



Social Capital Driving Environment-Oriented Business Model Innovation for Environmental Sustainability in SMEs

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ABSTRACT

Environmental sustainability has become a strategic priority for small and medium-sized enterprises (SMEs), requiring firms to develop innovation capabilities that support resource efficiency and environment-oriented business practices. This study investigates how social capital contributes to environment-oriented business model innovation through the mediating role of organizational learning capability by integrating the resource-based view, the knowledge-based view, and social capital theory. Survey data were collected from 312 Vietnamese SMEs and analysed using partial least squares structural equation modelling (PLS-SEM). The structural results showed that social capital strongly and significantly enhanced organizational learning capability ($\beta = 0.732, p < 0.001$), and organizational learning capability significantly enhanced business model innovation ($\beta = 0.620, p < 0.001$). The direct effect of social capital on business model innovation was non-significant ($\beta = 0.087, p > 0.05$), whereas the indirect effect through organizational learning capability was significant ($\beta = 0.454, 95\% CI [0.367, 0.548]$), indicating full mediation. The model explained 53.6% of the variance in organizational learning capability and 47.1% in business model innovation. This study contributes to environmental sustainability research by explaining how SMEs transform network-based knowledge into sustainable business model innovation and provides practical implications for strengthening environmentally sustainable business development in emerging economies.

Keywords: Environmental sustainability, Sustainable innovation, Organizational learning capability, Environment-oriented business model innovation

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INTRODUCTION

Environmental sustainability has become a strategic priority for governments, industries, and businesses seeking to address climate change, resource depletion, and increasing environmental pressures. Small and medium-sized enterprises (SMEs), which account for a substantial proportion of economic activities, play a crucial role in promoting sustainable development through the adoption of environmentally responsible business practices and environment-oriented innovation. However, SMEs frequently operate under severe resource constraints that limit their capacity to invest in sustainable technologies and environmental innovation (Ghi *et al.*, 2024). Consequently, exploiting intangible resources such as social relationships and organizational learning has become increasingly important for developing innovative business models that simultaneously improve competitiveness and environmental sustainability (Ghi *et al.*, 2024; Do *et al.*, 2025). Among these intangible resources, social capital—the goodwill, trust, and knowledge embedded within a firm's network of relationships—is widely recognized as a strategic asset.

Nevertheless, its contribution to sustainable and environment-oriented innovation is neither direct nor automatic (Nahapiet & Ghoshal, 1998; Alshahrani *et al.*, 2024).

Business model innovation has recently attracted considerable attention because it enables firms to redesign value creation, value delivery, and value capture while incorporating environmentally sustainable practices into business operations. For SMEs, environment-oriented business model innovation provides opportunities to improve resource efficiency, strengthen environmental responsibility, and develop sustainable competitive advantages despite limited tangible resources. Achieving these outcomes, however, requires firms not only to access external knowledge through social networks but also to develop the organizational capability to acquire, integrate, and apply that knowledge effectively. Therefore, understanding how social capital is transformed into environment-oriented business model innovation through organizational learning capability has become an important issue for both environmental sustainability research and innovation management.

Previous studies have demonstrated that social capital positively influences business model innovation and that organizational learning capability may mediate this relationship (Khan *et al.*, 2021). Nevertheless, empirical evidence remains limited in emerging economies and rarely examines

organizational learning capability as the primary mechanism through which network-based knowledge is converted into sustainable and environment-oriented innovation. Recent studies continue to identify social capital as a critical strategic resource whose contribution to innovation depends on complementary organizational capabilities (Alshahrani *et al.*, 2024; Al Balushi & Al Mamari, 2026). Vietnamese SMEs, in particular, rely heavily on social networks to compensate for internal resource limitations while facing increasing environmental expectations and sustainability challenges (Ghi *et al.*, 2024; Do *et al.*, 2025). Vietnam therefore provides an appropriate context for investigating how intangible resources contribute to environment-oriented business model innovation in resource-constrained enterprises.

Accordingly, this study develops and empirically tests an integrated model in which social capital enhances organizational learning capability, which subsequently promotes environment-oriented business model innovation. Grounded in the resource-based view, the knowledge-based view, and social capital theory, the study explains the mechanism through which relational resources are transformed into sustainable business innovation. By clarifying whether organizational learning capability fully or partially mediates the relationship between social capital and business model innovation, this study contributes to environmental sustainability research by providing empirical evidence on how SMEs can leverage intangible resources to strengthen resource-efficient innovation and support environmentally sustainable business development. The findings also provide practical implications for managers and policymakers seeking to promote sustainable innovation and environmental competitiveness among SMEs in emerging economies.

