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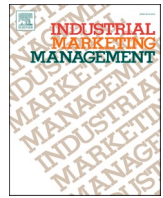
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How non-market collaboration shapes stakeholders' wellbeing through climate-risk management strategies in emerging market B2B firms?[☆]

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ABSTRACT

Climate change poses threats to stakeholders' wellbeing, defined as their satisfaction, value realisation, expectations, and retention with the firm. While research has established that enhancing stakeholders' wellbeing requires cross-sector collaboration, industrial marketing scholarship has paid less attention to the challenges faced by resource-constrained firms in emerging markets that often rely on non-market collaborations with government and regulatory bodies to access critical resources and knowledge. Using a survey of firms ($n = 142$) in Pakistan, which is among the most vulnerable country to climate-change risks, this study shows that non-market collaboration with government agencies promotes stakeholders' wellbeing through a serial mediation of climate-risk management strategies and value co-creation with value-chain (upstream and downstream) partners. Furthermore, the influence of non-market collaboration with climate-risk management strategies is more pronounced under high shareholder pressure. Also, the effects of climate-risk management strategies on value co-creation are strengthened by collaborative communication with value-chain partners. Extending industrial marketing literature that cross-sector partnerships are critical for value co-creation, these findings specifically underscore the importance of non-market collaboration in emerging markets, and demonstrate that multi-stakeholder collaborations facilitate sustainable value-chains, thereby generating positive stakeholders' wellbeing.

1. Introduction

According to the Climate Risk Index 2025, Pakistan ranked first among the top ten most climate-affected countries (Dawn-News, 2025b; GermanWatch, 2025). Based on the Climate Change Performance Index (CCPI, 2025), the country is graded high in greenhouse gas emissions and energy consumption, low in climate policy performance, and very low in renewable energy usage. These indicators highlight profound systemic vulnerabilities with direct implications for stakeholders' wellbeing, defined as *stakeholders' satisfaction, value realisation, expectations, and retention with the firm* (Freeman, 2023; Freudenreich et al., 2020). Underscoring the need for businesses to adopt sustainable practices in such resource-constrained emerging markets as Pakistan, this study

elucidates the mechanisms through which non-market collaboration—the cross-sector partnerships between firms and government agencies—influence firms' climate-risk management strategies and consequently stakeholders' wellbeing. Yet, scholarly understanding of non-market collaboration by firms in the highly climate-vulnerable frontier of emerging markets remains limited. While this study centres on the critical role of non-market collaboration in creating stakeholders' wellbeing in a sustainability-oriented context, it also highlights the importance of value-chain partnership between firms and their upstream and downstream partners in delivering stakeholders' wellbeing (Selsky & Parker, 2005; Valbuena-Hernandez & Ortiz-de-Mandojana, 2022). In doing so, this study demonstrates that firms are embedded in complex multi-stakeholder relationships that require them to account

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for the interests and wellbeing of diverse stakeholders, including shareholders, governments, and value-chain partners.

Non-market collaboration is particularly crucial for navigating the uncertainty, complexity, and systematic risks associated with climate change (Pinkse & Kolk, 2012). Government and regulatory bodies, as key institutional stakeholders, shape the policy frameworks that guide firms' climate-risk management efforts (Clarke & MacDonald, 2019; Jiang et al., 2023). This is particularly pronounced in resource-constrained environments of emerging markets (Vurro et al., 2010), where collaboration with government agencies is even regarded as indispensable (Jiang et al., 2023). We posit that knowledge exchange, organisational learning, and acquisition of critical resources are the main motivations for non-market collaboration, through which firms generate collaborative advantage and shared value (Dentoni et al., 2016) to develop and accelerate climate-risk management strategies, *the systematic approaches to identifying, assessing, taking responsibility for, monitoring, and managing climate risks that affect stakeholders* (Wieland & Wallenburg, 2012).

Stakeholder theory posits that firms' long-term sustainability depends on their ability to serve and balance the interests of multiple stakeholders, including shareholders and government agencies (Clarke & Crane, 2018; Freeman, 2010). Specifically, the instrumental thesis of the stakeholder theory purports the importance of firms developing mutually beneficial key stakeholder relationships (Freeman, 1999). As climate-risk management is a critical challenge that cannot be addressed by any single actor, it therefore requires broad stakeholder collaborations (Lemos et al., 2020; Romito et al., 2024). We therefore maintain that climate-risk management entails the instrumental action of developing collaborations, particular with non-market actors, that are aimed at promoting stakeholders' wellbeing. Based on these theoretical underpinnings, we address the following three research questions.

The first research question concerns the role that non-market collaboration plays in shaping stakeholders' wellbeing. This question tackles an important yet underexplored area in industrial marketing, which has largely overlooked the role of non-market partnerships in sustainability-oriented stakeholders' wellbeing. Our motivation is informed by the limited attention paid to stakeholder-centred outcomes in climate-risk management literature (Bag et al., 2023; Shankar & Gupta, 2024), despite conceptual arguments highlighting stakeholders' wellbeing as a critical outcome of sustainability strategies (Crick et al., 2022; Khan, et al., 2023).

Research Question 1: *How does non-market collaboration with government and regulatory bodies influence firms' stakeholders' wellbeing through climate-risk management strategies?*

Stakeholders are no longer passive actors in climate-risk management, as they increasingly pressure firms to adopt sustainable practices. For example, Climate Action 100+ (CA100+), a global investor-led initiative, comprises over 700 investors engaging firms responsible for approximately 80% of global greenhouse gas emissions (Slager et al., 2023). These investors encourage firms to align with government frameworks and collaborate with regulatory bodies in managing climate risks (Kantor, 2024; Huang et al., 2022; Velte, 2023). Such alignment not only facilitates regulatory compliance, but also enhances organisational credibility and legitimacy (Baum & Oliver, 1991; Xia et al., 2024). Accordingly, our second research question is:

Research Question 2: *To what extent does shareholder pressure moderate the relationship between non-market collaboration and climate-risk management strategies?*

Complementing the instrumental view of stakeholder theory that focuses on relationship building, the value co-creation perspective emphasises that value emerges through co-production between firms and stakeholders, rather than being unilaterally produced by the firms (Kohtamäki & Rajala, 2016; Ranjan & Read, 2016). Importantly, climate-change risk presents opportunities for value-chain upgrading, as lead firms increasingly shape environmental governance across global and local value chains (Hochachka, 2023). Thus, firms need to actively

facilitate value co-creation with value-chain partners by co-producing climate-related solutions that generate positive social impact. While the importance of value-chain partnership between firms and their upstream and downstream partners is well-established (c.f. Claro & Claro, 2010; Khan et al., 2026; Smals & Smits, 2012), the role of collaborative communication between the networked actors in sustainability-oriented value co-creation remains underexplored. Yet, prior research suggests the importance of communication for economic and relational outcomes, including commitment, collaboration, and value creation (Chen et al., 2013; Joshi, 2009; Paulraj et al., 2008). We consider collaborative communication as *constructive, two-way knowledge exchange between firms and stakeholders* (Chen et al., 2013). Given the complexity of climate-risk management, and the involvement of multiple stakeholders, collaborative communication becomes particularly critical (Jain et al., 2024; Joshi, 2009). This leads to our third research question:

Research Question 3: *To what extent does collaborative communication with value-chain partners moderate the relationship between climate-risk management strategies and value co-creation for stakeholders' wellbeing?*

To address these research questions, we conducted an empirical survey involving 142 firms in Pakistan. Pakistan is among the countries most vulnerable to risks from climate change (Dawn-News, 2025b; GermanWatch, 2025). In this context, firms frequently rely on non-market collaboration to access resource and enhance resilience to climate-induced shocks. Thus, situating our study in Pakistan offers a theoretically rich context for examining stakeholder engagement and collaborative strategy formation in high-risk, resource-constrained environments for stakeholders' wellbeing.

