Received: 31 March 2021 | Revised: 27 January 2023 | Accepted: 29 May 2023

DOI: 10.1111/jpim.12692

ORIGINAL ARTICLE

JOURNAL OF PRODUCT INNOVATION MANAGEMENT pdma

Confronting the grand challenge of environmental sustainability within supply chains: How can organizational strategic agility drive environmental innovation?

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Associate Editor: Shlomo Tarba

Abstract

Supply chains are interconnected, globally distributed, and complex systems that significantly impact the environment and human civilization. Achieving environmental sustainability in supply chains is a grand challenge that requires collaboration and innovation among multiple stakeholders. In this study, we combine the natural-resource-based view and the stakeholder-resource-based view (SRBV) to examine how organizational strategic agility can foster collaborative environmental innovation and enhance environmental sustainability in supply chains. We use data from 758 managers from 185 firms in Turkey, an emerging economy context. We find that organizational strategic agility, enabled by organic organizational structures and regional innovation initiatives, leads to more collaborative environmental innovation with supply partners and higher environmental sustainability performance. Our study contributes to the literature on grand challenges, organizational strategic agility, and innovation management by showing how for-profit firms can leverage their strategic agility to address the grand challenge of environmental sustainability in supply chains. We also find two interventions to promote this form of environmental innovation: developing organizational strategic agility and organic structures within firms and involvement in regional innovation initiatives to stimulate collaborative innovation for environmental sustainability among supply partners.

KEYWORDS

emerging economies, environmental innovation, environmental sustainability in supply chains, grand challenges, organizational strategic agility

1 | INTRODUCTION

Grand challenges associated with climate change and diminishing natural resources remain troublingly persistent (Brammer et al., 2019; George et al., 2016). For-profit firms are at the forefront of these environmental sustainability challenges, not least because of their frequent role in causing these problems. Positive engagement with the natural environment is now an expected feature of good business (George & Schillebeeckx, 2018), necessary to remedy the adverse effects of for-profit business on the natural environment (Gölgeci & Kuivalainen, 2020). To this end, firms increasingly adopt more flexible and agile capabilities and structures, and an innovation-oriented culture, to respond effectively to the grand challenge of environmental sustainability (Zahoor et al., 2023). Strategic agility is potent in adapting and adjusting processes to respond well to environmental demands (Teece et al., 2016). For instance, businesses increasingly use participating in partnerships (Doh et al., 2019), supply chain relationships (Han et al., 2018), co-development of environmental innovations (Stadtler & Lin, 2019), and collaborative value creation (DiVito et al., 2021; Hamann et al., 2020) as responses to grand challenges. However, while firms' supply chains and related global value chains have undoubtedly revolutionized economic production (Ambos et al., 2021), they have also profoundly impacted the natural environment (Achabou et al., 2017; Sun et al., 2019). As such, the potential of for-profit firms to innovate and coordinate efforts with their suppliers for environmental sustainability ranks among our generation's most pressing innovation management dilemmas (Buckley et al., 2017; Montiel et al., 2021; Soufani & Loch, 2021).

However, innovations for green growth (Fernandes et al., 2021) and environmentally sustainable business models (Ferreira et al., 2022) represent only piecemeal efforts by firms acting individually and independently of each other (Arora & De, 2020). Solutions to grand challenges require *coordinated* innovation with supply chain partners to reduce environmental harm across their global value chains. We propose two features that underpin this disparity. First, a focal firm's organizational processes must induce the *willingness* to innovate collaboratively with suppliers to reduce environmental harm. Second, organizational structures and sources that provide access to new and replenishing resources must facilitate the *ability* of the firm to lead and coordinate such collaborative initiatives. Our study asks the following question: *How and through what mechanisms can the organizational strategic agility of large for-profit firms be channeled to develop innovative solutions to grand challenges in collaboration with their supply chain partners?*

Practitioner points

- Environmental sustainability remains a grand challenge for nations, industries, and organizations, and it can be addressed effectively through nurturing organizational capabilities in conjunction with coordinated and innovative efforts.
- Firms can generate value for grand challenges by deploying strategic agility as a meta- organizational capability to steer collaboration with stakeholders and drive innovation for environmental solutions.
- Regional innovation initiatives and organic organizational structure also play an important role in maintaining a successful collaboration with stakeholders geared toward sustainability.
- Policymakers can harness the potential of collaboration in addressing grand challenges by creating policies and mechanisms for cross-regional, sectoral, and organizational collaboration to tackle environmental issues jointly.

The current study emphasizes how for-profit firms might tackle the grand challenges by creating environmental innovation among supply partners rather than uniquely in their organizational practices. Today, for-profit firms tend to be heavily dependent on top-down environmental sustainability mechanisms to coordinate and manage the sustainability practices of their suppliers, including social audits, certifications, or codes of conduct (Anisul Huq et al., 2014; Arora & De, 2020; Bouguerra et al., 2023). However, imposing rigid environmental sustainability benchmarks on businesses overlooks the complex and resource-constrained nature of these organizations that, in turn, influence their environmental sustainability practices and those of their suppliers (Sahasranamam et al., 2019; Soundararajan et al., 2021; Wilhelm et al., 2016). Emerging research suggests that the shortcomings of top-down mechanisms can be overcome by developing flexible, agile, and adaptive organizational practices in ways that spur collaboration between firms and their suppliers (Bouguerra et al., 2021; Overdevest & Zeitlin, 2017; Soundararajan et al., 2021). As such, an organization's strategic agility has emerged as an innovative meta-capability linked to how a firm adapts to environmental forces beyond its organizational boundaries (Ahammad et al., 2021; Junni et al., 2015) and is potentially critical for multinational enterprises (MNEs) wishing to contribute toward solving grand challenges (Shams et al., 2021). While organizational strategic agility holds promise because of its potent role in

guiding how firms adapt and quickly respond to their external environment (Christofi et al., 2021; Gurkov et al., 2017; Shams et al., 2021), we have limited knowledge of the *mechanisms* through which a focal firm's organizational strategic agility stimulates innovation *in its suppliers* for environmental sustainability.[1]

Drawing on the natural-resource-based view (NRBV) (Foerstl et al., 2010; Hart, 1995; Hart & Dowell, 2011; Lee & Klassen, 2008; Yusuf et al., 2017) and recent attempts at a stakeholder-resource-based view (SRBV) (Alvarez et al., 2020; Barney, 2020; Freeman et al., 2021; Hoskisson et al., 2018; Stoelhorst, 2023), we theorize that the potential for a firm's organizational strategic agility to stimulate collaborative innovations among its suppliers for environmental sustainability lies in organizational and resource-based mechanisms that convert willingness into ability. First, regional innovation initiatives link for-profit firms with institutions (e.g., public and private research laboratories, universities and colleges, and technology transfer agencies) to replenish resources and better understand regional environmental dynamics. Such networks provide new information to the for-profit firm exposing it to environmental sustainability pressure that allows it to reconsider how it applies its efforts commercially and environmentally. Second, even though regional innovation networks stimulate a resource-based ability to pursue innovation in supply chain partners, a firm's ability to coordinate resources to act effectively in this way is governed by its organizational structure. Firms adopting a decentralized, organic organizational structure are generally better prepared to react rapidly to new challenges because they embrace employees as stakeholders of the firm and empower resource use toward emerging opportunities and challenges. We develop a theoretical framework grounded in diminishing natural resources and SRBV that anticipates the role of regional innovation initiatives and an organic organizational structure that energizes a focal firm's organizational strategic agility to drive change among its supply chain partners to stimulate environmental innovations as a solution to environmental grand challenges.

The study makes three significant contributions. First, the theoretical development of the NRBV (Hart, 1995) has stagnated despite the critical importance of natural resources to environmental sustainability (Montiel et al., 2021; Steffen et al., 2015). The NRBV lacks a rationale for collaborative behavior beyond the constraints imposed by the natural environment and a deeper explanation of why collaborative behavior might occur. By connecting the NRBV to the emerging SRBV (Alvarez et al., 2020; Barney, 2020; Freeman et al., 2021; Stoelhorst, 2023), we provide the explanation missing within the NRBV about how a focal firm's organizational strategic agility enables it to capitalize on suppliers as resources for collaborative environmental innovation. This resolves the collaborate–isolate conundrum.

