

Linking dynamic managerial capabilities and organizational agility: The role of technological innovation

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Abstract. In an era of rapid technological change and increasing environmental uncertainty, organizational agility has become a key driver of firm competitiveness, underscoring the importance of understanding how dynamic managerial capabilities enable agile organizational responses. The current study investigates the relationship between dynamic managerial capabilities and organizational agility, with a particular focus on the mediating role of technological innovation. It employs a quantitative approach, analyzing survey data from SMEs in Vietnam using partial least squares structural equation modeling (PLS-SEM). The findings reveal that dynamic managerial capabilities positively affect organizational agility, and that technological innovation serves as a mediator in this relationship. Managers with strong dynamic capabilities enable firms to enhance their agility through continuous technological advancements. This study contributes to the literature on dynamic managerial capabilities and innovation by empirically validating the role of managerial capabilities in fostering organizational agility through technological innovation. In practice, it provides valuable insights for business leaders on leveraging managerial capabilities and adopting technology to navigate uncertain market conditions effectively.

Keywords: dynamic managerial capabilities, organizational agility, partial least squares structural equation modeling (PLS-SEM), SMEs, technological innovation

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1. Introduction

In the contemporary business landscape, characterized by technological advancements and digitalization, businesses face numerous challenges in maintaining competitiveness and ensuring long-term sustainability, especially small and medium-sized enterprises (SMEs) in developing countries [17]. Organizational agility, the capacity of an organization to swiftly adapt to changes in the external environment, reconfigure its internal structures and operations, and respond effectively to emerging opportunities and threats, plays a pivotal role in sustaining competitive advantage in today's turbulent markets [5]. Organizational agility empowers organizations to quickly detect and respond to technological, economic, and social shifts, ensuring adaptability and resilience [36]. It also supports the pursuit of competitive advantage by allowing firms to capitalize on emerging opportunities, innovate rapidly, and comply effectively with evolving regulations [36]. However, achieving and sustaining such agility requires not only structural flexibility or an advanced information technology infrastructure but also the strategic competencies and decision-making abilities of top managers. Recent research underscores the pivotal role

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of strategic capabilities for managers, known as dynamic managerial capabilities, in fostering agility and increasing digital readiness, facilitating innovation in rapidly evolving environments [52].

Dynamic managerial capabilities are defined as the capabilities through which managers create, extend, and modify how firms operate, impacting strategic change and organizational performance [25]. They are an extension of dynamic capabilities, focusing on how managers transform the firm's resources to sustain and enhance its competitive advantage and performance [25]. This capability is a key determinant of organizational agility, as it empowers managers to respond proactively to environmental changes [51, 25]. Managers with excellent dynamic managerial capabilities facilitate strategic decision-making, foster innovation, and effectively allocate resources to enhance agility [1, 25]. Although substantial evidence links dynamic capabilities to organizational agility, the specific contribution of dynamic managerial capabilities remains underexplored, as most studies fail to address the managerial aspect [6]. Further, researchers often combine managerial capabilities with other dynamic capabilities, complicating the isolation of the effects of managerial actions and decisions [52].

Technological innovation refers to the implementation of novel ideas in the form of new products or services, or the incorporation of new elements into an organization's production processes or service operations [11]. Technological innovation mediates the relationship between dynamic managerial capabilities and organizational agility. Managers with better dynamic managerial capabilities are more likely to foster an innovation-oriented culture, mobilize cross-functional teams, and allocate resources to develop new products, services, and processes that meet evolving market demands [24]. In turn, firms that engage in technological innovation are better positioned to anticipate and respond to market changes, thereby enhancing their organizational agility through improved tools and adaptive frameworks [3]. The interplay of dynamic managerial capabilities, technological innovation, and organizational agility is crucial for firms aiming to maintain competitive advantage in rapidly changing environments. There is a need for more empirical studies that explore the specific mechanisms through which technological innovation mediates the relationship between dynamic managerial capabilities and organizational agility. While prior studies have examined the role of information technology capabilities [6], there is limited research on other forms of technological innovation and their impact on organizational agility. A clearer understanding of these relationships is crucial for several reasons. First, it provides insights into how organizations can better leverage dynamic managerial capabilities to foster innovation and agility, an essential advantage in industries marked by rapid technological change and intense competition, where adaptability and innovation are critical to success [18]. Second, it informs strategic decision-making by highlighting the importance of investing in technological capabilities and fostering an innovation-oriented organizational culture [3].

Vietnam provides a helpful context for examining the relationships among dynamic managerial capabilities, technological innovation, and organizational agility. According to The Vietnam Enterprise White Book 2025 [39], while the number of enterprises in Vietnam continues to grow (as of 2024, the number of active enterprises reached 940,069, marking a 2% increase compared to 2023), firms are facing increasing challenges in operational efficiency, profitability, and productivity, which highlights persistent weaknesses in managerial effectiveness and competitiveness. In 2023, SMEs accounted for 97.3% of all enterprises that published financial statements but showed relatively modest financial performance, with 30.2% of medium-sized enterprises (3.7% of the total), 37.5% of small enterprises (26.5%), and 53.6% of micro-sized enterprises (67.1%) reporting financial losses [39]. These patterns indicate limited financial resilience and heavy exposure to environmental uncertainty. In addition, enterprises are highly concentrated in major urban centers such as Ho Chi Minh City (34.9% of the total) and Hanoi (20.9% of the total), while firms in peripheral regions face infrastructure and human capital constraints [39]. Although Vietnam has made substantial progress in digital infrastructure and innovation capacity, these improvements remain unevenly distributed across firms and regions [41]. These

institutional and structural conditions imply that managerial capabilities play a central role in shaping organizational innovation and agility in Vietnamese SMEs, and the empirical findings of this study should be interpreted in light of this specific ecosystem.