In addressing the three questions, a key contribution of our study is integrating stakeholder theory and the value co-creation perspective to explain how emerging market firms, typically plagued by institutional voids and resource constraints (Adomako et al., 2021), respond to climate risks through non-market collaboration. It demonstrates that even as emerging market firms operate in a multi-stakeholder environment, non-market collaboration constitutes a strategic response for developing sustainability-oriented value. Furthermore, by showing the positive interactive effect of shareholder pressure and non-market collaboration, the study challenges the assumption that shareholders' expectations (e.g., controlling) primarily undermine sustainability due to short-term financial motives (Gao et al., 2024), instead positioning them as contingent enablers of firms' climate strategies.

While firms are often portrayed as contributors to environmental degradation (Cavotta et al., 2023), our findings demonstrate that climate-risk management strategies prompt firms to engage in value co-creation with their value-chain partners. Given the vulnerability of business networks and operations with other businesses to climate risks due to multi-tier value-chain dependencies, collaborative communication functions as a critical mechanism for mobilising resources and knowledge to compensate for infrastructural deficiencies and enhance stakeholders' wellbeing. Collectively, this research extends theory by integrating stakeholder pressure, non-market collaboration, and value co-creation in explaining how resource-constrained firms in emerging markets address climate-change challenges.

The remainder of the paper is structured as follows. The next section develops the conceptual background and hypotheses, followed by the methodology, findings, and discussion.

2. Conceptual background

This study draws on stakeholder theory and the value co-creation perspectives to explicate how emerging market firms contribute to stakeholders' wellbeing through collaboration in a multi-stakeholder environment. First, the instrumental thesis of the stakeholder theory, which states that in order "to maximize shareholder value over an uncertain time frame, managers ought to pay attention to key stakeholder relationships" (Freeman, 1999, p. 235), suggests that relational collaboration with government agencies, as non-market stakeholders, shapes

stakeholders' wellbeing of emerging market firms in the context of climate-risk management. While interorganisational relationships are regarded as strategic resources that enhance firm performance (Crick et al., 2024), stakeholder theory foregrounds the strategic implications of firms' actions for diverse stakeholder groups, such as government organisations, by focusing on a more relational perspective of stakeholder relationships (Kujala et al., 2016).

Second, research has established that value emerges through collaborative co-creation among stakeholders (Kohtamäki & Rajala, 2016; Ranjan & Read, 2016). Similarly, Ranjan and Read (2016, p. 292) contend that co-production, a key dimension of value co-creation, among network actors occurs “through acts of mutual exchange, physical and mental activities, and access to mutual expertise.” Specifically relevant to this study's context, value-chain partners play key roles in co-production via joint effort that generates value over time (Demirezen et al., 2020; Dyer & Singh, 1998). However, existing research on value co-creation has predominantly focused on buyer–supplier industrial relationships (Smals & Smits, 2012). What remains less understood is how networked firms develop climate-change management strategies with value-chain partners to co-create value for broader stakeholders' wellbeing.

Moreover, the non-market strategy literature has historically concentrated on issues such as corporate social responsibility (Mellahi et al., 2016), sustainability governance (Bush et al., 2015), or institutional complexity (Sun et al., 2021). These research streams typically conceptualise collaboration with government as part of broader legitimacy-building or voluntary governance practice. Non-market collaborations to enhance stakeholders' wellbeing, specifically via climate-risk management, has not yet emerged as a central analytical lens. Yet, climate-risk management harbours distinct characteristics, including deep uncertainty, long temporal horizons, and multi-level governance complexity.

By integrating stakeholder theory and the value co-creation perspective, the present study advances understanding of how firms develop climate-risk management strategies and value co-creation processes aimed at enhancing stakeholders' wellbeing. Specifically, the study examines the relationships between non-market collaboration and stakeholders' wellbeing through the sequential mediating effects of climate-risk management strategies and value co-creation with value-chain partners. In addition, the study conceptualises the interacting effects of shareholder pressure and collaborative communication with value-chain partners. As depicted in the conceptual framework presented in Fig. 1, our model is consistent with the interventionist approach, which proposes testing causal relationships via mediating mechanism (Cornelissen & Werner, 2026). In the following section on hypothesis development, we elaborate on the proposed relationships in

accordance with this framework.

3. Hypothesis development

3.1. Creating stakeholders' wellbeing through non-market, value-chain collaboration

Value co-creation occurs through interactions among stakeholders, including governments, firms, and value-chain partners, within their extended ecosystem of value generation (Kohtamäki & Rajala, 2016; Lambert & Enz, 2012; Mouzas, 2022; Ramirez, 1999). In the sustainability literature, the value co-creation perspective is often complemented by stakeholder theory, which posits that stakeholders are both contributors to and beneficiaries of value creation (Freudenreich et al., 2020). In particular, the instrumental thesis of stakeholder theory attests to the importance of relationship among stakeholders in that value co-creation is a relational process that generates mutual benefits and promotes stakeholders' wellbeing (Freeman, 1999; Freeman, 2023; Freudenreich et al., 2020).

To better manage climate risks in frontier emerging markets such as Pakistan (the context of this study), firms often collaborate with government and regulatory bodies to enable them to access climate adaptation funds, technical assistance, and climate-related policy knowledge, facilitating strategic alignment with national sustainability agendas. Through such non-market collaboration, firms can anticipate policy shifts, co-shape regulatory frameworks (often underdeveloped in emerging markets), and enhance climate risk strategies that are consistent with public priorities. The collaboration helps firms not only to comply with regulations, but also to meet broader societal expectations (Dacin et al., 2007) and build credibility and trust with broader stakeholder groups, including investors and value-chain partners (Baum & Oliver, 1991; Xia et al., 2024).