Second, our study reinforces the differences between the SRBV and traditional stakeholder theory by conceptualizing stakeholders as resource holders and providers. We show that developing effective relationships with stakeholders can unlock competitive advantage through access to rare, hard-to-source resources (Barney et al., 2021). We then go a step further to unveil the mechanisms and circumstances through which strategically agile firms can capitalize on their suppliers' resources to drive innovation and change *in* those suppliers. An organic organizational structure and the effective use of regional innovation initiatives are key mediators in a collaborative model of environmental sustainability between a focal firm and its supply partners. This contribution provides the missing theoretical insights and empirical elaborations needed to explain why, despite considerable technological, economic, and social progress, the world remains besieged by grand challenges centered on climate change and diminishing natural resources (Brammer et al., 2019; George et al., 2016)—because they neglect the conditions needed to create coordinated, multiplex responses.

Third, we advance the literature on innovation management and organizational strategic agility (Junni et al., 2015; Weber & Tarba, 2014) by setting the focal firm's organizational strategic agility as a driver of supply chain environmental innovation rather than the agility of the supply chain itself. There is an essential difference between an organization that is strategically agile within its boundaries (Bouguerra et al., 2021) and supply chain agility (Baramichai et al., 2007; Carvalho et al., 2012), in which the level of analysis becomes the supply chain and the unit of analysis is the agility of the collaboration. The latter neglects the circumstances inside the buying firm. Despite a burgeoning literature in management studies on the antecedents and outcomes of firms' organizational strategic agility (Ahammad et al., 2021; Shin et al., 2015; Teoh et al., 2017), few studies explain how to harness best a firm's organizational strategic agility for external collaborative efforts around environmental innovation and sustainability (Bouguerra et al., 2021; Shams et al., 2021). We provide a theory grounded in the NRBV and SRBV that explains and conceptualizes how the potential of organizational strategic agility to stimulate collaborative innovations with suppliers for environmental sustainability lies in organizational and resource-based mechanisms, the demand for which originates from the depletion of natural resources coupled with resource-replenishing strategies. These new insights directly address calls for knowledge on collective responses to grand challenges around environmental sustainability (George et al., 2016; Shams et al., 2021).

[1]Our interest lies in the organizational strategic agility of a focal firm that hires suppliers, not on the agility of the supply chain.

2 | THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

Grand challenges are complex problems with far-reaching societal and organizational implications that are impossible for one firm to address alone (Grodal & O'Mahony, 2017; Olsen et al., 2016; Vakili & McGahan, 2016; Venugopal & Viswanathan, 2019). Discussing the United Nations' Sustainable Development Goals (SDGs), Montiel et al. (2021) asserted that grand challenges to environmental sustainability occur from the overuse of natural resources and irresponsible consumption compounded by a lack of coordinated innovation activities among buyers and supply chain partners. For example, reducing environmental harm requires innovation across supply, production, distribution, use, and disposal (Montiel et al., 2021). The United Nations (2015) confirmed that: "SDGs can only be realized with strong global partnerships and cooperation". Therefore, environmental sustainability requires innovative cooperation and collaboration between buyers and suppliers while appreciating other stakeholder roles in facilitating (or debilitating) innovation outcomes (Horan, 2019; Sondermann & Ulbert, 2021).

2.1 | The natural-resource-based view and the stakeholder-resource-based view

Hart (1995) put forward the NRBV of the firm to explain how firms can achieve sustainable resource use while maintaining and growing profitability (and gaining a competitive advantage). Firms must adapt to the dynamics of the natural environment to maintain legitimacy (George & Schillebeeckx, 2018; Gölgeci & Kuivalainen, 2020; Yusuf et al., 2017). The NRBV contains three pillars to explain this (mal)adaptation: pollution prevention; product stewardship; and environmentally sustainable development (Hart, 1995, 1997; Hart & Dowell, 2011). Organizations pressured by grand challenges will become sensitive to all three pillars (Montiel et al., 2021). However, while pollution prevention occurs inside the firm's boundaries, product stewardship and environmentally sustainable development rely on outside supplier collaboration (Hart, 1995). For example, Hart stated that: "product stewardship also suggests that firms take an environmentally proactive stance toward raw material and component suppliers, which is aimed at minimizing the environmental impact of the entire supplier system" (p.1001) and: "to develop and deploy low-impact technologies, especially in the emerging markets" (p.1002), but: "there appear to be limits to an exclusively internal (competitive) strategy for sustainable development [as] few companies have the capacity or market power to alter unilaterally entire sociotechnical systems" (p.1003). Product stewardship and environmentally sustainable development thus imply technological cooperation across supply chains to foster environmental innovations with and within suppliers (Stadtler & Lin, 2019). The premise of NRBV is that the firm's resources and capabilities can be channeled toward environmental issues as a means of value creation (DiVito et al., 2021; Hamann et al., 2020; Yusuf et al., 2017) and co-creation (with suppliers) in ways that solve grand challenges (Achabou et al., 2017; Sun et al., 2019).

The NRBV proposes two mechanisms for channeling firm behavior because of constraints imposed by the natural environment: *path dependence* and *embeddedness* (Hart, 1995). First, path dependence represents the first step for an organization to channel its organizational processes and become sensitive to changing external environments (Hart, 1995). We depict this as the *firm's organizational strategic agility*, understood as the ability of an organization to pool scarce resources and knowledge so that it can respond in a timely fashion to changes in the external environment in which it operates (Doz & Kosonen, 2008, 2010). An organization must possess three meta-capabilities to achieve organizational strategic agility (Debellis et al., 2021; Nyamrunda & Freeman, 2021; Shams et al., 2021), namely: strategic sensitivity; resource fluidity; and leadership unity (Doz & Kosonen, 2010). Strategic sensitivity refers to the possession by the organization of clarity and an intense awareness of the need for strategic planning and development. Resource fluidity means that the organization has the internal capabilities to reassign resources quickly. Leadership unity occurs when the top echelons of an organization's management can enact fast decision-making. We propose that organizational strategic agility will render the organization responsive to a changing external environment only if the organization has in place an *organic organizational structure*. An organic organizational structure represents flexible rules and processes supported by a fluid communication network to provide a basis to interact and more rapidly adapt to the external environment (Gresov & Drazin, 2007) and adopt innovation as a focal point of competitive strategy (Lavie & Miller, 2008). The second mechanism for channeling firm behavior because of constraints imposed by the natural environment is embeddedness, which represents efforts to accumulate resources to enable a coordinated response to environmental sustainability (Hart, 1995). We anticipate that embeddedness efforts emphasize collaborative value chains in attempting to respond to grand challenges (e.g., DiVito et al., 2021; Hamann et al., 2020) and activate collaborations with suppliers for environmental innovation (Doh et al., 2019). Moreover, any response to grand challenges must come affordably. We postulate that firms will prioritize solutions that harness science, technology, innovation, and resources from stakeholders to cope with environmental challenges that grow exponentially with the geographic

scope of their business operations (Bouguerra et al., 2021; Clarke & Boersma, 2017; Ivory & Brooks, 2018). We envisage this as the extent to which a firm leverages *regional innovation initiatives* to enable subsequent action (supplier innovation).

The NRBV is helpful in anticipating organizational and resource-based mechanisms that convert willingness to innovate into an ability to stimulate collaborative innovations among a firm's suppliers for environmental sustainability. However, it lacks a rationale for collaborative behavior beyond constraints imposed by the natural environment. It also lacks a deeper explanation of why collaborative behavior might (or might not) occur. These observations regarding the NRBV might be extendable to the SRBV, which equally struggles to tackle these issues. Nevertheless, the SRBV differs from the NRBV in explicitly accounting for stakeholders in a firm's value creation (Barney et al., 2021; Freeman et al., 2021) and value appropriation (Alvarez et al., 2020; Barney, 2018). The SRBV conceptualizes stakeholders as resources that contribute to competitive advantage and firm performance (Barney et al., 2021; Harrison et al., 2010) *when* stakeholder relationships mesh into a firm's operations. Conversely, the NRBV resolves an oversight in the emerging SRBV by emphasizing suppliers as enablers of change and regional actors as the most *essential* resource-holding stakeholders. Moreover, the NRBV emphasizes value appropriation only from stakeholders *to* the firm. The emerging SRBV reverses part of this appropriation, emphasizing that stakeholders must appropriate some value from the firm itself (Alvarez et al., 2020; Barney, 2020; Freeman et al., 2021). A firm may overappropriate value to some stakeholders in the short term (e.g., by collaborating closely with certain suppliers over others) but indirectly benefit through new forms of value creation (e.g., collaborative innovations with its suppliers for environmental sustainability; e.g., Barney et al., 2021; Harrison et al., 2010). Our conceptual framework (Figure 1) emphasizes the inputs and mechanisms that prompt the willingness and ability of for-profit firms to push for and support change *within* their suppliers, thus giving rise to innovations for environmental sustainability among their supplier partners.