The objective of this study is to examine the relationship between dynamic managerial capabilities and organizational agility among SMEs in Vietnam, clarifying the role of technological innovation in this relationship. To achieve this objective, the study adopts a quantitative research design and employs a survey-based methodology using a snowball sampling approach, collecting primary data from senior managers of SMEs across multiple industries in Vietnam. The proposed research model examines the direct and indirect effects of dynamic managerial capabilities on organizational agility, with technological innovation as a mediating mechanism. The hypothesized relationships are empirically tested using the PLS-SEM technique. In doing so, the study contributes to the literature by clarifying how dynamic managerial capabilities are associated with organizational strategic change, particularly organizational agility in volatile environments, and by providing empirical evidence on the mediating role of technological innovation in translating dynamic managerial capabilities into organizational outcomes. Finally, by focusing on SMEs in a developing economy, the study provides contextual evidence to assess the applicability of existing theoretical relationships in settings characterized by higher uncertainty, resource constraints, and managerial discretion.

2. Review of the literature and hypothesis development

2.1. Dynamic managerial capabilities and organizational agility

Adner and Helfat introduced the theory of dynamic managerial capabilities to refine and complement the theory of dynamic capabilities [1]. The authors defined dynamic managerial capabilities as managers' abilities to build, integrate, and reconfigure organizational resources and competences [1]. In broader terms, these capabilities refer to a manager's ability to develop, expand, or adjust the firm's approach to generating value by influencing both internal and external factors [24]. Dynamic managerial capabilities theory emphasizes the managerial influence on strategic change, expanding previous frameworks by explicitly incorporating the role of individual actors, their capabilities, social interactions, and agency in strategic decision-making [27]. Dynamic managerial capabilities, as individual-level capabilities with significant organizational impact, stem from managers' diverse skills, experiences, networks, and mental models, relying on their authority over resources to enable effective action [24]. Although dynamic managerial capabilities are conceptualized at the individual level, this study draws on upper echelons theory [22] and the micro-foundations perspective of dynamic capabilities [51, 15] to explain how individual-level capabilities translate into organizational-level outcomes. Both perspectives emphasize that strategic choices, resource allocations, and organizational change are shaped by the cognition, experiences, and capabilities of top managers. In this sense, managers' dynamic capabilities serve as micro-level mechanisms through which strategic decisions, investment priorities, and organizational routines are formed, thereby influencing firm-level innovation and organizational agility. This link is particularly evident in SMEs, where decision-making authority is typically concentrated at the top and managers tend to exert a more direct, disproportionate influence on organizational outcomes.

The role of dynamic managerial capabilities can be analyzed through the three key capabilities, involving the capacity to (1) sense and shape opportunities and threats, (2) seize opportunities, and (3) transform the resource base [51], enabling managers to guide their organizations through rapidly changing competitive environments. In the light of dynamic managerial capabilities theory, managerial human capital, social capital, and cognition are the three key antecedents of dynamic managerial capabilities [1]. These elements are deeply interconnected, influencing and reinforcing one another to shape a manager's ability to adapt

and respond to a changing business environment [37]. Variations contribute to disparities in outcomes, as the uneven distribution of these antecedents among managers results in differing levels of dynamic managerial capabilities [25]. For instance, dynamic managerial capabilities could promote proactive innovation behaviors, enabling managers to identify emerging technological trends and align internal processes and resources to exploit these opportunities swiftly. This agility is particularly evident when firms face market turbulence or disruptive innovations. Agility refers to the ability to respond to unpredictable and uncertain changes arising from external and internal changes [55]. Organizational agility is a firm-wide capability to swiftly and innovatively respond to unexpected changes in the business environment, leveraging them as opportunities for growth and success [55]. It comprises market capitalization agility and operational adjustment agility, both of which entail a continual openness to change, with the former focusing on an entrepreneurial mindset and the latter emphasizing speedy execution/implementation [35]. In a dynamic environment, organizations survive by adapting to evolving conditions, requiring quick, flexible responses and agility to operate efficiently amid turbulence and uncertainty [8]. Dynamic managerial capabilities shape organizational agility by enabling managers to sense opportunities, seize them effectively, and reconfigure resources to maintain competitive advantage. Managers with strong dynamic managerial capabilities can identify emerging trends, foster collaboration across organizational boundaries, and implement strategic changes that enhance organizational responsiveness and flexibility [25].