Theoretical background and hypotheses

Foundational theories

Three complementary theories underpin the proposed research model: the resource-based view (RBV), the knowledge-based view (KBV), and social capital theory (Ashwin *et al.*, 2024; Ganea *et al.*, 2024; Hillman, 2024; Jin *et al.*, 2024; Li *et al.*, 2024; Owusu *et al.*, 2024; Vornic *et al.*, 2024; Aksoy & Akaydin, 2025; Alves *et al.*, 2025; Chen *et al.*, 2025; Kunie *et al.*, 2025). Collectively, these perspectives explain how SMEs leverage intangible resources to develop environment-oriented business model innovation and improve environmental sustainability. The resource-based view argues that sustained competitive advantage arises from valuable, rare, inimitable, and non-substitutable resources (Barney, 1991), while social capital and organizational learning capability represent strategic intangible assets that enable sustainable innovation (Shehzad *et al.*, 2023). The knowledge-based view emphasizes knowledge as the firm's most valuable strategic resource and explains how externally acquired knowledge is integrated and transformed into innovation (Grant, 1996; Zhang *et al.*, 2025). Social capital theory further explains how networks of relationships facilitate knowledge exchange, trust, and collaboration that support innovation and organizational development (Nahapiet & Ghoshal, 1998; Alshahrani *et al.*, 2024).

The resource-based view (RBV) provides the fundamental theoretical logic of this study. Barney (1991) argues that

organizations achieve sustained competitive advantage through resources that are valuable, rare, imperfectly imitable, and non-substitutable. In SMEs, tangible resources are often limited because of financial and operational constraints, making intangible assets increasingly important for achieving both competitiveness and sustainable development. Social capital represents one such strategic resource because it accumulates through long-term interactions, trust, and collaborative relationships that are difficult for competitors to imitate (Nahapiet & Ghoshal, 1998; Alshahrani *et al.*, 2024). Likewise, organizational learning capability develops through organizational routines, experimentation, dialogue, and participative decision-making that become embedded within the firm's culture (Agyapong *et al.*, 2024). From an environmental sustainability perspective, these intangible resources enable SMEs to acquire and apply environmental knowledge, improve resource utilization, and develop environment-oriented business innovations. Nevertheless, RBV has been criticized for its relatively static perspective, explaining why strategic resources are valuable but providing limited insight into how they are continuously reconfigured to address dynamic environmental and market challenges.

To overcome this limitation, the dynamic capabilities perspective extends RBV by emphasizing firms' abilities to integrate, build, and reconfigure internal and external competencies in rapidly changing environments (Teece *et al.*, 1997). Business model innovation is increasingly viewed as an expression of these dynamic capabilities because firms continuously redesign their value creation, delivery, and capture mechanisms in response to evolving technological, competitive, and environmental conditions (Teece, 2018). For SMEs, where tangible resources remain constrained, dynamic capabilities largely depend on organizational learning processes that transform externally acquired knowledge into strategic renewal (Matarazzo *et al.*, 2021). These capabilities are particularly important for supporting environment-oriented innovation, enabling firms to improve resource efficiency, incorporate environmentally sustainable practices, and adapt business models to increasing environmental expectations. Organizational learning capability therefore represents a critical micro-foundation through which dynamic capabilities generate sustainable business model innovation.

The knowledge-based view (KBV) provides a complementary explanation by recognizing knowledge as the firm's most strategically significant resource (Grant, 1996). Under this perspective, innovation results from firms' ability to acquire, integrate, and recombine heterogeneous knowledge into new organizational configurations (Zhou *et al.*, 2023; Zhang *et al.*, 2025). Closely related is the concept of absorptive capacity, which describes an organization's ability to recognize valuable external knowledge, assimilate it, and apply it effectively (Cohen & Levinthal, 1990). This perspective explains why access to external knowledge alone does not automatically generate innovation. Instead, firms require internal learning mechanisms capable of converting network-based knowledge into innovative organizational practices. Within the present study, organizational learning capability represents this internal knowledge-processing mechanism, explaining why social capital contributes to environment-oriented business model innovation indirectly rather than directly.