2.2 | A firm's organizational strategic agility and the driving of environmental innovation among supply partners

Firms that adopt agile practices are better placed to tackle environmental sustainability pressures. As such, organizational strategic agility is crucial in satisfying various stakeholder requests and surviving competitive and environmental pressures (Li et al., 2017). For example, agile firms are better positioned to maneuver challenges in their supply chain and promote environmental sustainability (Bouguerra et al., 2021; Ivory & Brooks, 2018). Through the SRBV lens, agile firms should forgo some value appropriation by distributing some of that value to suppliers as crucial partners in their ability to tackle grand environmental challenges (Barney, 2018; Harrison et al., 2010). Organizational strategic agility primes a firm to transform and renew its business models by sharpening its strategic sensitivity. With greater strategic sensitivity, these firms form more precise perceptions of their external ecosystem and internal activity system (Doz & Kosonen, 2010). In a world of depleting natural resources, the NRBV leads us to anticipate that those firms enacting organizational strategic agility will exhibit a momentum to work for collaborative change among supply chain partners and innovate new resource reduction strategies, waste reduction initiatives, and cleaner production as well as supporting environmental goals.

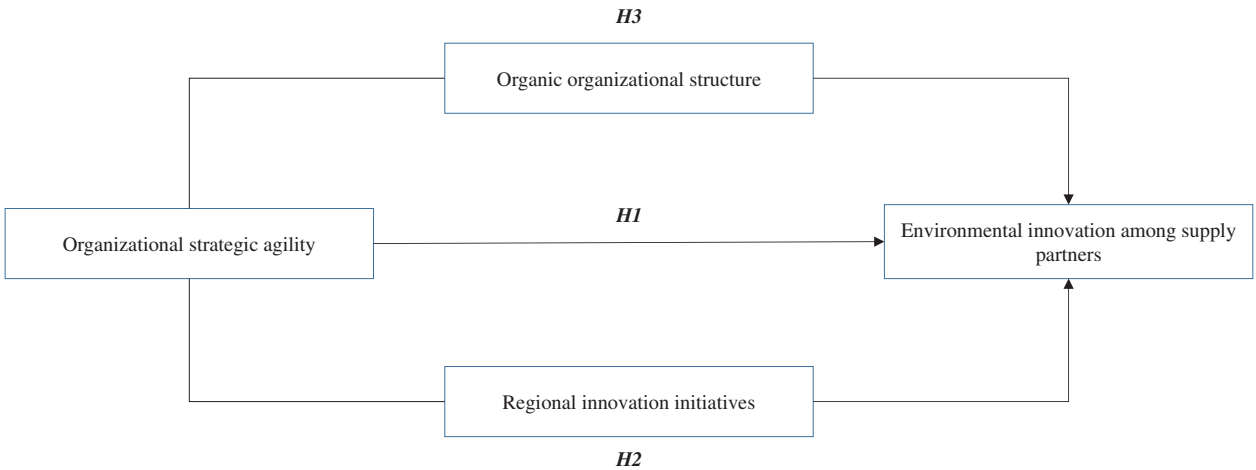

FIGURE 1 Conceptual model.

Strategically agile firms can mobilize scarce resources and expertise to react swiftly or adapt to unexpected changes, opportunities, and threats in their business environments (Ahammad et al., 2020; Christofi et al., 2021; Weber & Tarba, 2014). By derivation, we propose that organizational strategic agility is essential for effectively managing natural resource difficulties placed on organizations amid grand environmental challenges. Strategically agile firms constantly monitor internal and external environments, resulting in quicker information processing than their non-agile counterparts (Kumkale, 2016). Moreover, firms with organizational strategic agility are sensitive to innovation cues and deploy their fluid resources to change their actions to meet emerging demands (Junni et al., 2015; Sampath & Krishnamoorthy, 2017). Organizational strategic agility streamlines internal operations, prompting timely responses to emerging challenges (AlTaweel and Al-Hawary, AlTaweel & Al-Hawary, 2021; Xing et al., 2019).

Because the agile firm is attuned to environmental change, we expect firms with organizational strategic agility to press and collaborate for change in the actions of supplier firms. For instance, agile businesses are more likely to be aware of the need for collaboration with supply chain partners to solve grand environmental concerns, initiating collaborative efforts with supplier partners to respond to new challenges. In this sense, organizational strategic agility is especially relevant in emerging economy contexts where flexibility and adaptability are critical to navigating turbulent institutional environments (Ahammad et al., 2021; Rodgers et al., 2019). Yang (2014) argued that in such demanding contexts, the firm must efficiently mobilize its in-house resources and develop informal and formal business relationships with key stakeholders to generate the necessary relational capital needed to support organizational transformation efforts. This is commensurate with the tenets of the SRBV. Supply chain partners are a channel for agile for-profit firms to address these challenges further (Han et al., 2018; Montiel et al., 2021; Soufani & Loch, 2021). By co-opting change in supplier behavior toward waste reduction, cleaner production, and serving the focal firm's environmental goals (as anticipated in the NRBV), a more significant step change can be made to solve grand challenges around environmental sustainability.

Under the NRBV and SRBV, environmental practices are complex multiagent activities requiring better stakeholder collaboration (Gölgeci et al., 2019; Luzzini et al., 2015; Montiel et al., 2021), especially in the context of emerging markets in which the environment is fluid, and dynamic firms are likely to confront various tensions and complexities across the supply chain (Ferraris et al., 2022; Tatoglu et al., 2014). In this setting, firms must collaborate efficiently with their key stakeholders within the supply chain (Liu & Vrontis, 2017). This collective effort to engage proactively and connect multiple stakeholders enables firms to drive innovation among supply partners for environmental solutions (Caldwell et al., 2017). A strategically agile focal firm promotes collaborative environmental innovation among its supply chain partners because an agile firm is more likely to encourage the exchange of knowledge and skills among supply partners to develop environmental innovation.

Based on these views, we expect those firms with the highest organizational strategic agility to be sensitive to the difficulties associated with environmental innovation among suppliers, and they will work collaboratively and proactively with their supply chain to innovate for environmental sustainability. This follows because leveraging co-specialized assets controlled by stakeholders requires enough potential upside to make participation a better choice for those stakeholders than outside opportunities (Klein et al., 2021). Those firms low in organizational strategic agility will lack sensitivity and commitment to environmental sustainability pressures and operational flexibility to service suppliers as partner stakeholders. In SRBV terms, a firm low in organizational strategic agility will have less incentive and be less willing to allow suppliers to appropriate value from its resources and activities (Alvarez et al., 2020; Freeman et al., 2021). Therefore, we hypothesize:

> **Hypothesis 1.** Organizational strategic agility is positively associated with driving environmental innovation among supply partners in emerging economies.

2.3 | The mediating roles of regional innovation initiatives and organic organizational structure

The scope and magnitude of environmental challenges confronting firms grow exponentially with the geographic scope of their business operations (Bouguerra et al., 2021; Clarke & Boersma, 2017; Ivory & Brooks, 2018). As such, firms become more susceptible to the complexities of environmental grand challenges. For Eurasia and Turkey, their position as a hub between East and West and their embedded nature in regional politics (e.g., the China-driven New Silk Road initiative; Brem & Nylund, 2021; Ullah et al., 2019) intensifies the effects of grand challenges. Complexity strains organizational resources and diminishes the willingness and ability to respond to environmental grand challenges. The SRBV suggests that firms look to stakeholders as resource

providers and knowledge holders to (re)enable a more thorough response (Barney et al., 2021). A firm can shift its system of constraints around innovation (Ogbeibu et al., 2021) by leveraging regional initiatives and their organizational capacities (Brem & Nylund, 2021; Caldwell et al., 2017; Gölgeci et al., 2019; Liu & Vrontis, 2017). The shift toward a regional consideration also represents a renewed focus on meso-level (i.e., networks, markets, suppliers) structures and dynamics (Asheim & Coenen, 2005; Barney, 2018), which are central to how for-profit firms might resolve grand challenges around environmental sustainability (Doh et al., 2019).