Prior studies offer both conceptual and empirical support for a close link between dynamic capabilities and organizational agility. Teece et al. (2016) argued that dynamic capabilities are a prerequisite for achieving the level of organizational agility required to cope with deep uncertainty [50], and several empirical studies have indicated a positive association between the two constructs across different contexts e.g., [60, 23, 30]. Akkaya and Qaisar (2021) further highlighted the strategic relevance of organizational agility, demonstrating that it moderates the relationship between dynamic capabilities and firm performance [2]. Overall, this stream of research suggests that dynamic capabilities are an important antecedent of organizational agility. At the same time, these studies conceptualize dynamic capabilities at the organizational level. They are conducted outside transition-economy contexts, leaving relatively little insight into how dynamic managerial capabilities operate as micro-foundational drivers of organizational agility in SMEs operating in transition economies. Recently, Tenggono et al. (2025) examined the positive relationship between dynamic managerial capabilities and strategic agility in SMEs within a transition economy [53]. However, this study did not incorporate technological innovation as a mediating mechanism in the relationship between dynamic managerial capabilities and organizational agility. In addition, dynamic managerial capabilities were operationalized as a set of resources (managerial human capital, social capital, and cognition), rather than as a set of behaviors reflected in sensing, seizing, and reconfiguring capabilities [53].

Building on this literature, dynamic managerial capabilities can be understood as the manager-level mechanisms through which dynamic capabilities are enacted in organizations. They are particularly relevant in SMEs, where strategic decision-making and resource allocation are typically concentrated among a small number of senior managers. In such settings, managers' abilities to sense opportunities and threats, handle them appropriately, and transform resources are likely to translate directly into how quickly and flexibly the organization can respond to its environment. Therefore, it seems reasonable to expect that firms led by managers with stronger dynamic managerial capabilities will exhibit higher levels of organizational agility. Based on the above discussion, we propose the following hypothesis:

H1: Dynamic managerial capabilities positively impact organizational agility.

2.2. Dynamic managerial capabilities and technological innovation

Technological innovation refers to the implementation of ideas that result in new products or new services, or the introduction of new elements into an organization's production or service processes [11]. It encompasses any modification to an existing product or process, as well as the development of entirely new technologies [24]. Managers play a critical role in technological innovation, particularly those overseeing research and development and new product development, as they significantly contribute to idea generation and may even propose new concepts [22]. Additionally, they influence the outcome through managerial processes and strategic decisions, such as determining funding levels and shaping the composition of the development team, guiding the innovation process [24].

Senior managers also play a pivotal role in shaping technological innovation by scanning the external environment for emerging technologies relevant to their organizations, by investing in specific new technologies, establishing an organizational structure conducive to innovation, such as implementing cross-functional teams or determining the centralization or decentralization of research and development units, or by modifying existing structures to support technological advancement better [24]. Managers with strong dynamic managerial capabilities are more likely to scan the environment for innovative technologies and integrate these insights into strategic decision-making. They play a pivotal role in overcoming internal inertia and fostering a culture that embraces change, thereby enhancing the organization's innovation capabilities [24]. Based on the above arguments, we propose the following hypothesis:

H2: Dynamic managerial capabilities positively impact technological innovation.

2.3. Technological Innovation and Organizational Agility

As mentioned above, technological innovation involves the development and application of new technologies to improve processes, modify existing or new products, and enhance competitive advantage [24]. Some studies indicate that investing in and adopting information technology and digital technologies enhances organizational agility [47, 42, 6]. First, technological innovation enhances agility by enabling real-time data processing and faster decision-making through advanced technologies such as cloud computing, big data analytics, and artificial intelligence, allowing organizations to detect emerging trends and adapt their operations swiftly [47]. Second, these technological advancements enable flexible operational frameworks, making it easier for organizations to reallocate resources and restructure processes in response to market disruptions [42]. Organizations that invest in technology innovation are better equipped to enhance their agility, enabling them to remain competitive in rapidly changing environments. Thus, we propose the following hypothesis:

H3: Technological innovation positively impacts organizational agility.

2.4. The mediating effect of technological innovation

Dynamic managerial capabilities enable managers to adjust the ways an organization earns a living in the present [24]. They focus on transforming how an organization sustains itself by building, integrating, and reconfiguring its resources and competencies [1]. Thus, these capabilities play a pivotal role in shaping an organization's strategic direction [25]. As mentioned above, managers with strong dynamic managerial capabilities will enhance the organization's agility by sensing environmental changes and responding more quickly. Managers with strong dynamic managerial capabilities are also equipped to identify and capitalize on technological opportunities by driving investments in new technologies and fostering an innovation-friendly culture essential for developing and implementing technological innovations [24]. The integration and adoption of technological innovations enhances an organization's ability to process real-time information, streamline decision-making, and rapidly reconfigure operations, thereby

directly increasing organizational agility and enabling a more effective response to environmental changes [6, 47, 42]. Thus, we propose the following hypothesis:

H4: Technological innovation mediates the relationship between dynamic managerial capabilities and organizational agility.