Social capital theory constitutes the third theoretical foundation

of this study. Rooted in the concept that economic activities are embedded within social relationships (Granovetter, 1985), the theory explains how trust, cooperation, and social interaction facilitate information exchange and collective value creation (Adler & Kwon, 2002). Nahapiet and Ghoshal (1998) conceptualize social capital through structural, relational, and cognitive dimensions. The structural dimension concerns the configuration of relationships that provide access to external knowledge and resources. The relational dimension emphasizes trust, reciprocity, and mutual commitment that encourage knowledge sharing. The cognitive dimension reflects shared language, common understanding, and collective vision that facilitate knowledge integration. Together, these dimensions enable organizations to access and combine diverse knowledge that supports innovation. Importantly, social capital theory argues that the value of social relationships is realized through organizational learning and knowledge integration rather than through network connections alone (Nahapiet & Ghoshal, 1998). This theoretical proposition provides the conceptual basis for examining organizational learning capability as the mediating mechanism between social capital and environment-oriented business model innovation.

Taken together, these complementary theories explain how SMEs develop sustainable and environment-oriented innovation through the effective utilization of intangible resources. Social capital theory explains how organizations access valuable environmental and market knowledge through collaborative networks, while the knowledge-based view and absorptive capacity explain how this knowledge is internally processed and transformed into organizational capabilities. The resource-based view, reinforced by the dynamic capabilities perspective, explains why the integration of social capital and organizational learning capability constitutes a valuable strategic resource that enables sustainable competitive advantage (Barney, 1991; Grant, 1996; Teece, 2018). Accordingly, the research model proposed in **Figure 1** conceptualizes organizational learning capability as the mechanism through which social capital is converted into environment-oriented business model innovation, thereby supporting sustainable business development and environmental sustainability.

Core constructs of the research model

Social capital

Social capital is defined as the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by the firm (Nahapiet & Ghoshal, 1998). At the SME level, these networks include customers, suppliers, competitors, industry associations, financial institutions, and government agencies (Ghi et al., 2024; Do et al., 2025). Consistent with the multidimensional conceptualization, this study captures social capital through three dimensions: structural (the frequency and strength of interactions with stakeholders), relational (trust, reciprocity, and mutual support), and cognitive (shared vision, common language, and compatible organizational goals). In emerging economies, where institutional support remains limited, these social relationships compensate for deficiencies in formal market mechanisms and facilitate access to external

knowledge, environmental information, and collaborative resources required for sustainable innovation (Ghi et al., 2024; Al Balushi & Al Mamari, 2026). Consequently, social capital represents an important strategic resource that enables SMEs to strengthen organizational resilience and develop environment-oriented business practices.

Organizational learning capability

Organizational learning capability refers to the organizational and managerial characteristics that facilitate the creation, acquisition, transfer, integration, and application of knowledge, thereby enabling organizations to continuously adapt to changing environments (Chiva et al., 2007). Consistent with previous studies, the construct comprises four facilitating dimensions: experimentation, risk-tolerant dialogue, interaction with the external environment, and participative decision-making (Chiva et al., 2007; Purwanti et al., 2022). These organizational learning processes enable firms to recognize environmental challenges, absorb sustainability-related knowledge, and transform external information into innovative organizational practices. Empirical evidence from emerging economies consistently demonstrates that organizational learning capability enhances SME innovation, competitiveness, and long-term performance (Ngibe & Lekhanya, 2023; Agyapong et al., 2024). From the perspective of absorptive capacity, organizational learning capability represents the firm's ability to convert externally acquired knowledge into strategic actions that support sustainable and environment-oriented innovation (Cohen & Levinthal, 1990).

Business model innovation

Business model innovation refers to meaningful changes in the content, structure, and governance of a firm's business model that enhance value creation, value delivery, and value capture (Zott & Amit, 2007; Foss & Saebi, 2017). The construct incorporates two principal design themes: novelty-centered innovation, which introduces new activities, relationships, and value propositions, and efficiency-centered innovation, which improves organizational processes and reduces transaction costs throughout the value system (Zott & Amit, 2007; Zott et al., 2011). For SMEs, business model innovation represents an effective approach to improving competitiveness because it enables strategic renewal without requiring substantial investments in research and development (Miller et al., 2021; Albats et al., 2023). In the context of this study, business model innovation specifically reflects environment-oriented business model innovation, whereby firms redesign their value propositions, organizational processes, and stakeholder relationships to improve resource efficiency, incorporate environmentally sustainable practices, and strengthen long-term environmental performance. Such innovation enables SMEs to integrate sustainability principles into their business operations while creating economic and environmental value simultaneously, consistent with evidence that green intangible resources contribute to sustainable performance through innovation in products, processes, and business models (Shehzad et al., 2023; Zhang et al., 2025).