Our baseline hypothesis predicts that organizational strategic agility provides a firm with a framework to identify and encourage environmental sustainability innovation with and within its supply chain partners. Suppliers are vital stakeholders in a firm's value creation and appropriation in environmentally sustainable ways (Barney et al., 2021; Harrison et al., 2010). However, suppliers are not the only vital stakeholder. Firms adopting agile principles are better placed to maintain policies that support and draw on regional stakeholders (Shams et al., 2021). Regional innovation initiatives are networks and linkages between public and private institutions (e.g., firms and public and private research laboratories, universities and colleges, and technology transfer agencies; see Lau & Lo, 2015). Organizational strategic agility allowing rapid and flexible responses to different environmental dynamics should prompt interaction and the exchange of knowledge with regional stakeholders to access resources and the knowledge needed to fuel its activities. Engaging key stakeholders in regional innovation initiatives serves not only as a channel for assimilating and utilizing knowledge about the external ecosystem (Doz & Kosonen, 2010) but can also channel its strategic sensitivity, resource fluidity, and collective commitment—properties that underpin its organizational strategic agility (Junni et al., 2015). Moreover, such engagement leverages the embeddedness principle contained in the NRBV for product stewardship (reducing environmental harm across the value chain) and environmentally sustainable development (to stymy negative links between the environment and the firm's economic activity) (Hart, 1995).

Through the NRBV and SRBV, we expect that strategically agile firms will exhibit more significant regional innovation initiative-seeking behavior, purposefully creating linkages with external institutions, government agents, suppliers, customers, and others (Kodama, 2008). Organizational strategic agility engenders a general disposition toward developing stakeholder linkages to tackle external challenges (Lau & Lo, 2015). Since the Turkish context sits at the literal crossroads of complex geopolitical, globalization, and trade bloc (de) coupling, we should expect agile firms (given their greater strategic sensitivity to external events) to form more robust regional innovation relationships and seek out regional innovation initiatives to increase their ability to fuel and co-create wealth (Chhetri et al., 2018). Strategically agile firms offer flexible structures to improve interaction among key stakeholders and respond rapidly to environmental demands (Shams et al., 2021).

Furthermore, firms engaging in regional innovation initiatives are better positioned to press for, support, and collaborate with their supply chain partners. For instance, firms that engage in regional innovation initiatives derive innovative ways to address complex environmental concerns faced in their supply chain (Kibbeling et al., 2013). As institutions underpinning environmental sustainability requirements are likely to diverge across national contexts (Fainshmidt et al., 2016), building regional innovation networks can help bridge differences between partners. Hence, we predict regional innovation initiatives will drive environmental innovation among supply partners if enacted by a firm's organizational strategic agility:

> **Hypothesis 2.** Regional innovation initiatives mediate the relationship between organizational strategic agility and the driving of environmental innovation among supply partners in emerging economies.

Firms operating in emerging economies experience a turbulent and dysfunctional institutional context (Rodgers et al., 2019). In these situations, firms often lack established (internal) business structures (Clarke & Boersma, 2017). The organizational structure indicates a firm's enduring configuration of tasks and activities. A mechanical structure is characterized by high formalization, centralization, and directed individual behavior. As this structural form relies heavily on rigid rules and policies, the firm usually reacts slowly to uncertain events (Mihm et al., 2010). An organic structure represents flexible rules and regulations and an informal communication network that provides a basis to interact and better adapt to the external environment (Gresov & Drazin, 2007). We focus on the organic structure and see it as one that channels the qualities of organizational strategic agility.

Organic organizational structures facilitate communication (Bennett & Gabriel, 1999) and the adoption of innovation (Lavie & Miller, 2008); they also engender a higher degree of creativity (Khandwalla, 1977). These properties influence knowledge flows inside the firm by

shaping patterns and frequencies of communication among organizational members, stipulating decision-making locations, and affecting the efficiency and effectiveness of implementing new ideas. Organic structures are associated with accelerated and expanded search behavior and more pronounced innovation activities (Ambos et al., 2008; Siggelkow & Levinthal, 2003), thereby supporting organizational efforts to adapt to complex environmental conditions (Siggelkow & Rivkin, 2005). While organizational strategic agility provides an impetus to drive change among supply chain partners, we anticipate that an organic organizational structure will further manifest an ability to evoke innovative environmental sustainability changes among the agile firm's supply chain partners.

In dynamic contexts, organically structured firms significantly benefit from distributed knowledge exchange and innovative ideas about the complexity of the environment (Zheng et al., 2010). Counterparts organized in more bureaucratic ways lose the ability to disseminate rapidly and act on new knowledge, hindering their organizational strategic agility from manifesting meaningful change in the firm's ecosystem (and specifically among its suppliers). A mechanistically structured firm is inherently inflexible with more centralized decision processes, slowing down the organization's ability to act on any attempts at organizational strategic agility. In the NRBV, an organic structure supports the path dependence principle needed for better product stewardship and more environmentally sustainable development. For instance, the organically structured firm is better organized to forgo the imposition on its suppliers of unproductive top-down environmental sustainability mechanisms (e.g., coordinated audits. certifications, or codes) (Anisul Huq et al., 2014; Arora & De, 2020) in favor of adaptive practices in collaboration with suppliers (Bouguerra et al., 2021; Overdevest & Zeitlin, 2017; Soundararajan et al., 2021). In SRBV terms, such an approach acknowledges the pressures placed on suppliers for environmental sustainability (Montiel et al., 2021). When agile firms develop an organic way of managing business activities and processes, we envisage the emergence of a general tendency to become more flexible in addressing the challenging environmental requirements of their supply chains and more collaborative in innovating with supply chain partners. Therefore:

> **Hypothesis 3.** Organic organizational structure mediates the relationship between organizational strategic agility and the driving of environmental innovation among supply partners in emerging economies.

3 | RESEARCH METHODS

3.1 | Study context

Context is a key issue in managerial and organizational studies (Meyer & Peng, 2016). An increasingly turbulent world calls for a better appreciation of contextual dynamics around a firm's agility. As Liu and Vrontis (2017) argued, when focusing mainly on emerging market contexts, the "context" of sociocultural, economic, political, and institutional differences must be considered. This is important because emerging economies will serve a significant role in shaping the future of a globalized economy, and we need to learn more about these diverse settings to advance the innovation literature.

Turkey is a highly relevant research setting to inform our research question for several reasons. First, Turkey, a member of the G20 group of leading economies, maintains a strategic geopolitical location overlapping Europe and Asia. It positions itself as a global trading hub and key global supply chain player that connects markets across Europe, Asia, and Africa. In this setting, firms are pressured by governments and other stakeholder groups to prioritize sustainable development within supply chains and attain environmental objectives (Akhtar et al., 2020; Demirbag et al., 2017; Durand & Jacqueminet, 2015; Gölgeci & Kuivalainen, 2020). Second, an empirical focus on Turkey responds to calls for scholarly research to extend the empirical focus beyond the dominant gaze on countries such as China, Russia, Brazil, and India (Bouguerra et al., 2022; Meyer & Peng, 2016). To this end, Turkey is a key emerging market with its high GDP rate and significant economic and infrastructure improvements. Turkey has attracted significant amounts of foreign direct investment (Ayden et al., 2018), including investments from MNEs engaged in research and development (R&D) activities (Karabag et al., 2011). It exhibits core features comparable to other leading emerging markets (e.g., institutional, industrial, and organizational), including Brazil, Mexico, Chile, Poland, and Ukraine (Fainshmidt et al., 2016), that are conducive to the generalizability of our findings. Third, Turkey strategically promotes its innovation base, significantly transforming its economic structure by implementing education, social development policies, and R&D expenditures (Bakırcı, 2018) and by supporting the innovation-related activities of firms. Finding ways to raise the value-added of Turkish firms to increase productivity and move up in global value chains is a critical success factor for the country's future economic development (Kleiner-Schaefer & Schaefer, 2022). Between 2014 and 2016, 64.5% of all industrial firms in Turkey reported innovation activity as product or process innovation

(e.g., new product or service development, efficiency in manufacturing, and improved business operations; Turkish Statistical Institute, 2017). Expenditure on R&D as a share of GDP more than doubled from 0.47% in 2003 to 0.96% in 2017 (Arda et al., 2019). A recent development plan for Turkey (2019–2023) underlines the implementation of key policy measures to support the R&D capabilities of the manufacturing sector within the Turkish economy, which, in turn, will facilitate further innovation within the sector (Presidency of The Republic of Turkey, 2019). We add original knowledge to the innovation management literature in emerging economies by showing that firms require collaborative innovation with suppliers as key stakeholders to solve grand challenges.

