM) to examine the relationships between these constructs. Beyond its academic contribution, the proposed measurement scale offers a practical tool for business leaders and policy makers to diagnose capability gaps and design innovation strategies aligned with long-term performance goals. Future studies are encouraged to replicate and expand this scale across different sectors, regions, and organizational contexts to enhance its generalizability and impact.

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