We further propose that non-market collaboration enhances stakeholders' wellbeing through the serial mediation of climate-risk management strategies and value co-creation with value-chain partners. First, developing effective climate-risk management—particularly with resource-constrained firms in Pakistan—requires identifying, assessing, and monitoring climate risks. Thus, firms have to rely heavily on government partnerships for timely access to resources, knowledge, and capabilities critical to sustainability initiatives (Richey Jr et al., 2014). Non-market collaborations help to inform the design and implementation of robust climate strategies, enabling co-development of sector-wide sustainable solutions with value-chain partners (Bennett & Grabs, 2025; Dorobantu et al., 2017; Jacob et al., 2023; Wrona & Sinzig, 2018). Furthermore, non-market collaborations are crucial for resource-

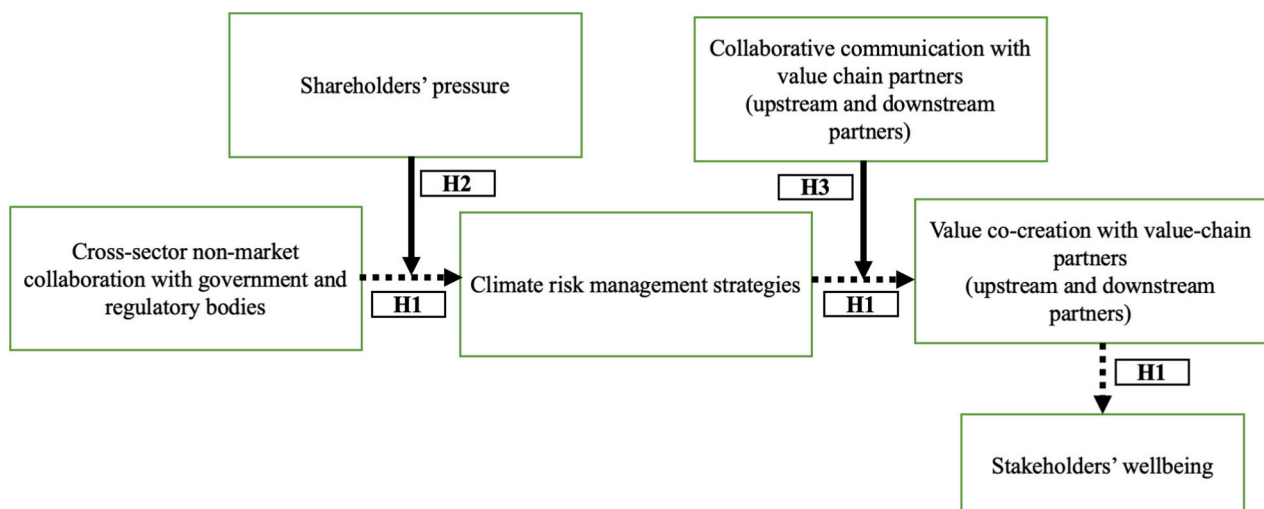


Fig. 1. Cross-sector and value chain collaboration.

constrained firms, especially SMEs, which engage in such partnerships to order to access resources for sustainability-driven activities (Zhang et al., 2023). Due to legitimacy concerns and stakeholder pressure (Marquis & Qian, 2014; Wang & Qian, 2011), SME firms in emerging markets that develop non-market collaborations are more likely to pursue social aligned goals, particularly those supported by government bodies (e.g., climate resilience). Such collaborations also foster internal learning and strategic development that align with policy mandates (Desai, 2016).

Industrial marketing literature on collaboration has largely focused on partnerships with market stakeholders, such as suppliers and buyers, and emphasising their role in developing market-oriented strategies for economic value creation (Claro & Claro, 2010; Smals & Smits, 2012). However, in emerging markets, firms often depend upon non-market collaboration with government and regulatory bodies to successfully enact their strategies. This is because of the institutional voids and critical resource constraints that these markets face (Adomako et al., 2021). Despite the effectiveness of non-market collaboration in enhancing stakeholders' wellbeing, this issue remains underexplored in industrial marketing research. Hence, the present study extends existing knowledge by examining the role of emerging market firms' non-market collaboration with government and regulatory bodies in shaping sustainability-oriented strategies, specifically climate-risk management strategies, and their implications for value co-creation with upstream and downstream value-chain partners.

Second, even if non-market collaboration can facilitate firms in developing effective climate-risk management strategies, the positive efficacy of climate-risk management strategies on stakeholders' wellbeing depends on the extent to which sustainable practices are embedded throughout the value chain. This is because industrial value chains—through production, logistics, and manufacturing processes—are major contributors to environmental degradation (Undheim, T. A. (2022) in Forbes; McKinnon, 2024). Unsustainable practices within these value chains directly affect stakeholders' wellbeing. As the complexity of business operations that span production, transportation and consumption, requires coordinated efforts across the value chain (Khan, Gupta, et al., 2023), collaboration with value-chain partners supports risk assessment and sustainable innovation at each stage of the chain (André et al., 2023). Such holistic engagement facilitates the co-creation of sustainability-oriented ecosystems, which reinforces stakeholders' wellbeing. This means that climate-risk management cannot be addressed by the firms in isolation, but necessitates value co-creation with value-chain partners (c.f. Doh et al., 2019; Falcke et al., 2024; Stadler et al., 2024). Despite this, prior business research has primarily focused on economic performance indicators (e.g., market-based returns) (Bag et al., 2023; Shankar & Gupta, 2024), with limited empirical attention to stakeholders' wellbeing (Khan et al., 2023). We thus raise the following hypothesis:

Hypothesis 1. Non-market collaboration enhances stakeholders' wellbeing through the serial mediating effects of climate-risk management strategies and value co-creation.

3.2. Shareholders' pressure in non-market collaborations

Shareholders are increasingly concerned with climate-change risks and their implications for long-term corporate profitability, resilience, and stakeholders' wellbeing. This apprehension is evident in the Global Investor Survey 2025 reported by PwC (Islam & DiGuseppe, 2025), which reports that 84% of investors believe that firms should maintain or increase investment in climate-risk management. Firms that fail to do so risk damaging their market reputation, environmental performance, and investor appeal (c.f. Abideen, 2025; Baah et al., 2021). In industrial activities contexts, the climate-change risks also disrupt value chain operations—such as production and logistics (Ghadge et al., 2020). Just as climate change negatively affects firm value, investments in environmental, social, and governance initiatives can mitigate this impact (Bagh et al., 2024). As Pfeifer and Sullivan (2008) note, investors increasingly

factor climate risks and opportunities into their investment analyses. Consequently, investors are placing increased pressure on firms to adopt climate-resilient and sustainable practices. They leverage their influence as shareholders to pressure firms into proactive climate action.