3.2 | Data collection procedures

3.2.1 | Sampling

We sampled various firms from several product-intensive industries located in Turkey to reach a high degree of generalizability and external validity for our findings. We targeted medium-sized and large-sized firms because small-sized firms (i.e., fewer than 50 employees) frequently have limited resources. We framed our sample to include firms that met our selection criteria from those in the Union of Chambers and Commodity Exchanges of Turkey (TOBB). This industrial database comprises over 40,000 firms registered in 10 Chambers of Industry, 19 Chambers of Trade, and 64 Chambers of Industry and Trade, and it includes 365 different local commerce and business chambers. The database constitutes a valuable source for our sampling frame formation as a critical nongovernmental organization in an emerging economy in which information sources on firms are incomplete or inadequate (Gölgeci et al., 2019). We made a formal request to the Information Services Department of TOBB to gain access to the database. This department provides all relevant commercial and financial information needed by the chambers and commodity exchanges in Turkey, designing websites, implementing programs, and providing technical support to facilitate the accessibility of relevant information. After omitting firms that did not meet the screening criteria, we randomly sampled 1000 firms from this database. Following Dillman's (Dillman, 2007) recommendation, we targeted and prequalified prospective respondents in participant firms according to their roles, their understanding of the organization's strategic orientations, processes, and activities, and their managerial expertise.

We recruited multiple responses from each firm. We sent 5000 questionnaires (four to six responses from each firm) with a cover letter introducing the survey. The cover letter solicited responses from managers with a high degree of actual decision-making power or at least an overall and systematic understanding of organizational innovation development processes and proficiency in firm operations. This procedure was essential to enhance the accuracy and validity of the data. Following two rounds of data collection and two reminders, we attained 783 questionnaires, of which 758 were usable (from 185 firms), representing an effective response rate of 18.5%. The sample was a random one but appears to be representative of the overall population of firms based on various firm sizes and industry characteristics. For example, the sample firms operate in various product-intensive industries ranging from automotive and related products, consumer electronics, and food/beverages to transportation, hospitality, and tourism. A similar pattern was seen among the firm size categories, in which nearly 70% of the sample firms were firms with 1000 or fewer employees. Table 1 summarizes the characteristics of the respondents and responding firms.

3.2.2 | Measures

Our data were collected using questionnaires mailed to our sample firms. We employed the back-translation method as recommended by Brislin (1986). The questionnaire was initially developed in the English language and subsequently back-translated into the Turkish language. The back-translation method was critical to ensure the accuracy and quality of the translation before finalizing the survey (e.g., two bilingual academics were involved in the back translation of English and Turkish versions).

The items of the variables were drawn from previous literature and were measured on 5-point Likert scales (1 = "strongly disagree" to 5 = "strongly agree"). We used managers' perceptions to evaluate each variable. Managers' perceptual measures reflect the firm's current situation and capture its mechanisms, processes, and capabilities. Previous research has employed and accepted these measures (Singh et al., 2016).

Dependent variable. Environmental innovation among supply partners measures how firms coordinate and innovatively collaborate with their suppliers to improve and meet environmental demands. Four items drawn from Vachon and Klassen's (Vachon & Klassen, 2006) item instruments of environmental collaboration were used to measure this construct. We used and selected only items related to driving environmental innovation among supply partners.

Independent variable. We assessed organizational strategic agility using five items (Tallon & Pinsonneault, 2011).

TABLE 1 Characteristics of respondents and responding firms.

Characteristics of respondents ($N = 758$)		**Number**	**%**
Managerial level	Top level (CEO, chairman, and board member)	198	26
	Medium level (Director/head of department)	359	48
	Lower level (First-line manager and supervisor)	201	26
Education level	High school	55	7
	Some college	82	11
	Bachelor degree	378	50
	Postgraduate degree	243	32
Work experience	Less than 4 years	164	22
	4–9 years	238	31
	10–15 years	158	21
	More than 15 years	198	26
Industry sector	Industrial, automotive, and machinery equipment	133	18
	Textile and apparel	58	8
	Consumer electronics and appliances	64	9
	Forestry products and paper	84	11
	Food and beverage	73	10
	Other manufacturing	67	9
	Healthcare services	93	12
	Transportation and logistics	55	7
	Financial services	56	7
	Hospitality and tourism	49	6
	Other services	26	3
Number of employees	50–249	195	25
	250–500	174	23
	501–1000	158	21
	1001–5000	119	16
	More than 5000	112	15
Characteristics of responding firms ($N = 185$)		**Number**	**%**
Industry sector	Industrial, automotive, and machinery equipment	26	14
	Textile and apparel	13	7
	Consumer electronics and appliances	18	10
	Forestry products and paper	19	10
	Food and beverage	18	10
	Other manufacturing	16	9
	Healthcare services	27	14
	Transportation and logistics	13	7
	Financial services	11	6
	Hospitality and tourism	15	8
	Other services	9	5
Number of employees	50–249	54	29
	250–500	44	24
	501–1000	38	21
	1001–5000	25	13
	More than 5000	24	13

Managers assessed the agility of their firms, including adapting and adjusting their strategic tasks and activities to meet environmental changes. Respondents were asked to refer to their firm when answering questions related to organizational strategic agility.

Mediating variables. Regional innovation initiatives and organic organizational structure variables were mediators in our study. Regional innovation initiative measures the extent to which firms utilize innovation initiatives available in their region to reflect the appropriateness of the regional innovation policy. We used four items adapted from previous studies (Lau & Lo, 2015; Yam et al., 2004).

In addition, we used four items to measure organic organizational structure by adopting Covin and Slevin's (Covin & Slevin, 1988) scale. This construct assesses the extent to which a firm is structured informally and organically.

Control variables. In line with previous research (Schweisfurth & Raasch, 2018), our control variables were: *industry sector*, *firm size*, *managerial level*, *work experience*, and *managers' educational level*.

3.3 | Analysis

Our sample consisted of 758 employees working in 185 firms. Based on our data's nature and structure, we ran a multilevel modeling analysis using MLwiN™ software. We verified and justified the adequacy of this analytical technique by assessing the difference between a model of one level (individual-level) and a model of two levels (individuals nested in firms). The log-likelihood difference was significant ($1820.62–1692.79 = 127.83$; $p < 0.01$). Next, we compared a variance at level 2 to the total variance by dividing 0.23 (level 2 variance) by 0.41 (the total variance), and the result shows a value of 0.56. As the value is greater than 0.1, it validates the employment of multilevel modeling analysis (Klein et al., 2000).

We used the tool of the Monte Carlo Markov Chain (MCMC) to test our mediation hypotheses (e.g., the mediating effects of regional innovation initiatives and organic organizational structure on the relationship between organizational strategic agility and the driving of environmental innovation among supply partners; Bauer et al., 2006). The mediation effect can be significant when the confidence intervals do not contain the zero value (Selig & Preacher, 2008).

In this study, we undertook two steps to test nonresponse bias. First, responses from early and late respondents were evaluated, and the test results indicated no significant differences ($p > 0.1$) for the following measures: organizational strategic agility (t-value $= 1.01$, $p > 0.1$); organic organizational structure (t-value $= 0.22$, $p > 0.1$); regional innovation initiatives (t-value $= 1.65$, $p > 0.1$); and environmental innovation among supply partners (t-value $= 1.02$, $p > 0.1$). Therefore, no response bias was evident. Second, a random group of 50 nonparticipating and 250 respondent firms was nominated. There are no significant variations ($p > 0.1$) across the following demographic variables: industry, number of employees, and turnover. Therefore, we presume that nonresponse bias is not a severe problem in our research.

4 | FINDINGS

4.1 | Confirmatory factor analysis

The results of our confirmatory factor analysis (CFA) are reported in Table 2. These results report a good fit with the data [$\chi^2 = 673.54$; DF $= 84$; $\chi^2/\text{df} = 8.01$, $p < 0.01$; comparative fit index (CFI) $= 0.90$; incremental fit index (IFI) $= 0.90$; Tucker-Lewis index (TLI) $= 0.85$; root-mean-square error of approximation (RMSEA) $= 0.08$].

We assessed the convergent validity of our model via the average variance extracted (AVE) measures. Table 3 shows that all AVE values are greater than 0.40. Even though one of our AVE values is lower than the suggested threshold of 0.50, the convergent validity of the construct is still satisfactory as the composite reliability (CR) is higher than 0.60 (in Table 2, all the CR values are above 0.7), as recommended by Fornell and Larcker (1981).