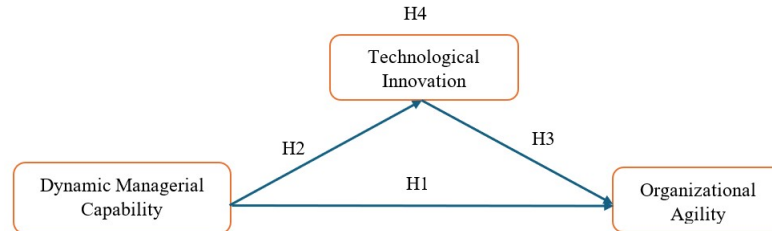


Figure 1: *Research framework.*

3. Methodology and data

3.1. Design

The current study employed two phases. First, a preliminary quantitative study was conducted to ensure that respondents understand the questionnaire, assess the reliability and validity of the measurement items, and identify any potential errors before launching the main study. It consisted of two main steps: a pretest and a pilot test. The pretest study was conducted through in-depth interviews with three academics currently teaching management-related courses and five top managers of SMEs. The pretest aimed to confirm the clarity and relevance of the questions and, if necessary, adjust the terminology for the upcoming survey. The pilot test involved a preliminary survey with 30 senior SME managers to assess the reliability and validity of the measurement items. The main study was also conducted with senior SME managers.

3.2. Sample and Procedure

Data were collected from senior managers of SMEs across diverse industries in Vietnam between December 2024 and May 2025. According to The Vietnam Enterprise White Book 2025 [39], as of the end of 2024, there were 940,078 active enterprises nationwide. In terms of economic sectors, service enterprises accounted for 68.5% of the total, followed by industry and construction at 30.3%, while agriculture, forestry, and fisheries accounted for only 1.3%. Regarding geographical distribution, enterprises located in the Red River Delta accounted for 32.7%, the Northern Midlands and Mountainous Areas for 4.7%, the North Central and Central Coastal region for 13.1%, the Central Highlands for 2.9%, the Southeast region for 39.1%, and the Mekong River Delta for 7.5%. The two cities with the highest concentrations of enterprises are Ho Chi Minh City (after the administrative merger), with 34.9%, and Hanoi, with 20.9%. Together, these two cities represent as much as 55.8% of the total number of enterprises in operation nationwide in 2024. In terms of firm size among operating enterprises with business results as of the end of 2023, micro-sized enterprises accounted for 67.1%, small-sized enterprises 26.5%, medium-sized enterprises 3.7%, and large enterprises 2.7%. As of the end of 2023, SMEs represented 97.3% of all enterprises reporting financial statements. SMEs account for the majority of enterprises in Vietnam's economy and make significant contributions to the country's socio-economic development and its competitive advantage in the global market [38, 57]. Due to the absence of a comprehensive sampling frame and contact lists, this study used the snowball sampling method, which has been widely used in management research [12, 40]. Initially, we contacted

senior managers and provided a clear explanation of the study’s scientific purpose, inviting them to participate voluntarily in a self-administered questionnaire with mixed delivery modes. We conducted face-to-face meetings with most survey participants to introduce the study and distribute the questionnaire, but respondents completed the questionnaire themselves. In cases where a face-to-face meeting could not be arranged, we contacted potential respondents by phone to explain the purpose of the study and invite them to participate. Upon obtaining their consent, the questionnaire was sent either in paper or electronic form, and the completed questionnaire was returned later. No personal information, company names, or contact details were collected, and no audio recordings were made. Respondents were also informed that there were no right or wrong answers and that their responses would be treated confidentially and used solely for academic purposes, in aggregated form. These procedures were intended to reduce the risk of socially desirable responses and response bias. After the first round, we asked the senior managers surveyed for referrals or connections to other senior managers. Then we contacted the next senior managers to request a meeting for the survey.

All questions were rated on a 7-point Likert scale from 1 (totally disagree) to 7 (totally agree). To estimate the minimum sample size, we employed the 10-times rule as a heuristic guideline commonly used in research utilizing the partial least squares structural equation modeling approach [33]. According to this rule, the minimum sample size should be determined by the greater of the following two values: (1) ten times the maximum number of formative indicators used to measure a single construct, or (2) ten times the highest number of structural paths directed toward any endogenous latent construct in the model [19]. The construct of organizational agility has the highest number of structural paths pointing toward it, which is two. Therefore, based on the 10-times rule, the minimum sample size for this study is 20. In addition to this heuristic benchmark, we conducted a statistical power analysis [10] using G*Power (with parameters, including $\alpha = 0.05$; power = 0.80; effect size $f^2 = 0.15$; number of predictors = 2). The results indicate that a minimum sample size of 68 is required. With 119 valid responses, the present study exceeds this requirement and therefore has adequate statistical power to detect medium-sized effects.