Recognising that climate-risk management is governed increasingly by regulatory frameworks, investors expect firms to demonstrate alignment with both mandatory compliance and voluntary sustainability initiatives (Pfeifer & Sullivan, 2008). Accordingly, firms are pressured to collaborate with governmental and regulatory bodies, both to validate their commitment to sustainability and to signal credibility to shareholders (Baum & Oliver, 1991; Xia et al., 2024). Under heightened shareholder pressure, firms tend to increase their engagement in CSR activities, particularly through partnerships with non-market actors for enhanced climate-risk management strategies (Barko et al., 2022). Shareholder pressure also compels firms to pursue greater transparency and accountability in sustainability-oriented strategies (Valentinov et al., 2025). As firms engage with non-market actors, shareholders expect tangible, measurable outcomes. This external pressure may thus incentivise firms to leverage these partnerships to design and implement more proactive, integrated, and evidence-based climate-risk management strategies that serve both regulatory compliance and investor priorities. Indeed, strong shareholder pressure can activate an accountability loop, compelling firms to move beyond minimum compliance, and adopt more comprehensive and inclusive climate-risk management strategies (Ali et al., 2017; Flammer et al., 2021). Thus, shareholder pressure plays a pivotal role in strategically shaping the influence of non-market collaborations on climate-risk management strategies. It ensures that sustainability becomes embedded within the corporate strategy, not just as compliance, but as a core dimension of stakeholder value creation (Freudenreich et al., 2020).

Drawing on the above arguments, we posit that under high shareholder pressure, firms are more likely to mobilise resources obtained through non-market collaboration toward sustainability-oriented strategies, specifically climate-risk management strategies. In contrast, when shareholder pressure is low—as is often the case in frontier emerging economies like Pakistan—firms may lack the motivation or capacity to invest in climate-risk management strategies due to limited resources or entrenched unsustainable practices.

Hypothesis 2. The effect of cross-sector non-market collaboration on climate-risk management strategies is strengthened under conditions of high shareholder pressure.

3.3. Collaborative communication with value-chain partners

Climate-risk management strategies are linked to value co-creation with both upstream and downstream value-chain partners, aiming to enhance stakeholders' wellbeing. For instance, upstream collaborations may involve a logistics provider partnering with a manufacturing firm to transition to electric freight vehicles, requiring joint investments in green infrastructure, such as charging stations. On the downstream side, a technology manufacturer might collaborate with distributors or resellers to co-develop sustainable product lines and offer training programs focused on reducing carbon footprints.

We posit that the effectiveness of a firm's climate-risk management strategies on value co-creation with value-chain partners is strengthened under conditions of high collaborative communication (Lindberg-Repo & Grönroos, 2004). It is important to distinguish between general “communication” and what we refer to as “collaborative communication.” While basic communication ensures the flow of information, collaborative communication is more structured, strategic, and built on two-way knowledge exchange and joint decision-making between firms and their stakeholder (Chen et al., 2013). This distinction matters, especially when multiple stakeholders across the value chain are involved in managing complex issues like climate risks, which are systemic, dynamic, and distributed across the value chain.

Well recognised for its contributions to inter-organisational collaboration (Joshi, 2009; Khan et al., 2025), collaborative communication plays a pivotal role in strengthening the relationship between climate-risk management strategies and value co-creation efforts. It not only helps value-chain partners to align their internal functions, but it also ensures that strategies are consistently implemented across the network of partners (Evans & Berman, 2001). When communication is well-structured and frequent, firms are better able to implement sustainability strategies consistently across their supply networks, ensuring alignment toward shared objectives (Evans & Berman, 2001). In this sense, communication acts as a crucial conduit in translating strategies into stakeholder value.

According to Joshi (2009), collaborative communication comprises four key dimensions: (1) frequency – the volume of interactions between the firm and its stakeholders; (2) reciprocal feedback –bidirectional exchange and mutual responsiveness; (3) formality – the extent to which interactions are structured, routine, and pre-planned; and (4) rationality – the degree to which firms provide logical reasoning and evidence to justify strategic decisions and recommendations. When these four dimensions are present at high levels, firms are more likely to engage in coordinated and complementary actions with their stakeholders to achieve mutual goals (Chen et al., 2013). Climate risks, by nature, require dynamic strategic responses, periodic reassessment, and adaptive implementation (Bag et al., 2023; Nadeem et al., 2026). Under frequent and open communication, strategic changes—such as updates in climate data or stakeholder impact assessments—can be quickly disseminated, allowing partners to stay responsive and aligned. High communication frequency also supports joint problem solving and a shared commitment to climate objectives. Higher level of communication within a value chain, the more effective the flow of resources and knowledge, and the greater the ability of value-chain partners to respond effectively (Canevari-Luzardo et al., 2020). Reciprocal feedback mechanisms further enable value-chain partners to voice concerns, exchange data, and negotiate the co-development of solutions (Mouzas, 2016). Such interactive communication channels foster trust, increase mutual understanding, and enhance learning opportunities (c.f. Ferguson et al., 2022; Payne et al., 2008; Veal & Mouzas, 2010). This is particularly important given that climate-risk management typically entails long-term initiatives, such as setting carbon reduction targets or making infrastructure investments. Structured and formal communication can also provide a critical foundation for coordinated climate action—especially when addressing novel or emerging challenges such as climate-risk management (Allen, 2016). When communication is formalised through routines, planning systems, or documentation, it enables the development of shared structures to address complex sustainability issues more effectively. Equally important is the rationality of communication—partners are more inclined to engage in collaborative action when the rationale, logic, and purpose of the strategy are transparent and evidence-based (Mouzas & Henneberg, 2015). When firms clearly articulate why a climate strategy is necessary—especially in terms of stakeholders' wellbeing and regulatory alignment—they promote strategic alignment and shared value creation across the value chain (Khan et al., 2025).

While the benefits of collaborative communication in economic and relational value creation are well established, its application within sustainability and climate resilience contexts remains underexplored. Yet, the interactive and iterative nature of sustainability efforts makes collaborative communication especially relevant, given its capacity to foster mutual learning, trust, and adaptability across value chain actors (Jain et al., 2024; Mouzas, 2024). We hypothesise that firms' climate-risk management strategies are more effective in enabling value co-creation with value-chain partners when firms engage in collaborative communication. Thus, we offer this hypothesis:

Hypothesis 3. In creating stakeholders' wellbeing, the effects of climate crisis management strategies on value co-creation with their

upstream and downstream value-chain partners are enhanced under conditions of collaborative communication.

4. Method

4.1. Sampling and data collection approach

Based on a convenience sampling approach, the data for this study was collected from small and medium-sized enterprises (SMEs) in Pakistan. This was a logical choice, as SMEs constitute approximately 90% of all businesses in Pakistan (Dawn-News, 2025a). We appointed professional research assistants in Pakistan to facilitate data collection through personal visits. These assistants compiled a list of firms in sectors including manufacturing, construction and building materials, transportation and logistics, insurance, and agriculture, using various industry databases. These sectors were selected due to their deep involvement in value chain processes and partnerships, allowing for greater variability in responses and the potential to capture sector-level effects, if present. Out of the 307 firms approached for a face-to-face survey, 142 firms completed the survey, yielding an approximate response rate of 46%. This response rate is consistent with prior research, which reports rates of about 40% for survey-based studies in similar markets (Zahoor et al., 2023). A personalised data collection approach was adopted; this method is preferred by firms in this market, thus helping to generate higher response rates compared to email or postal survey (c.f Zahoor et al., 2023). Table 1 provides an overview of the sample characteristics. Data collection took place between March to June 2025. Pakistan is an ex-British colony, where English is widely used in business. Therefore, the questionnaire was written in English.