Also, in line with Fornell and Larcker's (1981) suggestions, we assessed discriminant validity by comparing AVE values to shared variances (squared correlations). Table 3 indicates that the AVE values are greater than the shared variances for all constructs, confirming discriminant validity.

4.2 | Common method bias and endogeneity

Given that both dependent and independent variables were collected using the same questionnaire and participants, there is a concern that common method bias (CMB) might exist. However, we pursued several steps to reduce any risk of CMB, as recommended in the literature (Tehseen et al., 2017). First, we applied various design-related procedures to remedy the potential problem of CMB. An initial prequalification of potential respondents was done based on the respondent's prior knowledge of the research topic. Next, all respondents were informed about their anonymity and confidentiality. They were advised that there are no "right" and "wrong" answers and that their responses

TABLE 2 Confirmatory factor analysis results.

Constructs	Standardized loadings	CR
Organizational strategic agility		0.80
Our organization responds to changes in aggregate consumer demand	0.63	
Our organization customizes a product or service to suit an individual customer	0.59	
Our organization introduces new pricing schedules in response to changes in competitors' prices	0.68	
Our organization expands into new regional or international markets	0.67	
Our organization adopts new technologies to produce better, faster, and cheaper products and services	0.60	
Our organization introduces new pricing schedules in response to changes in competitors' prices	0.66	
Regional innovation initiatives		0.86
In our organization, there are different technological partnerships with different entities	0.79	
In our organization, there is financial support from the government, such as innovation and technology funds	0.79	
In our organization, there is support or funding for human capital development	0.77	
In our organization, there are technology spin-offs from university and research institutions	0.80	
Organic organizational structure		0.77
In our organization, there is loose, informal control, heavy dependence on informal relations, and norm of co-operation for getting work done systems	0.55	
In our organization, there is a strong emphasis on getting things done, even if this means disregarding formal procedures	0.79	
In our organization, there is a strong emphasis on adapting freely to changing circumstances without too much concern for past practice	0.64	
In our organization, managers' operating styles are allowed to range freely from the very formal to the very informal	0.75	
Environmental innovation among supply partners		0.83
Our organization encourages its suppliers to develop new source reduction strategies	0.71	
Our organization cooperates with its suppliers to improve its waste reduction initiatives	0.66	
Our organization works with its suppliers for cleaner production	0.83	
Our organization collaborates with its suppliers to acquire materials, parts, and/or services that support its environmental goals	0.80	

Note: All loadings are significant at $p < 0.001$.
Abbreviation: CR, Composite reliability.

TABLE 3 Convergent and discriminant validity of the measurement model[a].

Constructs	No of items	AVE[b]	1	2	3	4
1. Organizational strategic agility	6	0.41	*0.64*			
2. Regional innovation initiatives	4	0.62	0.16	*0.78*		
3. Organic organizational structure	4	0.53	0.003	0.001	*0.72*	
4. Environmental innovation among supply partners	4	0.56	0.22	0.14	0.002	*0.72*

[a]Italicized values on the diagonal are the square root of the AVE values.
[b]Average variance extracted.

will be used only for the academic study and its resultant academic articles. Each participant's responses were returned in a sealed envelope to avoid bias (Podsakoff et al., 2012). In addition, two to six qualified respondents within each firm were used to improve the consistency and validity of the data (Craighead et al., 2011). Gathering data from various respondents enabled us to depict potential variations in assessing a firm's organizational strategic agility and its environmental outcomes.

Second, we ran two additional statistical tests to address any further issues of CMB. We initially tested Harman's one-factor analysis. Our results demonstrate that a single factor did not systematically explain most of the variance in the measurement items (Podsakoff et al., 2003). We then undertook a marker variable procedure. The lowest positive correlation between self-reported variables was deducted from each correlation value (Podsakoff et al., 2012). The results demonstrate that the differences are relatively small (between 0.01 and 0.005), indicating that CMB is not a problem.

We checked for potential endogeneity using a two-stage least squares (2SLS) estimation with an instrumental variable. The construct "explicit knowledge" was used as an instrumental variable for two main reasons. First, explicit knowledge refers to the ability of individuals to acquire explicit knowledge of the firm's procedures, practices, and market dynamics (e.g., profession, industry, and customer service) that can influence business performance (Nonaka, 1994). This reflects the core argument of organizational strategic agility, as it provides market intelligence on customers and competitors to enable quick reactions and adaptations to environmental changes (Teece et al., 2016). Second, explicit knowledge (instrumental variable) is associated with organizational strategic agility (explanatory variable), but it is not correlated with environmental innovation among supply partners (dependent variable), indicating that explicit knowledge is a valid instrument (Ullah et al., 2019). According to 2SLS, we regressed organizational strategic agility on controls and the instrumental variable, then used the predicted value of this regression in our hypothesized model. The first stage of the analysis reports that the instrument variable is positively and significantly correlated with the explanatory variable ($\beta = 0.15$, SE $= 0.05$, $t = 3.00$). In the second stage, the results demonstrate that after controlling for endogeneity, organizational strategic agility is still positively and significantly associated with environmental innovation among supply partners ($\beta = 0.36$, SE $= 0.04$, $t = 9.00$), indicating that endogeneity is not a problem in our study.

4.3 | Hypotheses testing

The descriptive statistics, reliability estimates, and correlations are reported in Table 4. We used tolerance values and VIF analyses (variance inflation factors) to identify any potential multicollinearity in each model. The tolerance values are all greater than 0.83, and all VIF values range between 1.01 and 1.19, implying that multicollinearity is not an issue in our research (Hair et al., 2010).

The direct effect of organizational strategic agility on driving environmental innovation among supply partners is displayed in Table 5. The mediation effects of organizational strategic agility on driving environmental innovation among supply partners through organic organizational structures and innovation initiatives are reported in Table 6. We report our results as follows: Models 1 and 2 in Table 5 test the direct effect of organizational strategic agility on driving environmental innovation among supply partners. In Table 6, Models 3 and 4 assess the mediation effect of regional innovation initiatives on the link between organizational strategic agility and driving environmental innovation among supply partners. Similarly, Models 5 and 6 display the mediation effect of organic organizational structure on the link between organizational strategic agility and driving environmental innovation among supply partners.

TABLE 4 Descriptives and correlation matrix.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Industry	11.40	5.85	1								
2. Firm size	2.43	1.30	−0.02	1							
3. Work experience	3.62	1.15	−0.04	0.03	1						
4. Educational level	3.06	1.04	0.03	0.13**	−0.11**	1					
5. Managerial position	1.84	0.70	0.04	0.15**	−0.36**	−0.04	1				
6. Organizational strategic agility	3.95	0.55	−0.08*	0.04	0.04	−0.02	−0.13**	1			
7. Regional innovation initiatives	2.83	0.86	0.003	0.15**	0.01	0.05	−0.03	0.40**	1		
8. Organic organizational structure	3.55	0.85	−0.07*	−0.04	−0.09*	−0.04	0.02	0.06	0.07*	1	
9. Environmental innovation among supply partners	3.90	0.75	−0.06	−0.02	−0.02	0.01	−0.07*	0.47**	0.38**	−0.04	1

Note: $N = 758$ managers nested in 185 firms. *$p < 0.05$; **$p < 0.01$.

TABLE 5 Results of direct effect.

Dependent variable: environmental innovation among supply partners	Model 1			Model 2		
	β	SE	*t*-value	*β*	SE	*t*-value
Intercept	4.23*	0.19	22.26	4.01*	0.17	23.58
Control variables						
Industry	0.00	0.00	0.00	0.00	0.00	0.00
Firm size	0.00	0.02	0.00	−0.01	0.02	−0.50
Work experience	−0.03	0.03	−1.00	−0.02	0.02	−1.00
Educational level	0.00	0.02	0.00	0.02	0.02	1.00
Managerial position	−0.08	0.05	−1.60	−0.01	0.04	−0.25
Organizational strategic agility (H1)				0.66*	0.04	16.5
Intercept variance (SE)	0.58	0.03		0.45	0.02	

Note: $N = 758$ managers nested in 185 firms. *$p < 0.01$.

Direct effect. Model 2 in Table 5 shows that organizational strategic agility is positively associated with driving environmental innovation among supply partners ($\beta = 0.66$, $p < 0.01$), supporting H1.