This study surveyed 119 senior managers, each representing a distinct SME, resulting in one respondent per firm. Among them, 35 were female (29.4%), 83 were male (69.7%), and 1 respondent (0.8%) preferred not to specify their gender. In terms of age, 20.2% were 25–35, 52.1% were 36–45, 25.2% were 46–55, and 2.5% were over 55. Regarding education, 4.2% had a high school education, 66.4% held a university/college degree, 27.2% had a postgraduate degree, and 1.7% fell into other categories. In terms of company size, according to Decree 80/2021/ND-CP of the Government of Vietnam, SMEs are classified based on employee headcount and financial criteria: micro enterprises have fewer than 10 employees and total annual revenue or capital not exceeding 3 billion VND; small enterprises have 10 to fewer than 50 employees and total annual revenue or capital not exceeding 50 billion VND; medium enterprises have 50 to fewer than 200 employees and total annual revenue or capital not exceeding 200 billion VND [56]. Based on this classification, 19.3% are micro enterprises, 66.4% are small enterprises, and 14.3% are medium-sized enterprises. Regarding firm age, 0.8% had been established for less than a year, 26.9% for 1–5 years, 37% for 6–10 years, and 35.3% for more than 10 years. By industry, 18.5% operated in manufacturing, 16% in construction, 56.3% in trade and services, 7.6% in agriculture, forestry, and fisheries, and 1.7% in other sectors.

3.3. Measurement

Three constructs were analyzed in this study: dynamic managerial capabilities, organizational agility, and technological innovation. All of these constructs were derived from existing studies across various contexts worldwide, which may lead to differences in meaning and terminology. Therefore, Schaffer and Riordan’s back-translation technique was applied to ensure that the

Vietnamese version of the scale items accurately conveyed the corresponding original meaning [48]. Specifically, the questionnaire was initially prepared in English and then translated into Vietnamese by the author. This procedure was carried out because managers in this market, especially at SMEs, have limited proficiency in English. Another bilingual business administration scholar subsequently translated it back into English. Both English versions of the questionnaire were subsequently compared to verify semantic equivalence. All items in the questionnaire were assessed using a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

Dynamic managerial capabilities were measured using a six-item scale adopted from Roth et al. (2023) [46]. Example items include “I systematically identify opportunities from changes in customer needs, new technologies, and the activities of other companies” and “I frequently take the risk of championing investments in new service solutions.” Organizational agility was measured by six items adopted from Cegarra-Navarro et al. (2016) [9]. Example items are “We have the ability to rapidly respond to customers’ needs” and “We rapidly implement decisions to face market changes.” Technological innovation was measured by four items based on Donbesuur et al. (2020) [13]. Example items are “The firm can extend its range of products” and “The firm can replace products that are obsolete.”

3.4. Data analysis

The study employed the partial least squares structural equation modeling (PLS-SEM) approach with Smart PLS4 for data analysis. PLS-SEM is well-suited for this study because it is designed for prediction-oriented and theory-building research and allows the simultaneous estimation of measurement and structural models, including direct and indirect relationships [19, 21]. This methodological choice aligns with recent comparative research, which emphasizes that PLS-SEM is especially appropriate for predictive and exploratory research, whereas covariance-based SEM (CB-SEM) is more suitable for purely confirmatory purposes [58]. Moreover, PLS-SEM follows a composite-based logic in which indicators are aggregated to form proxies of abstract constructs [34, 44], which is appropriate for survey-based operationalization of managerial and organizational capabilities and for cross-level designs linking individual-level perceptions to organizational-level outcomes. Finally, PLS-SEM performs well in contexts with relatively small samples and complex models, which is particularly relevant in SME settings [19].

At the same time, we acknowledge that PLS-SEM does not provide the same global fit measures as CB-SEM and is therefore applied here as a method suited to predictive and complex modeling rather than as a general substitute for covariance-based approaches [19, 21]. Following Hair et al.’s (2021) recommendations, both the measurement and structural models were systematically evaluated [20]. The assessment of the measurement model included examinations of internal consistency, convergent validity, and discriminant validity. Then, a bootstrapping procedure with 5,000 subsamples was conducted to test hypotheses in the structural model estimation stage.

3.5. Common method bias

This study used cross-sectional data obtained from a single respondent pool, specifically senior managers of firms, which may include the risk of common method variance. To mitigate common method variance, this study employed multiple techniques [43]. First, the study used enhancement techniques to encourage participants’ engagement [14] by incorporating statements into the questionnaire such as: “There is no right or wrong answer; all of your responses are valuable to the study, answering the questionnaire is completely voluntary, and we have no authority to force anyone to participate in the research,” and “Your responses will be kept

confidential, only researchers of this project can access the data for the sole purpose of science.” Second, the study conducted Harman’s one-factor test, and the single factor accounted for less than 50% of the variance [43, 32]. The results indicate that the single-factor model accounted for 37.77% (below the 50% threshold), suggesting that common method variance did not bias the results of this study.

4. Results and discussion

4.1. Measurement model

The internal consistency of the reflective measurement model was evaluated using Cronbach’s alpha and composite reliability. To guarantee internal consistency, Hair et al. (2017) have indicated that both Cronbach’s alpha and composite reliability should exceed 0.7 but remain below 0.95 to prevent measurement redundancy, as the values above this threshold suggest that all indicators measure the same phenomenon [19]. The results in Table 1 indicate a satisfactory level of internal consistency, with Cronbach’s alpha values ranging from 0.717 (dynamic managerial capabilities) to 0.862 (organizational agility). Similarly, composite reliability values vary from 0.824 (dynamic managerial capabilities) to 0.897 (organizational agility).