4.2. Scales

Scales for this study are adapted from prior literature with established reliabilities. All scale items were measures on 1–7 ratings, whereby 1 denotes strong disagreement and 7 denotes strong agreement to the scale items.

Non-market collaboration: The 5-item scale on non-market collaboration with government and regulatory bodies (i.e., a cross-sector partnership) was adapted from Khan, Khan, et al. (2023), where the original items were contextualised for a foreign market context. We adapted the wordings so that they did not refer to or imply foreign market.

Shareholders' pressure: The scale for shareholders' pressure was adapted from Helmig et al. (2016), where it was contextualised for the customers/investors. We adapted it in context of shareholders.

Climate-risk management strategies: The four items for this construct was adapted from Wieland and Wallenburg (2012). The scale

Table 1
Sample and control variables characteristics.

Controls	Mean	Sample characteristics
Firm size (number of employees)	162.39	SMEs = 142
Managers' perception regarding the "Likelihood of climate change related events affecting the sector in which firm operate"	5.25	Respondents = Managers
Firm Age	FREQUENCIES	
> 10–15 years	5	
>15 years	137	
	FREQUENCIES	
Textile Manufacturing	33	
Construction	31	
Transportation and logistics	27	
Building materials and supplies	17	
Agricultural	15	
Food Manufacturing	11	
Insurance	8	

was adapted from supply-chain risk management to the climate-risk management as the focal context. This scale covered the aspects of systematic risk identification, assessment, taking responsibility and monitoring in context of climate-risk management.

Collaborative communication: The scale for collaborative communication covers the frequency (three items), reciprocal feedback (four items), formality (four items) and rationality (two items) were adapted from [Chen et al. \(2013\)](#), where it was contextualised for customers. In present study, we adapted it for the value-chain partners.

Value co-creation: The six items for this scale came from [Zhang et al. \(2015\)](#). We adapted the items from its original context of customers to value-chain partners.

Stakeholders' wellbeing: Taken from a 4-item scale by [Crick et al. \(2022\)](#) that measures the satisfaction of customers as stakeholders, we adapted the scale to the overall stakeholders' wellbeing context. Specifically, we related stakeholder satisfaction with their wellbeing, in terms of assessing firm performance in creating their wellbeing. It is assessed on various dimension i.e., overall stakeholders' satisfaction, value delivered, delivering what they want, and retaining valued stakeholders. Stakeholders' wellbeing is a different concept from shared value that is often defined in the literature as value that mutually beneficial for the stakeholders rather than focusing solely on the firm value ([Dembek et al., 2016](#)). Our conceptual framework integrates various stakeholders' engagement of the business i.e., firm non-market collaboration with government and regulatory bodies, collaboration and communication with upstream and downstream value-chain partners, and shareholders' pressure. Hence, accordingly stakeholders' wellbeing captures the wider stakeholders' perspective, rather than confining it to a particular stakeholder.

Control variables: We controlled for the confounding effects of firm size, firm age and industry type. We also controlled for the likelihood of climate change related events affecting the sector in which the firm operate (from 1 = less likely to 7 = extremely likely).

Marker variable: A key criterion for marker variable selection is that it must be theoretically unrelated to the main constructs of the study ([Lindell & Whitney, 2001](#)). We included an additional construct i.e. satisfaction with restaurant performance in our survey to assess the common method bias. The four items in the scale (1 = highly dissatisfied to 7 = highly satisfied) came from prior studies ([Zhou et al., 2019](#)).

5. Analysis and findings

5.1. Factor analysis, reliabilities and discriminant validity

The confirmatory factor analysis revealed that all items loaded onto their respective factors, with the lowest factor loading being 0.645. The reliability of the scales also exceeded the minimum threshold of 0.700 ([Bagozzi & Yi, 2012](#)), with the lowest reliability among the main constructs being 0.815 (See [Table 2](#)).

[Table 3](#) reports the mean, correlations, squared correlations, and average variance extracted (AVE) for the constructs. The AVE values for all constructs exceeded the recommended threshold of 0.500 ([Bagozzi et al., 1991](#)), and in each case, the AVE was greater than the squared correlation between any pair of constructs in the conceptual model ([Fornell & Larcker, 1981](#)). These results provide evidence supporting discriminant validity.

5.2. Common method bias assessment

We adopted the marker variable technique proposed by [Lindell and Whitney \(2001\)](#) to assess and adjusted for common method bias using the correlations among the main variables. The marker variable showed insignificant correlation with the main variables of this study (see [Table 3](#)), satisfying the criterion to be used as a marker variable. Specifically, we used the absolute lowest correlation ($r = 0.013$, between the marker variable and climate-risk management strategies) and the

Table 2
Confirmatory factors analysis and composite reliability.

Constructs and Related Items	Factor Loading
Non-market collaboration: Evaluate the firm non-market collaboration with regulatory body and government organisations (CR = 0.856)	
1. Our company tries to influence regulators for developing effective regulations.	0.700
2. Our company is in regular contacts with government/regulatory bodies for creating positive solutions and valuable actions.	0.807
3. We dedicate significant resources and time in developing partnerships with government organisations for value creation.	0.757
4. Our company actively participates in standard regulatory bodies.	0.738
5. Our interactions with regulators and government often led to a meaningful action plan.	0.682
Shareholders' pressure: Evaluate the shareholders' pressure on firm regarding sustainability. (CR = 0.815)	
1. Our shareholders (e.g., investors) expand into the market of corporate sustainability-oriented investments.	0.710
2. Sustainability aspects of investments are important for our shareholders (e.g., investors).	0.771
3. Our shareholders (e.g., investors) support responsible corporations.	0.726
4. Our shareholders (e.g., investors) are reluctant to invest if a firm is not sustainability oriented.	0.690
Climate-risk management strategies: Evaluate the firm's climate change management strategies on the following items. (CR = 0.842)	
1. Our company systematically identifies the climate change risks.	0.799
2. Our company assesses both own risks and risks to B2B partners and other stakeholders.	0.734
3. Our company takes the responsibility toward the management of climate change risks by designing effective risk management strategies.	0.739
4. Our company continuously monitors and takes effective measures in managing and mitigating the climate change risks.	0.748
Value co-creation: Evaluate the value co-creation with value-chain partners (considering both the upstream and downstream partners). (CR = 0.873)	
1. Value-chain partners actively participate in our plans.	0.702
2. Our company shares plans with value-chain partners.	0.710
3. Value-chain partners and our company jointly deal with problems that arise in the course of relationship in working toward plans.	0.839
4. In most aspects of relationship with value-chain partners, the responsibility of getting things done is shared.	0.765
5. Value-chain partners and our company are flexible in responding to changes.	0.710
6. We develop solutions together with our value-chain partners.	0.647
Collaborative communication: Evaluate business communication with value-chain partners (both upstream and downstream partners). (CR = 0.932)	
Frequency	
1. Our business frequently interacts with value-chain partners through face-to-face communication.	0.718
2. Our business frequently interacts with value-chain partners through telephonic communication	0.727
3. Our business frequently interacts with value-chain partners through written communication	0.693
Reciprocal feedback	
4. Our business solicits value-chain partners' view on plans on an ongoing basis.	0.702
5. Our business solicits value-chain partners' view on operational processes on an ongoing basis.	0.750
6. Our business responds promptly to communication from value-chain partners.	0.733
7. Our business works hard to ensure that there is a lot of two-way communication between value-chain partners and us.	0.716
Formality	
8. In coordinating activities with value-chain partners, our business has formal communication channels.	0.755
9. Our business writes down the terms of value-chain partners-firm relationships in detail	0.666
10. Our value-chain partners expectations of us are communicated in detail.	0.755
11. Our business explicitly discusses and verbalises the components of the relationships with value-chain partners.	0.718