Mediation effects. Table 6 reports the mediation hypotheses. We followed the recommendations of Selig and Preacher (2008) and ran a multiple mediation model using the online tool MCMC. Model 4 indicates that H2 is supported when regional innovation initiatives mediate the relationship between organizational strategic agility and driving environmental innovation among supply partners ($\beta = 0.52$, $p < 0.01$). The 95% confidence interval (CI: 0.12–0.17) of the indirect effect is significant. Similarly, Model 6 shows that organic organizational structure mediates the relationship between organizational strategic agility and driving environmental innovation among supply partners ($\beta = 0.67$, $p < 0.01$). Using the MCMC tool, we found that the 95% confidence interval (CI: 0.02–0.06) of the indirect effect does not have zero value, indicating strong support for H3.

5 | DISCUSSION

Environmental sustainability represents perhaps the grandest of grand challenges of our times. The extant scholarly inquiry has examined the role of environmental innovation in creating and embedding environmentally sustainable business practices, with a particular focus on organizational practices within the firms themselves (Sahasranamam et al., 2019). At the same time, scholars point to the considerable promise that organizational strategic agility may hold for environmental sustainability (Shams et al., 2021; Singh & Vinodh, 2017). In this study, we have sought to extend knowledge at the intersection of environmental sustainability and innovation by showcasing the potential of organizational strategic agility to support innovations in environmental sustainability. In particular, our primary research objective was to explore how organizational strategic agility drives environmental innovation among supply partners to tackle the grand challenge of environmental sustainability in supply chain firms. In doing so, we outline the possibilities of exploring the intersections of environmental sustainability and environmental innovation at the meso-level, considering, in particular, the context of networks in which firms and their suppliers operate. Our study has generated several key findings.

The findings reveal that organizational strategic agility positively drives environmental innovation among supply partners. Furthermore, regional innovation initiatives and organic organizational structure powerfully mediate the link between organizational strategic agility and driving environmental innovation among supply partners. Given the weightiness of environmental footprints, institutional pressures, and social concerns, firms are increasingly compelled to adopt more innovative ideas and solutions to drive collaboration among suppliers and enhance environmental sustainability. Moreover, firms exhibiting organic structures in collaboration with their supply chain partners tend to provide better sustainable environmental solutions and contribute to tackling grand challenges. Our findings highlight the role of regional innovation initiatives and organic organizational structures as valuable mediating means *to convert organizational strategic agility into driving environmental innovation among supply partners*. We next outline several contributions to theory and implications for managers and policymakers from our study.

TABLE 6 Results of mediation effects.

***Dependent variable*: Environmental innovation among supply partners**	**Model 3**			**Model 4**			**Model 5**			**Model 6**		
	β	**SE**	***t*-value**	***β***	**SE**	***t*-value**	***β***	**SE**	***t*-value**	***β***	**SE**	***t*-value**
Intercept	4.32*	0.12	36.00	4.09*	0.16	25.56	4.27*	0.13	32.84	4.02*	0.17	23.64
Control variables												
Industry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Firm size	0.00	0.01	0.00	−0.03	0.02	−1.50	0.03	0.02	1.50	−0.02	0.02	−1.00
Work experience	0.00	0.02	0.00	−0.02	0.02	−1.00	0.00	0.02	0.00	−0.02	0.02	−1.00
Educational level	−0.02	0.02	−1.00	0.01	0.02	0.50	−0.01	0.02	−0.50	0.01	0.02	0.50
Managerial position	−0.09	0.05	−1.80	−0.01	0.03	−0.33	−0.08	0.05	−1.60	−0.01	0.04	−0.25
Mediation of regional innovation initiatives												
Organizational strategic agility → Regional innovation initiatives	0.27*	0.02	13.50									
Organizational strategic agility via regional innovation initiatives (H2)				0.52*	0.05	10.40						
95% confidence interval: 0.12–0.17												
Mediation of organic organizational structure												
Organizational strategic agility → Organic structure							0.06*	0.02	3.00			
Organizational strategic agility via organic structure (H3)										0.67*	0.04	16.75
95% confidence interval: 0.02–0.06												
Intercept variance (SE)	0.25	0.01		0.42	0.02		0.29	0.02		0.44	0.02	

Note: $N = 758$ managers nested in 185 firms. *$p < 0.01$.

5.1 | Theoretical contributions

This study makes several important and timely theoretical contributions. First, despite recent developments (e.g., Foerstl et al., 2010; Hart & Dowell, 2011; Yusuf et al., 2017), the use and theoretical development of the NRBV of the firm (Hart, 1995) has stagnated. Hart's (1995) NRBV was far ahead of its time. Its focus on natural resources and their careful management as part of the *raison d'être* of the firm signals the essential role that for-profit firms *must play* in resolving today's grand challenges. The NRBV lacks a rationale for collaborative behavior beyond constraints imposed by the natural environment and a deeper explanation of why collaborative behavior might occur. Our findings reenergize and advance the NRBV: rather than firms reacting to environmental changes, our findings elucidate how for-profit firms *proactively* and *strategically* alter their course of supplier collaboration to meet goals in response to environmental sustainability pressures. This insight is crucial for the NRBV as a theory of the firm. Each theory of the firm has at its heart that firms organize first and foremost to create wealth for themselves. The grand challenge of environmental sustainability questions that core

assumption as it requires firms to consider societal and environmental wellbeing. Our findings about the effects of strategic agility reveal the decisive role of organizational strategic agility as an organizing mechanism for coopting innovations among the firm's suppliers. This reveals a hidden external, collaborative organizing and innovation effect resolving the collaborate–isolate conundrum in the NRBV theory.

Second, our inclusion of the SRBV is equally essential. Drawing on the new SRBV theory (Alvarez et al., 2020; Barney, 2020; Freeman et al., 2021; Stoelhorst, 2023), we contribute to this emerging thesis by showcasing the mechanisms by which a focal firm can capitalize on stakeholders as resources and the mechanisms that lead them to coopt stakeholders (specifically suppliers) to address the grand challenge of environmental sustainability. The SRBV risks making the same error associated with crude interpretations of stakeholder theory—a false assumption that all stakeholders are equally important and valuable and must be drawn equally into the firm (Donaldson & Preston, 1995; Phillips et al., 2003). The SRBV differs from stakeholder theory by conceptualizing stakeholders as resource holders and resource providers, effective relationships with whom unlock competitive advantages (Barney et al., 2021). However, we advance the emerging SRBV theory by revealing the determinants, mechanisms, and circumstances behind how a firm can capitalize on resources held by its suppliers as key stakeholders to drive innovation and change *in* those suppliers.

Our findings reveal the organic organizational structure and effective use of regional innovation initiatives as critical mediators in a collaborative model of environmental sustainability to solve grand challenges. This contribution provides theoretical insights and reveals why, despite considerable technological, economic, and social progress, the world remains besieged by grand challenges centered on climate change and diminishing natural resources (Brammer et al., 2019; George et al., 2016). The origin of the problem lies in neglecting the interlocking web of *key* stakeholders needed to create co-ordinated, multiplex responses. Our findings draw attention to the vital need to unpack the organizing principles in the NRBV and SRBV. We add organizational strategic agility and organic structure as internal organizing principles and the firm's efforts to integrate into regional innovation initiatives as external organizing mechanisms that draw stakeholder resources into the firm.

Third, this study contributes new insight into resolving grand challenges in business and management (Buckley et al., 2017; Liou & Rao-Nicholson, 2021; Soundararajan et al., 2021), how and through what mechanisms and circumstances organizational strategic agility tackles the grand challenge of environmental sustainability in supply chains by driving environmental innovation among supply partners. Existing literature on organizational strategic agility has focused almost entirely on its ability to enact positive changes within the narrow remits of firm-level boundaries. However, we broaden the concept's scope and empirically demonstrate how focal firms' organizational strategic agility incentivizes tackling environmental grand challenges by generating *collaboration between firms* and innovations for attaining environmental sustainability. For instance, extant research has predominantly focused on how organizational strategic agility enables firms to improve performance, including financial, sales, and overall organizational effectiveness (Christofi et al., 2013; Shin et al., 2015). However, few studies to date have provided clear evidence that strategic ability can go beyond economic and financial benefits for the firm to more broadly and collaboratively improve environmental sustainability (e.g., Bouguerra et al., 2021; Gligor et al., 2015; Ivory & Brooks, 2018). Our study contributes to this nascent but important stream of research and responds to Shams et al.'s (2021) call for more research on how organizational strategic agility influences stakeholders (especially suppliers) by empirically explaining how it can facilitate collaboration with stakeholders and drive environmental innovation among supply partners to alleviate environmental impacts. Organizational strategic agility can provide the motivation and ability for firms to engage in environmentally focused, relational exchanges with stakeholders to facilitate environmental innovation among supply partners. It can help stakeholders engage in a shared commitment to tackling grand challenges to adapt to the needs and requirements of environmental challenges. We recognize that agile practices generate environmental benefits that go beyond a firm's boundaries and, in doing so, directly address grand challenges. This implies that in addition to achieving shareholder priorities, organizational strategic agility drives change in stakeholder structures for the benefit of the wider environment and society beyond the narrow remits of the firm's boundaries.