Next, the study evaluated the convergent validity of all constructs by analyzing outer loadings and average variance extracted (AVE). The outer loadings value indicates the reliability of the indicators and is suggested to exceed the threshold of 0.708 [19]. For values between 0.4 and 0.7, the researchers should consider removing the indicator only if its removal enhances composite reliability or AVE [19]. In the first analysis of convergent validity, the outer loadings and AVEs of constructs such as organizational agility and technological innovation met the required criteria; however, the AVE for the dynamic managerial capabilities construct was only 0.434, which is below the threshold of 0.5 [19]. In the subsequent analysis, after removing two items (DMC2 and DMC6) with outer loadings below 0.708, the AVE for this construct increased to 0.540, surpassing the threshold. In Table 1, although DMC1 had an outer loading below 0.708, it was retained because the AVE of the dynamic managerial capabilities construct had already exceeded 0.5. Table 1 below presents the final results on indicator reliability, showing that the AVEs exceeded the required threshold of 0.5 (dynamic managerial capabilities = 0.54; organizational agility = 0.593; technological innovation = 0.649).

Research constructs	Items	Outer loadings	Construct reliability and validity		
			Cronbach’s α	Composite reliability	Average variance extracted (AVE)
Dynamic managerial capabilities – DMC [46]	DMC1	0.678	0.717	0.824	0.540
	DMC3	0.727			
	DMC4	0.731			
	DMC5	0.799			
Organizational agility – ORA [9]	ORA1	0.707	0.862	0.897	0.593
	ORA2	0.826			
	ORA3	0.749			
	ORA4	0.826			
	ORA5	0.764			
	ORA6	0.740			
Technological innovation – TEI [13]	TEI1	0.777	0.821	0.881	0.649
	TEI2	0.864			
	TEI3	0.789			
	TEI4	0.790			

Table 1: *Convergent validity*

Another stage in evaluating the measurement model was assessing discriminant validity. This study employed the Fornell–Larcker criterion [16] and the heterotrait-monotrait ratio [26]. According to the Fornell–Larcker criterion, the square root of the AVE for each construct should be greater than its correlations with other constructs. Additionally, the heterotrait-monotrait ratio should not exceed 0.9 to ensure the discriminant validity. As shown in Table 2, our measurement model met the discriminant validity requirements based on the Fornell–Larcker criterion and heterotrait-monotrait ratio.

Variables	Fornell–Larcker criterion			HTMT		
	DMC	ORA	TEI	DMC	ORA	TEI
DMC	0.735*			–		
ORA	0.661	0.770*		0.825	–	
TEI	0.526	0.659	0.806*	0.649	0.759	–

Note: * Square root of AVE value.

Table 2: *Discriminant validity.*

4.2. Structural model

To ensure a reliable evaluation of the structural model, the current study examined collinearity issues between two sets of constructs. Hair et al. (2017) have suggested that the ideal variance inflation factor (VIF) value should be below 5 [19]. Based on this criterion, collinearity was not an issue in this study (Table 3). Next, the study assessed the in-sample predictive power using the R^2 value. According to Hair et al. (2017), R^2 values of 0.75, 0.5, and 0.25 are considered substantial, moderate, and weak, respectively [19]. The R^2 value of organizational agility is 0.595, indicating a moderate effect of predictors (Table 4). We then evaluated the model’s out-of-sample predictive power by using the Q^2_{predict} value. To estimate this criterion, the study applied the partial least squares predictive procedure. The Q^2_{predict} value for the organizational agility was 0.417, which is greater than 0, meaning that the model has predictive power [19].

	ORA	TEI
DMC	1.382	1.000
TEI	1.382	

Table 3: *VIF values.*

	R^2 value	Q^2_{predict} value
TEI	0.288	0.256
ORA	0.595	0.417

Table 4: *Model fit indices.*

This study examined the direct and indirect effects of dynamic managerial capabilities on organizational agility using a bootstrapping procedure with 5,000 subsamples to validate the proposed hypotheses (Table 5). Analyses supported H1, indicating that dynamic managerial capabilities directly impact organizational agility ($\beta = 0.435$, $p = 0.000$, LL/UL=0.295/0.577). Additionally, dynamic managerial capabilities directly impact organizational innovation ($\beta = 0.526$, $p = 0.000$, LL/UL=0.347/0.670), supporting H2. Hypothesis H3 is supported, indicating that technological innovation directly impacts organizational agility ($\beta = 0.43$, $t = 5.253$,

LL/UL=0.265/0.587). Finally, technological innovation plays a mediating role in the relationship between dynamic managerial capabilities and organizational agility ($\beta = 0.226$, $p = 0.000$, LL/UL=0.130/0.351).