(continued on next page)

Table 2 (continued)

Constructs and Related Items	Factor Loading
Rationality	
12. Our business provides specific information in order to make a case for a particular course of action that we would like our value-chain partners to implement.	0.670
13. Our business shares the results of any past experience(s) in making a case for a particular course of action that they would like value-chain partners to implement.	0.704
Stakeholders' wellbeing: Evaluate the firm performance in creating stakeholders' wellbeing ($CR = 0.827$)	
1. Overall stakeholders' satisfaction	0.720
2. Delivered value to stakeholders	0.697
3. Delivered what stakeholders wanted	0.744
4. Retained valued stakeholders	0.790
Marker Variable (restaurant performance): Please rate your level of satisfaction with a restaurant that you have last visited. ($CR = 0.806$)	
1. Friendliness of service personnel	0.766
2. Availability of healthy meals	0.704
3. Cleanliness of the place	0.645
4. Presentation of meals	0.739

CR = Composite reliability.

second-lowest absolute correlation ($r = 0.032$, between the marker variable and collaborative communication) to adjust the correlations between the main variables. After the adjustments, all previously significant correlations remained significant at $p < .05$, indicating the absence of common method bias.

5.3. Late response bias assessment

To assess potential non-response bias, we conducted independent sample *t*-test comparing early and late respondents on the main constructs, as well as four control variables. The lowest *p*-value obtained was 0.222 for the equality of means test, indicating no statistically significant differences between early and late respondents. This suggests that non-response bias was unlikely to be a concern (Armstrong & Overton, 1977).

5.4. Endogeneity assessment

Endogeneity problem may arise when a predictor variable is significantly correlated with the error term of the dependent variable (Ebbes et al., 2021; Rutz & Watson, 2019). We followed the Gaussian copula method to determine if there was any such confounding effect (Eckert &

Hohberger, 2023; Park & Gupta, 2012). Using SMART-PLS v4 software only for the purpose of calculating Gaussian copulas, the *p*-value for the Gaussian copulas ranged between 0.304 and 0.971 for the main relationships in the conceptual model, supporting that endogeneity did not pose a problem.

5.5. Adequacy of sample size

Following Von Delft et al. (2019), we conducted a post hoc power analysis using G*power, based on path- by- path predictor correlations for the stated hypothesis and the overall model. The lowest calculated power value was 0.888, which exceeds the recommended threshold of 0.800, indicating adequate statistical power for the sample size. Furthermore, our sample size ($n = 142$) was larger than other studies involving Pakistani firms (c.f. Zahoor et al., 2023).

5.6. Empirical results of conceptual model

To test our hypotheses, we analysed the conceptual model using structural equation modelling (SEM) with bootstrapping (5000 resamples) and 95% confidence intervals using AMOS (version 29). As our model was relatively complex with moderation and mediation (see Fig. 1), SEM is suitable because it estimates structural path parameters simultaneously. Unlike regression or Process macros, SEM specifically models measurement errors, thus reducing potential bias (Kline, 2023). The sample size ($n = 142$) has adequate statistical power (see section 5.5) and the structural model demonstrates a good fit ($CFI = 0.91$; $TLI = 0.901$; $IFI = 0.912$; $RMSEA = 0.047$; $\chi^2/df = 1.307$, $p < .01$). We used convergence-based SEM; comparative studies shows that CB-SEM and PLS-SEM produce similar results (Al Issa & Abdelsalam, 2021; Astrachan et al., 2014). The results of the full-path model with mediators and interactive effects are reported in Table 4.

The findings show that non-market collaboration has a significant positive effect on climate-risk management strategies ($\beta = 0.256$; *p*-value = .039), which in turn had a positive effect on value co-creation ($\beta = 0.511$; *p*-value < .01. Furthermore, value co-creation significantly influences stakeholders' wellbeing ($\beta = 0.606$; *p*-value < .01). However, the direct effect of non-market collaboration on stakeholders' wellbeing is insignificant ($\beta = 0.078$; *p*-value = .511) in the presence of both mediators (see Table 4).

It is noteworthy that when we first mediator, climate-risk management strategies, is added, the positive significant effects of non-market collaboration ($\beta = 0.191$; *p*-value = .135) on stakeholders' wellbeing become insignificant, while the effects of climate-risk management

Table 3
Means, correlations, average variance extracted.

Factors	Mean (SD)	AVE	NM	SP	CRS	COC	VCO	SW	RP
NM	5.089 (.752)	.545	--	.450** .203	.357** .127	.372** .138	.348** .121	.277** .077	-.047 (.578)
SP	5.194 (.752)	.525	--	--	.346** .120	.427** .182	.377** .142	.367** .135	-.117 (.166)
CRS	4.965 (.854)	.571	--	--	--	.361** .130	.552** .305	.277** .077	-.013 (.880)
COC	5.126 (.687)	.513	--	--	--	--	.427** .182	.329** .108	-.032 (.703)
VCO	5.159 (.745)	.535	--	--	--	--	--	.497** .247	.065 (.444)
SW	4.853 (.755)	.546	--	--	--	--	--	--	-.043 (.609)
RP	5.326 (.759)	.511	--	--	--	--	--	--	--

** implies correlations significant at < 0.01 level. Insignificant correlations are reported in brackets.

SD = standard deviation; AVE = average variance extracted.

NM = non-market collaboration with government and regulatory bodies; SH = shareholders' pressure; CRS = climate-risk management strategies; COC = collaborative communications; VCO = value co-creation; SW = stakeholders' wellbeing; RP = restaurant performance (marker variable).