Hypothesis development

Relationships with partners such as customers and suppliers

provide abundant knowledge that strengthens a firm's capacity to absorb and experiment with new ideas (Khan *et al.*, 2021); social capital thus serves as an input to the learning process (Samad, 2022). Learning capability, in turn, enables firms to identify gaps in the current model and redesign their value architecture to meet the market (Han *et al.*, 2024), acting as the engine of strategic change (Agyapong *et al.*, 2024). Lastly, social capital merely provides access to knowledge; without the capacity for assimilation and application, that knowledge cannot be transformed into true creativity. (Khan *et al.*, 2021; Ghi *et al.*, 2024). Building on these arguments, the following paragraphs elaborate each mechanism in turn and derive the hypotheses.

Social capital should enhance organizational learning capability through three mechanisms that map onto its three dimensions. First, the structural dimension widens the intake of the learning process: frequent, dense interaction with customers, suppliers, and institutional partners exposes the firm to non-redundant information about technologies, market shifts, and regulatory expectations, enlarging the pool of stimuli available for experimentation and dialogue (Nahapiet & Ghoshal, 1998; Do *et al.*, 2025). Second, the relational dimension lowers the cost and risk of learning: trust and norms of reciprocity encourage partners to share tacit, fine-grained knowledge that they would withhold from arm's-length counterparties, and internally the same relational climate legitimizes questioning and tolerates the failures inherent in experimentation (Khan *et al.*, 2021; Alshahrani *et al.*, 2024). Third, the cognitive dimension raises the efficiency of knowledge transfer: shared language and vision reduce misunderstanding, allowing externally sourced knowledge to be assimilated more quickly into organizational routines (Zhou *et al.*, 2023). Empirically, social capital has been shown to strengthen learning-related capabilities in SMEs across emerging markets (Khan *et al.*, 2021; Samad, 2022; Ghi *et al.*, 2024). Hence:

H1. Social capital positively affects organizational learning capability.

Organizational learning capability, in turn, should drive business model innovation. Business model innovation is a cognitively demanding act: it requires managers to surface and challenge the assumptions underlying the current model, envision alternative activity systems, and reconfigure relationships with exchange partners (Foss & Saebi, 2017; Teece, 2018). Each of the four learning-facilitating dimensions contributes to this act. Experimentation supplies the trial-and-error engine through which alternative value propositions and

revenue logics are tested at small scale before full commitment (Albats *et al.*, 2023). Dialogue and participative decision-making mobilize dispersed knowledge from employees who interact daily with customers and processes, increasing both the quality of redesign ideas and the organizational acceptance of model change (Chiva *et al.*, 2007; Agyapong *et al.*, 2024). Interaction with the external environment keeps the redesign anchored to actual market and regulatory movement, including rising environmental expectations (Han *et al.*, 2024; Zhang *et al.*, 2025). Consistent with this reasoning, learning capability has been found to fuel innovation performance and model-level strategic change in SMEs and creative enterprises alike (Purwanti *et al.*, 2022; Raji & Kassoh, 2026). Hence:

H2. Organizational learning capability positively affects business model innovation.

Finally, the conversion logic implies that organizational learning capability transmits the effect of social capital to business model innovation. The knowledge-based view and absorptive capacity jointly predict that access to knowledge is a necessary but insufficient condition for innovation: relational resources deliver raw informational inputs, but only firms with the internal machinery to assimilate and recombine those inputs can transform them into a renewed activity system (Cohen & Levinthal, 1990; Grant, 1996). Nahapiet and Ghoshal (1998) make the same claim theoretically — social capital creates value through the combination and exchange of knowledge, not through the mere possession of ties. Where learning capability is weak, network knowledge remains inert, socially available but organizationally unusable; where it is strong, the same network becomes a continuous feed into model redesign (Khan *et al.*, 2021; Wang *et al.*, 2025). Prior SME evidence supports a mediating role of learning capabilities between social capital and business model innovation (Khan *et al.*, 2021), and chain-mediation studies confirm organizational learning as a core conduit between firm resources and innovation outcomes (Christofi *et al.*, 2025; Wang *et al.*, 2025). Hence:

H3. Organizational learning capability mediates the relationship between social capital and business model innovation.