Finally, within innovation management, most literature on environmental sustainability has focused on bottom-of-pyramid innovations, sustainability outcomes, and emerging organizational forms to solve environmental sustainability issues (Hörisch et al., 2015). Conversely, Klein et al. (2021) suggested how a commitment to environmental sustainability can impact the configuration of organizational structure and broader strategic behavior. Therefore, while researchers have argued that environmental sustainability may drive business model innovation (Foss & Saebi, 2017), studies overlook the

circumstances under which an association between a firm's organizational strategic agility and collaborative environmental innovation efforts occurs. We reveal two new mechanisms through which firms' organizational strategic agility associates with collaborative environmental innovation with suppliers. This association is made possible by carefully managing regional stakeholder relations (through regional innovation initiatives) in combination with a conducive organizational structure to enable collaborative annotation (through organizational strategic agility and organic structure), which operates at the meso-level and micro-level, respectively. In this nascent field of inquiry, there is insufficient scrutiny in innovation management of the role of organizational strategic agility in facilitating innovative supply chain management beyond simply supply chain logistics (Gligor et al., 2015). These lacunae persist despite valuable studies by Li et al. (2017) on the role of strategic flexibility in driving radical innovation and Del Giudice et al. (2021) on how small-firm organizational strategic agility, especially in the digital sector, can engender innovation change. Equally, the paucity of understanding innovation management of organizational strategic agility linked to supply chain management remains an issue despite agility located *in the supply chain itself* (and not within a focal firm or set of participating firms) (Baramichai et al., 2007; Carvalho et al., 2012). In advancing the innovation management literature, we offer theory and evidence that for-profit firms require *collaborative* innovation with suppliers as key stakeholders to solve grand challenges. We highlight the necessity of focusing the level of analysis on the firm and the unit of analysis on its behavior, as opposed to the supply chain itself. We demonstrate how organizational strategic agility stimulates collaborative innovations with suppliers because environmental sustainability lies in organizational and resource-based mechanisms, the demand for which originates from depleting natural resources coupled with resource replenishing strategies. These new insights answer calls for knowledge on collective responses to grand challenges around environmental sustainability (George et al., 2016; Shams et al., 2021).

5.2 | Managerial implications

Our study offers crucial empirical evidence regarding contributions to practice for managers and policymakers. Both practitioners and policymakers in emerging markets can harness the power of organizational capabilities and mechanisms to tackle grand challenges. We have highlighted how firms can enact organizational strategic agility as a core capability to positively impact innovative changes within supply chain management across the globe, which, in turn, can engender more embedded environmentally sustainable business practices. This suggests that managers must develop agile practices to better collaborate with stakeholders and drive innovation for environmental solutions. Investing in developing organizational strategic agility helps firms engage stakeholders and tackle the grand challenge of environmental sustainability.

We stress that organizational strategic agility alone cannot maintain success in tackling grand challenges. In this vein, we also identify how business managers should focus on the importance of micro-internal capacities, such as an organic organizational structure, and meso-externalities, such as the ability to develop regional innovation initiatives to develop collaborations. First, managers should invest in improving regional innovation initiatives by creating a network and developing meaningful relationships within the region(s) in which they operate. This initiative enables firms to overcome organizational resistance to innovation (Heidenreich & Talke, 2020) and leads to more efficient collaboration with stakeholders (e.g., suppliers) to find environmentally sustainable supply chain solutions. Managers also need to enhance organic organizational structures and be structurally flexible to speed up the firms' ability to act on any attempts at organizational strategic agility. Managers should invest in developing flexible and organic structures to help the firm go beyond rigid top-down environmental sustainability mechanisms with its suppliers (e.g., coordinated audits. certifications, or codes) and promote adaptive practices necessary for successful collaboration with suppliers.

Second, policymakers in emerging economies can harness the potential of collaboration in addressing grand challenges. Collaboration is essential to overcoming environmental and societal grand challenges (Bode et al., 2019; Sondermann & Ulbert, 2021). However, as the scale and size of grand challenges are stretching and organizations are generally slow to change, policymakers should invest in developing cross-regional, sectoral, and organizational collaboration policies to tackle the grand challenge of sustainability jointly. These collaborations enable the integration of multiple stakeholders and provide the basis for collective efforts to attain environmental and social success.

5.3 | Limitations and future research

Despite providing important novel insights, this study has some limitations. First, we used a cross-sectional dataset based solely on perceptive/subjective evaluation. It could be useful to combine objective and subjective measures in future research to enhance the generalizability of our findings. Also, it might be fruitful to engage in

a more longitudinal-type study to provide an analysis of the impact of firms engaging in forms of organizational strategic agility to enact innovative change within supply chains. This could deepen our understanding of the temporal dynamic interplay between organizational strategic agility forms and broader environmental sustainability issues. Within these contexts, heightened attention to regional innovation initiatives and considering organic organizational structures therein will be increasingly imperative.

Second, this study used data from Turkey, a strategically important and under-researched country within emerging global supply chains. Future research could undertake a similar project in various under-researched emerging economy contexts and regions to establish to what extent the conclusions we have drawn in this study are relevant within differing institutional/regional contexts. Studies in the future could usefully examine alternative country combinations to explore whether there are any variations from our findings in this study. A comparison of an advanced market economy and another emerging market economy would be helpful in generalizing the findings and investigating similarities and differences between groups of countries to generate more profound insight into grand challenges, organizational strategic agility, and innovation management. Further research could adopt a mixed-methods approach using qualitative research methods, such as focus groups with senior management employees. This would further articulate the micro-level processes across different organizational settings, which can facilitate or constrain firm-level strategic orientation and intent. Future research could also integrate and examine various micro-level capabilities (e.g., individual creativity, resilience, emotions)—as moderators or mediators—to gain an in-depth understanding of the role of cross-individual/organizational level relationships in attaining environmental success. Moreover, future studies focusing on managerial practices by, for example, adopting a strategy-as-a-practice lens may shed additional light on the processes behind innovative changes in supply chains and on the perceptions of such strategic plans and implementation, which could enrich existing knowledge. Concurrently, scholars may wish to examine strategic agility at the supply chain or collaborative level, considering agile practices inside supply chains or when two organizationally strategically agile firms (a buyer and a supplier) innovate together.

6 | CONCLUSION

The study analyzed agile micro-level firm perspectives and meso-level organizational structures and dynamics in a Turkish/Eurasian context to understand how these practices facilitate environmentally focused innovation efforts between a focal firm and its suppliers. Collaboration is now regarded as the chief key to solving environmental grand challenges by the United Nations (Montiel et al., 2021). The study considered the literature on the SRBV and the NRBV and their roles in pointing at environmental sustainability concerns (kindred with subsequently developed grand challenges) in rendering firms more adaptable to the settings and contexts in which they operate. We introduced and considered the role of firms' organizational strategic agility in creating and maintaining environmentally sustainable relationships in meso-level interconnections between these firms and their supply chain partners and as underpinning regional innovation initiatives (e.g., with universities, competitor firms, and suppliers) and, consequently, organic organizational structures. Through a comprehensively developed research methodology, the study accessed and analyzed a sample of 758 employees working in 185 Turkish firms and elaborated on the hitherto under-commented Turkish/Eurasian context. Overall, this study contributes to a theory of collaborative environmental innovation between focal firms and their suppliers.

CONFLICT OF INTEREST STATEMENT

The authors declared no conflicts of interest.

ETHICS STATEMENT

The authors have read and agreed to the Committee on Publication Ethics (COPE) international standards for authors.

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How to cite this article: Bouguerra, Abderaouf, Mathew Hughes, Peter Rodgers, Peter Stokes, and Ekrem Tatoglu. 2023. "Confronting the Grand Challenge of Environmental Sustainability Within Supply Chains: How Can Organizational Strategic Agility Drive Environmental Innovation?" *Journal of Product Innovation Management* 1–24. https://doi.org/10.1111/jpim.12692