Grey highlights are the squared correlations.

Table 4
Main results.

EFFECTS											
NM → CRS	SP → CRS	SPxNM → CRS	NM → VCO	CRS → VCO	COC → VCO	COCxCRS → VCO	NM → SW	CRS → SW	VCO → SW		
0.256 (0.039)	0.364 (0.011)	0.183 (0.025)	0.097 (0.382)	0.511 (<0.01)	0.273 (0.003)	0.143 (0.049)	0.078 (0.511)	−0.142 (0.248)	0.606 (<0.01)		
CONTROLS											
Indtype → CRS	Firm age → CRS	Firm size → CRS	iC_effect → CRS	Indtype → VCO	Firm age → VCO	Firm size → VCO	iC_effect → VCO	Indtype → SW	Firm age → SW	Firm size → SW	iC_effect → SW
−0.065 (0.483)	0.097 (0.26)	−0.056 (0.626)	0.017 (0.84)	−0.091 (0.246)	0.012 (0.881)	−0.07 (0.44)	0.072 (0.33)	0.13 (0.128)	−0.01 (0.907)	0.103 (0.301)	−0.1 (0.218)

*Bootstrap 5000 with 95% confidence intervals. Standardised coefficients (p-value) are reported in the brackets.

NM = non-market collaboration with government and regulatory bodies; SP = shareholders' pressure; CRS = climate-risk management strategies; COC = collaborative communications; VCO = value co-creation; SW = stakeholders' wellbeing; iC_effect = likelihood of climate change related events affecting the sector in which the firm operates; indtype = industry-type.

strategies on stakeholders' wellbeing remains positive and significant ($\beta = 0.222$; p -value = .044). When the second mediator, value co-creation, is added, the effects of non-market collaboration ($\beta = 0.070$; p -value = .553) and climate-risk management strategies ($\beta = -0.155$; p -value = .235) on stakeholders' wellbeing are insignificant. In contrast, the effect of value co-creation on stakeholders' wellbeing remains positive and significant ($\beta = 0.639$; p -value ≤ 0.01). For these path by path results (incremental models), please see the supplementary table of results in the appendix. As shown in Table 4, the serial mediation is taking place as the effects of non-market collaboration and climate-risk management strategies on stakeholders' wellbeing are insignificant in the presence of value co-creation with value chain partners.

Thus, H1 is supported.

Table 4 shows that both shareholders' pressure ($\beta = 0.364$; p -value = .011), as well as the interaction between non-market collaboration and shareholders' pressure ($\beta = 0.183$; p -value = .025), have positive and significant effects on climate-risk management strategies, thus providing support for H2.

Similarly, the interaction between collaborative communication and climate-risk management strategies significantly predicts value co-creation ($\beta = 0.143$; p -value = .049), which subsequently enhances stakeholders' wellbeing ($\beta = 0.606$; p -value $< .01$). This implies that the positive impact of firms' climate-risk management strategies on value co-creation ($\beta = 0.511$; p -value ≤ 0.01)—and ultimately on stakeholders' wellbeing—is enhanced when collaborative communication is present along the value chain, thus supporting H3. Collectively, the results in Table 4 empirically validate the hypothesised moderation and mediation effects in our conceptual framework. Fig. 2 illustrates the overall results.

6. Discussion and implications

By integrating stakeholder theory with a value co-creation perspective in the context of climate-risk management, this study explores the roles of various stakeholders—non-market actors, shareholders, and value-chain partners—in fostering co-creation processes that enhance stakeholders' wellbeing. In doing so, the study advances industrial marketing literature beyond market-based collaboration toward multi-sector, non-market collaboration, providing a theoretically informed understanding of how firms from frontier emerging markets create value in addressing grand challenges due to climate change. While industrial marketing management literature emphasises the value of collaboration in networks and relationships (Batt & Purchase, 2004; Naudé & Sutton-Brady, 2019), research adopts an economic perspective (Najafi-Tavani et al., 2018) focusing predominately on market-based partnerships, such as buyer-supplier relationships (Claro & Claro, 2010). Thus, further research is warranted regarding non-market collaboration with government, regulatory bodies, and cross-sector actors in sustainability-oriented value-creation.

Corollary to Research Question 1, the study finds that firms' non-market collaboration with government agencies positively influences stakeholders' wellbeing via serial mediation of climate-risk management and value co-creation. This demonstrates that that stakeholder engagement and value co-creation are not confined to market-based partners for economic outcomes, but also extend to non-market actors and value-chain partners, particularly in addressing sustainability challenges. Conceptually, this extends the current understanding of non-market collaboration in business networks as a critical part of a multi-sectoral

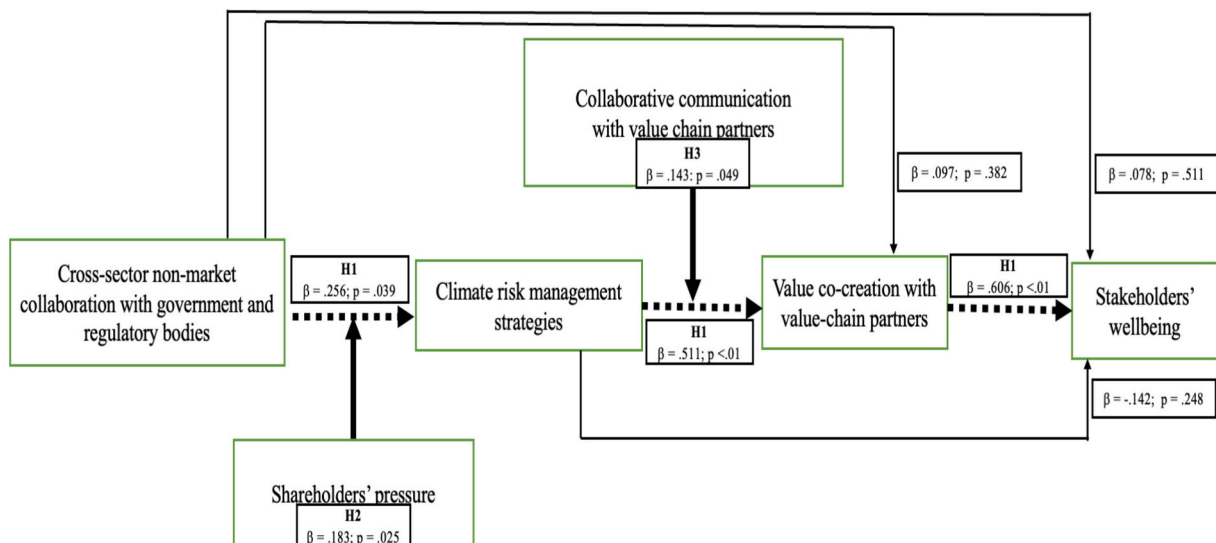


Fig. 2. Results cross-sector and value chain collaboration.

mechanism that drives sustainability-oriented strategies, rather than as merely serving compliance purposes.