Figure 1 presents the conceptual research model of this study, illustrating the proposed relationships among social capital, organizational learning capability, and business model innovation in Vietnamese SMEs. Specifically, the model hypothesizes that social capital influences business model innovation both directly and indirectly through organizational learning capability.

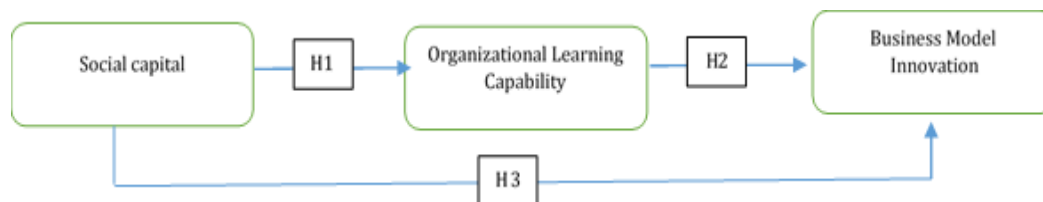


Figure 1. Conceptual research model.

MATERIALS AND METHODS

Sample and data collection

A quantitative, cross-sectional survey design was used, with the owner or senior manager of each SME as the unit of analysis.

Data were collected from 312 Vietnamese SMEs. As summarised in **Table 1**, the sample was broadly balanced across firm size (micro 35.3%, small 35.9%, medium 28.8%) and region (North 31.1%, Central 37.5%, South 31.4%), with exporters and non-exporters almost evenly represented (50.6% vs. 49.4%) and an

average firm age of about 9 years. This profile is consistent with the structure of the Vietnamese SME population and supports adequate statistical power for PLS-SEM (Hair *et al.*, 2019).

Table 1. Sample characteristics (n = 312)

Demographics	f	%
Firm size		
Micro	110	35.3
Small	112	35.9
Medium	90	28.8
Region		
North	97	31.1
Central	117	37.5
South	98	31.4
Export status		
Exporter	158	50.6
Non-exporter	154	49.4
Ownership		
Private/limited	154	49.4
Joint-stock/other	158	50.6
Firm age	mean = 9.1 years	range 3–24

Note. f = Frequency, % = Percentage.

Measures

All constructs were measured on five-point Likert scales (1 = strongly disagree to 5 = strongly agree) (Han *et al.*, 2024; Tjahjadi *et al.*, 2024). Social capital was measured with nine items across the structural, relational and cognitive dimensions (Nahapiet & Ghoshal, 1998), capturing interaction frequency with partners, mutual trust and support, and shared vision and language within the network. Organizational learning capability was measured with twelve items across experimentation, dialogue, external interaction, and participative decision-making (Purwanti *et al.*, 2022; Agyapong *et al.*, 2024). Business model innovation was measured with six items capturing the novelty and efficiency of the model — differentiation in value creation for customers and change in the configuration of business partners (Zott & Amit, 2007). Firm age, size, region, export status, and ownership were included as controls (Alhossan *et al.*, 2024; Danchin *et al.*, 2024; Frost *et al.*, 2024; Cuenca-Martínez *et al.*, 2025; Ismail *et al.*, 2025; Laaksonen & Virtanen, 2025; Mishra *et al.*, 2025; Peterson & Rogers, 2025; Salem *et al.*, 2025; Torres *et al.*, 2025).

Data analysis

Partial least squares structural equation modelling (PLS-SEM) was used, given its suitability for prediction-oriented models with mediating chains (Hair *et al.*, 2019). Following the standard two-stage procedure, the measurement model was assessed for indicator reliability, internal consistency (Cronbach's alpha and composite reliability), convergent validity (average variance extracted, AVE), and discriminant validity via the heterotrait-monotrait ratio (HTMT) (Henseler *et al.*, 2015). The structural model was evaluated through path coefficients, the coefficient of determination (R^2), and effect sizes (f^2). The mediating (indirect) effect was assessed with bias-corrected bootstrapping using 5,000 subsamples; an indirect effect whose 95% confidence interval excludes zero indicates mediation, and a non-significant direct effect alongside a significant indirect effect indicates full mediation.