Path description	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	LL/UL	t	p	Hypotheses
<i>Direct effects</i>							
Dynamic managerial capabilities → Organizational agility	0.435	0.437	0.073	[0.295; 0.577]	5.973	0.000	H1: Supported
Dynamic managerial capabilities → Technological innovation	0.526	0.533	0.076	[0.347; 0.670]	6.912	0.000	H2: Supported
Technological innovation → Organizational agility	0.430	0.432	0.082	[0.265; 0.587]	5.253	0.000	H3: Supported
<i>Mediating effects</i>							
Dynamic managerial capabilities → Technological innovation → Organizational agility	0.226	0.230	0.056	[0.130; 0.351]	4.007	0.000	H4: Supported

Table 5: *Results of the hypotheses.*

4.3. Discussion

The study found a direct, positive impact of dynamic managerial capabilities on organizational agility (H1), demonstrating that managers who can identify opportunities, restructure internally, and adapt strategies flexibly enhance the organization’s responsiveness to environmental changes. This finding is consistent with the dynamic capabilities perspective, which conceptualizes organizational agility as an outcome of a firm’s abilities to sense, seize, and reconfigure resources and competences in response to environmental change [50]. This study is also consistent with previous research on the impact of dynamic managerial capabilities on firm agility. Specifically, dynamic managerial capabilities have been shown to have a direct and positive effect on strategic agility [53], an indirect and positive impact on supply chain responsiveness [45], and a direct and positive impact on coordination flexibility [29]. However, unlike prior studies that conceptualize dynamic managerial capabilities primarily as resources (e.g., managerial human capital, social capital, cognition) [53, 29], this study adopts a behavioral perspective that focuses on what managers actually do. This perspective provides a more process-oriented explanation of how agility is generated. Moreover, prior studies focused on firms of different sizes rather than exclusively on SMEs and were mainly conducted in developed economies [29, 45]. By contrast, the current study extends this line of research by providing empirical evidence from SMEs in a transition economy, where organizational structures tend to be more flexible, but resources are more constrained.

The study also found that dynamic managerial capabilities have a substantial impact on technological innovation. These results are consistent with the arguments of Helfat and Martin (2015), who emphasize the role of dynamic managerial capabilities in shaping organizational innovation [24]. We extend this work by empirically testing this relationship in the specific context of SMEs and by demonstrating that dynamic managerial capabilities influence not only strategic change (organizational agility) but also concrete technological investment and adoption decisions. This study also aligns with the previous empirical research on the impact of dynamic managerial capabilities on innovation activities in organizations. Specifically, dynamic managerial capabilities have a direct and positive impact on green product innovation [54], SMEs’ innovation performance [31], and a digital firm’s innovativeness [28]. However, while

these studies focus mainly on general innovation outcomes and dynamic managerial capabilities conceptualized as managerial resources, the present study explicitly examines technological innovation as a distinct and critical organizational process and dynamic managerial capabilities conceptualized as managerial behaviors. This empirical validation is critical in emerging economies, where innovation depends heavily on managerial initiative and discretion [4].

Data analysis from the current study revealed that technological innovation positively affects organizational agility (H3). This finding indicates that adopting and developing new technologies enhances organizational agility, enabling businesses to process information more efficiently. Prior studies have shown that investments in information technology and the adoption of digital technologies enhance organizational agility [42, 6]. However, our findings go beyond these studies by showing that technological innovation does not merely act as an independent driver of organizational agility but also serves as a mediating mechanism linking dynamic managerial capabilities to organizational agility. Specifically, the current study highlights the mediating role of technological innovation in reinforcing the relationship between dynamic managerial capabilities and organizational agility (H4). This finding suggests that dynamic managerial capabilities are not automatically translated into organizational agility; rather, they operate through innovation-related decisions and implementation processes that enable organizations to respond more effectively to environmental change.

As described earlier, the majority of Vietnamese firms can be classified as microenterprises or SMEs (93.6% in 2023). They are financially constrained and operate under conditions of high environmental uncertainty, uneven digital infrastructure, and limited access to skilled human capital [39, 41]. At SMEs, high-level managers and owner-managers often hold centralized decision-making authority and shape organizational culture; thus, their vision, knowledge, and strategic decision-making can shape how proactively and effectively an SME pursues digital initiatives [59]. Top executives must not only support technological investments but also guide their organization through change, fostering new mindsets, capabilities, and agility [49]. This organizational structure strengthens the influence of dynamic managerial capabilities in driving innovation and enhancing organizational agility.

Furthermore, the uneven distribution of digital infrastructure, skills, and innovation capacity across SMEs in Vietnam [41] implies that technological innovation is a critical yet fragile mechanism through which managers' capabilities are translated into organizational outcomes. For many SMEs, innovation is not a routine process but rather a selective, manager-driven investment decision shaped by resource scarcity and risk considerations. Accordingly, the mediating role of innovation reflects both its strategic importance and the practical limitations faced in emerging economies. These results highlight that the effects of dynamic managerial capabilities on organizational agility are likely to be stronger and more visible in environments characterized by institutional uncertainty, resource limitations, and centralized decision-making authority, such as Vietnam [41, 39, 59]

5. Conclusion

5.1. Theoretical contributions

The study makes several theoretical contributions. First, it complements the theory of dynamic managerial capabilities by elucidating the mechanism through which managers' capabilities influence strategic change, specifically the impact on organizational agility in response to environmental volatility. While previous studies have often focused on the underpinnings of dynamic managerial capabilities and their impact on strategic change in volatile environments [29], our study emphasizes how sensing, seizing, and transforming capabilities influence strategic change.