RESULTS AND DISCUSSION

Measurement model

The measurement model exhibited strong psychometric properties (Table 2). All standardized loadings exceeded 0.89; Cronbach's alpha ranged from 0.959 to 0.985; composite reliability from 0.968 to 0.986; and AVE from 0.833 to 0.877 — all comfortably above the thresholds of 0.70 and 0.50 (Hair *et al.*, 2019). Discriminant validity was supported: all HTMT ratios (SC-OLC = 0.743; SC-BMI = 0.556; OLC-BMI = 0.702) fell below 0.85 (Henseler *et al.*, 2015).

Table 2. Measurement model: reliability and convergent validity

Construct	Loadings	α	CR	AVE
Social Capital (9 items)	0.924–0.948	0.982	0.985	0.877
Organizational Learning Capability (12 items)	0.916–0.940	0.985	0.986	0.859
Business Model Innovation (6 items)	0.899–0.921	0.959	0.968	0.833

Note. α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted.

Structural model and hypothesis tests

The structural results (Table 3) supported the hypothesised mechanism. Social capital had a strong, significant effect on organizational learning capability (H1: $\beta = 0.732$, $t = 20.96$, $p < 0.001$; $f^2 = 1.16$, large), and organizational learning capability significantly affected business model innovation (H2: $\beta = 0.620$, $t = 10.89$, $p < 0.001$; $f^2 = 0.34$, large). The model explained 53.6% of the variance in learning capability ($R^2 = 0.536$) and 47.1% in business model innovation ($R^2 = 0.471$).

Table 3. Structural model results and mediation test

H	Path	β	t	p	Result
H1	SC → OLC	0.732	20.96	<0.001	Supported
H2	OLC → BMI	0.620	10.89	<0.001	Supported
	SC → BMI (direct)	0.087	1.58	>0.05	n.s.
H3	SC → OLC → BMI (indirect)	0.454	9.79	<0.001	Full mediation

Note. n.s. = not significant. Indirect effect 95% bias-corrected bootstrap CI [0.367, 0.548]; variance accounted for (VAF) = 83.8%. R^2 (OLC) = 0.536; R^2 (BMI) = 0.471.

The mediation analysis provided clear support for H3. The direct effect of social capital on business model innovation was non-significant ($\beta = 0.087$, $p > 0.05$), whereas the indirect effect through organizational learning capability was significant, with a bootstrap confidence interval excluding zero ($\beta = 0.454$, 95% CI [0.367, 0.548]). Together, these indicate full mediation, with organizational learning capability accounting for approximately 84% of the total effect of social capital on business model innovation.

These results support the main claim of the study. Instead of instantly translating into new business models, social capital works by first enhancing the company's capacity for learning, which subsequently transforms network-based knowledge into innovative business models. The result aligns with evidence that learning capability mediates the social-capital-innovation relationship in SMEs (Khan *et al.*, 2021) and that learning ability

is the engine of strategic and model-level change (Han *et al.*, 2024; Raji & Kassoh, 2026). It is also consistent with recent chain-mediation evidence that organizational learning is a core conduit through which firm resources reach innovation outcomes (Christofi *et al.*, 2025; Wang *et al.*, 2025). Substantively, the full-mediation pattern is theoretically meaningful: consistent with the knowledge-based view, relational access to knowledge is necessary but not sufficient — it is the internal capacity to assimilate and apply that knowledge that produces innovation (Grant, 1996; Ghi *et al.*, 2024).

For Vietnamese SMEs operating under resource constraints, the practical implication is direct. Investing in relationships alone will not renew a business model unless the firm simultaneously builds the learning routines — experimentation, open dialogue, environmental scanning, and participative decision-making — that digest relational knowledge into action. Managers should therefore treat network-building and learning-capability development as complementary rather than substitute investments, and policymakers supporting SME innovation should prioritise programmes that strengthen organizational learning, not merely networking opportunities.

CONCLUSION

The findings provide empirical evidence that social capital alone is insufficient to generate business model innovation in Vietnamese SMEs. Instead, its contribution is realized only after external knowledge embedded in collaborative networks is transformed into organizational knowledge through organizational learning capability. The significant effect of social capital on organizational learning capability ($\beta = 0.732$), together with the significant influence of organizational learning capability on business model innovation ($\beta = 0.620$), confirms that organizational learning represents the essential mechanism through which relational resources are translated into innovation.

From an environmental sustainability perspective, these findings suggest that social networks enable SMEs to access knowledge related not only to markets and technologies but also to environmentally sustainable practices, resource-efficient production, and emerging environmental expectations. However, merely possessing environmental knowledge through external relationships does not automatically improve business sustainability. SMEs must develop organizational learning capability to absorb, interpret, and integrate this knowledge into business model redesign. The full mediation identified in this study demonstrates that learning capability is the organizational mechanism through which external sustainability knowledge becomes environment-oriented business model innovation.

The results also reinforce the growing view that business model innovation should be considered an important pathway toward environmental sustainability. Through continuous learning, SMEs are better positioned to redesign value creation processes, strengthen collaboration with environmentally responsible stakeholders, improve resource efficiency, and incorporate sustainability considerations into business operations. Such organizational transformation contributes not only to competitive advantage but also to broader environmental sustainability objectives by encouraging more efficient resource utilization and environmentally responsible

business practices.

These findings are particularly relevant for SMEs operating in emerging economies, where financial and technological resources remain constrained. Under such conditions, intangible resources become increasingly important for supporting sustainable development. Rather than relying primarily on capital-intensive technological investments, SMEs may strengthen environment-oriented innovation by developing collaborative networks and organizational learning processes that facilitate the continuous acquisition and application of sustainability-related knowledge.

Theoretical implications

This study contributes to environmental sustainability literature by extending the application of the resource-based view, the knowledge-based view, and social capital theory to explain how intangible organizational resources support environment-oriented business model innovation. While previous studies have primarily examined these theories from the perspective of organizational competitiveness and innovation, the present findings demonstrate their relevance for understanding sustainable business transformation in resource-constrained SMEs.

A major theoretical contribution is the identification of organizational learning capability as the critical mechanism through which social capital contributes to sustainable innovation. The finding of full mediation indicates that external relationships alone do not directly generate business model innovation. Instead, sustainability-related knowledge obtained through social networks must first be assimilated, interpreted, and integrated within organizational learning processes before it can be transformed into environment-oriented innovation. This finding strengthens the knowledge-based view by providing empirical evidence that organizational learning capability serves as the principal knowledge-conversion mechanism linking relational resources with sustainable business innovation.

Furthermore, this study contributes to environmental sustainability research by conceptualizing business model innovation as an organizational response to increasing environmental expectations. The findings demonstrate that sustainable innovation depends not only on technological resources but also on organizational capabilities that enable firms to integrate environmental knowledge into business model renewal. This perspective expands current understanding of how SMEs can utilize intangible resources to support sustainable business development and environmentally responsible organizational practices.

Practical implications

The findings provide several practical implications for SME managers, policymakers, and organizations responsible for promoting environmental sustainability. First, managers should recognize that developing collaborative networks alone is insufficient to improve sustainable innovation. Greater attention should be devoted to strengthening organizational learning capability through continuous knowledge sharing, experimentation, participative decision-making, and systematic interaction with external stakeholders. These learning processes enable firms to transform externally acquired sustainability knowledge into practical organizational

innovations.

Second, SMEs should incorporate environmental knowledge into business model redesign by strengthening cooperation with customers, suppliers, universities, industry associations, and government agencies involved in environmental sustainability initiatives. Such collaborative relationships provide access to valuable knowledge regarding resource efficiency, environmentally sustainable production practices, and emerging environmental regulations, thereby supporting environment-oriented innovation.

Third, policymakers seeking to promote sustainable SME development should complement networking programs with initiatives that enhance organizational learning capability. Capacity-building programs focusing on knowledge management, organizational learning, sustainability training, and environmental innovation are likely to generate greater long-term environmental benefits than networking support alone. Strengthening SMEs' ability to acquire and apply environmental knowledge may contribute to more resource-efficient production systems, environmentally responsible business practices, and the broader transition toward sustainable economic development.

Finally, the findings suggest that sustainable competitiveness in SMEs increasingly depends on organizational capabilities that continuously convert environmental knowledge into innovative business practices. By strengthening both social capital and organizational learning capability, SMEs can improve resource efficiency, support environmentally sustainable business model innovation, and enhance their long-term contribution to environmental sustainability.

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