Second, the current study extends the theory of dynamic managerial capabilities by integrating technological innovation as a mediating variable in the relationship between dynamic

managerial capabilities and organizational agility. While many studies have emphasized the direct impact of dynamic managerial capabilities on strategic change and performance outcomes, intermediary mechanisms such as technological innovation have not been thoroughly examined [7]. The current research demonstrates that technological innovation is not merely a byproduct of dynamic managerial capabilities but rather a crucial bridge that transforms managers' capabilities into competitive advantage and organizational agility.

Finally, our study confirms the positive relationship between dynamic managerial capabilities and technological innovation, clarifying a dual mechanism in which leaders not only directly influence the innovation process but also indirectly foster a sustainable innovation environment that enhances organizational agility. While previous studies highlighted the link between dynamic managerial capabilities and innovation [25], no research has thoroughly analyzed both the direct and indirect impacts of these capabilities on technological innovation.

5.2. Practical contributions

From a practical perspective, the research findings show that an organization can improve its agility by developing dynamic managerial capabilities. These capabilities enable businesses to quickly identify opportunities, reconfigure resources, and innovate, but also enhance their ability to respond flexibly to unexpected changes. Thus, managers should proactively build effective dynamic managerial strategies, focusing on improving flexible decision-making, enhancing an adaptive organizational culture, and encouraging continuous innovation. At the same time, businesses should focus on training and developing their workforce to enhance flexible thinking and the ability to cope with change at all levels of the organization. Moreover, the study provides policymakers with a scientific basis for designing support programs for businesses, particularly SMEs, helping them develop dynamic managerial capabilities, increase competitiveness, and achieve sustainable growth in a challenging, risk-prone environment.

Second, the research finding that dynamic managerial capabilities positively affect technological innovation confirms that these capabilities play a key role in helping businesses seize technological opportunities, modify strategies, and optimize resources for effective innovation implementation. Consequently, businesses, including SMEs, should focus on developing dynamic managerial capabilities, including the ability to perceive technological trends, restructure processes, and flexibly adapt to a changing environment. Additionally, the study offers practical insights for managers to formulate appropriate innovation strategies, thereby enhancing competitiveness and achieving sustainable growth. Business support organizations and policymakers can leverage these findings to design training, consulting, and innovation support programs, enabling businesses to maximize their dynamic managerial capabilities and drive technological innovation.

Third, technological innovation makes significant practical contributions to enhancing organizational agility, especially for SMEs, which often have limited resources but must quickly adapt to the market to maintain a competitive edge. It not only helps SMEs optimize their operations and improve efficiency but also enables them to swiftly identify opportunities, reallocate resources, and adjust strategies in response to fluctuations in the business environment. More importantly, technology establishes a foundation for internal connectivity, enhances coordination between departments, automates processes, and strengthens data-driven decision-making, allowing SMEs to respond more flexibly to continuous market changes. Moreover, technological innovation serves as a crucial mediator between dynamic managerial capabilities and organizational flexibility, enabling SMEs to maximize their managerial potential – not only reacting quickly to risks but also proactively driving change. Given their smaller scale, SMEs can leverage technology to bridge the gap with larger enterprises, enhancing competitiveness and expanding the market. This study provides essential practical insights, encouraging SMEs to invest strategically in technological innovation to enhance adaptability, optimize resource use,

and achieve sustainable growth in an increasingly volatile business environment.

5.3. Limitations and directions for future research

Although this study contributes to the literature on dynamic managerial capabilities from both theoretical and practical perspectives, it still has certain unavoidable limitations that should be acknowledged and addressed in future research. First, it is based on a relatively small sample of 119 observations, which may limit the generalizability of the findings. A small sample size can lead to higher margins of error and reduce the reliability of statistical analyses. Future studies should aim to increase the sample size to enhance the representativeness and reliability of the results. Given the lack of comprehensive sampling frames and contact lists, particularly in surveys of senior managers, researchers may consider extending data collection using structured snowball sampling approaches across different industries and regions. Further, future studies using probability-based sampling techniques could enable systematic comparisons between responding and non-responding firms, thereby strengthening the methodological rigor of the findings. A larger and more heterogeneous sample would allow for more robust validation of the findings and improve the generalizability of the conclusions. Second, this study focuses exclusively on SMEs in Vietnam, a developing country in Asia. Because the data are drawn from Vietnamese SMEs, the findings reflect the institutional and economic characteristics of a transitioning economy and may not be directly generalizable to firms in more developed or structurally different contexts. This limitation may affect the generalizability of the findings to other types of businesses or countries with different economic and social conditions. Further studies should consider expanding the scope to include larger enterprises or multinational corporations. Additionally, conducting similar studies in other countries would help assess whether the findings hold across different economic and cultural contexts. Third, the study relies on self-reported survey data, which can introduce biases due to personal subjectivity, inaccuracies, or social desirability effects. Subsequent research could adopt a mixed-methods approach by incorporating observational data, in-depth interviews, or secondary data sources to complement and validate self-reported findings. Fourth, the current study may not have fully accounted for all potential factors influencing organizational agility, such as corporate culture, technological advancements, and leadership styles. Future studies should expand the theoretical framework to incorporate these factors. Finally, this study does not examine the role of moderating variables, such as the competitive environment and innovation level. To gain deeper insight, future research should introduce moderating variables to examine how the relationship between key factors changes across different conditions.

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