In addressing Research Question 2, the study finds a positive moderating role of shareholder pressure on the relationship between cross-sector non-market collaboration and climate-risk management strategies in firms. Our findings suggest that shareholder pressure can incentivise proactive climate strategies, likely due to the growing recognition of long-term sustainable value and reputational risk mitigation. This challenges conventional assumptions and criticism about shareholders prioritising financial returns over sustainability (Gao et al., 2024). In doing so, we link shareholder-driven governance to non-market strategy, and highlight how internal institutional pressure shapes the effectiveness of external collaboration in sustainability-oriented value co-creation.

Lastly, in line with Research Question 3, collaborative communication with value-chain partners positively moderates the relationship between climate-risk management strategies and value co-creation for stakeholders' wellbeing. Although prior industrial marketing literature underscores the role of collaborative communication in building trust and commitment (Chen et al., 2013), our study extends these insights to the high-stake domain of climate-risk management, positioning communication not just as an operational enabler, but as a strategic integrator that links social responsibility, stakeholder engagement, and co-creation outcomes.

6.1. Theoretical implications

The study contributes to stakeholder (Freeman, 1999) and value co-creation (Ramirez, 1999) perspectives by integratively situating them within climate-specific crisis management in emerging markets. It extends existing research by shifting the focus from traditional, industrial firm-centric interpretations of stakeholder influence—often framed primarily as sources of external pressure (e.g., Chang & Fong, 2025)—to a more dynamic and participatory view of stakeholders as co-creators of value in sustainability contexts.

The findings suggest that stakeholders, including shareholders, are not only agents of pressure in sustainability-related matters, but also essential collaborators in the value co-creation process. Specifically, value co-creation with value-chain partners mediates the relationship between non-market collaboration and climate-risk management strategies in enhancing stakeholders' wellbeing. This positions value co-creation as a central mechanism through which external collaboration translates into internal strategic value for firms.

Importantly, the study refines existing stakeholder theory by demonstrating that shareholder pressure functions as an enabling contingency under conditions of climate-risk management. Our study shows that shareholder pressure amplifies the positive effects of non-market collaboration on climate-risk management strategies. This extends prior literature, which characterises shareholder expectations (e.g., controlling) as obstacles to long-term sustainability investments (Gao et al., 2024), by illustrating their enabling role in catalysing deeper non-market engagement. It suggests that institutional actors, when aligned with sustainability goals, can serve as powerful levers for activating cross-sector collaboration and stakeholder-oriented strategy.

The study also highlights that collaboration for sustainability crisis management is not a linear or isolated phenomenon. Rather, it is a sequential, interactive, and ecosystem-based process, in which non-market actors and their collaborative resources feed into lead firms' climate-risk management strategies. In turn, these strategies enable firms to co-create value with upstream and downstream value-chain partners in ways that promote stakeholders' wellbeing. This conceptualization supports the theoretical framing of collaboration in industrial relationship management research as networked, multi-actor ecosystems (Lacoste, 2016) by considering both the non-market (government and regulatory bodies) and market actors (focal firm, shareholders, and value chain partners) specifically in climate management.

Furthermore, the findings show that a high level of collaborative communication with value-chain partners strengthen the relationship between climate-risk management strategies and value co-creation, thereby enhancing stakeholders' wellbeing. This indicates that two-way communication is not merely a supportive activity, but a core strategic capability in sustainability-focused value co-creation. While prior industrial marketing literature asserts efficacy of collaborative communication in relational performance (Chen et al., 2013), this research extends its critical role in managing stakeholder expectations, facilitating joint problem-solving, and ensuring the alignment of sustainable practices across the value chain in accordance with climate-risk management strategies objectives.

In summary, the research findings offer an integrated view of how firms operating in frontier emerging markets can operationalise (1) stakeholder theory and (2) value co-creation to address grand societal challenges such as the climate-change risk. Taken together, these findings support a theoretically integrated framework in which non-market actors provide institutional resources, shareholders regulate strategic intensity, firms develop dynamic capabilities, and value-chain partners co-create stakeholder value under conditions of effective communication. This positions sustainability-oriented strategy as an ecosystem-level orchestration process, thereby extending industrial marketing literature beyond firm-centric, or even dyadic, models toward a systemic understanding of value creation under conditions of environmental uncertainty and institutional complexity.

6.2. Managerial implications

The study demonstrated that firms operating in emerging markets may benefit from proactive collaboration with government and regulatory bodies. Research findings show that non-market collaboration could support climate-risk management strategies by providing timely knowledge about policy measures, frameworks, and regulatory expectations. Managers could leverage these collaborations to extract key resources and capabilities, which could inform the identification, mentoring, assessment, and management of stakeholder impacts.

Stakeholders, including shareholders, can play an enabling role in sustainability-oriented value co-creation. Managers therefore need to maintain transparency with shareholders and demonstrate how collaboration with non-market actors could inform climate-risk management strategies, thereby aligning expectations and facilitating supportive engagement. Similarly, upstream and downstream value-chain partners are critical collaborators in co-creating sustainability solutions. Building on this study, managers need to trigger a two-way collaborative communication with their partners to strengthen the translation of climate-risk management strategies into enhanced stakeholders' wellbeing. Hence, managers need to actively engage value-chain partners in joint problem-solving, establishing feedback loops to share best practices, knowledge, and updates on sustainability efforts across production, logistics, and consumption stages. This interactive engagement of business counterparts would allow managers to build networked ecosystems for sustainability, creating value for a broader set of stakeholders and supporting retention, satisfaction, and social impact.

More broadly, this study suggests that firms must simultaneously engage with non-market actors, shareholders, and value-chain partners to co-create value. The ability to orchestrate this multi-stakeholder networks—where institutional resources, governance pressures, organisational capabilities, and relational coordination are integrated into a coherent system—will help to deliver stakeholders' wellbeing.

Another managerial implication is that the context of this study, Pakistan, provides a critical empirical setting, and not merely as a case study. Among the countries most affected by climate change (Dawn-News, 2025b; GermanWatch, 2025), Pakistan exemplifies the distinctive institutional, regulatory, and cultural characteristics of frontier emerging markets, where formal institutions are often weak or volatile, and informal institutions and social mechanisms play a central role in

enabling organisational survival and growth (Barkema et al., 2015; Morris et al., 2023). Such conditions challenge foundational assumptions in stakeholder and value co-creation theories, which presuppose stable institutions, predictable collaboration pathways, and relatively homogeneous stakeholder priorities. Our findings reveal that in such context, firms navigate institutional volatility, multi-stakeholder complexity, and high environmental risk, providing a theoretically generative setting for extending existing frameworks of non-market collaboration, stakeholder engagement, and sustainability-oriented value co-creation to emerging market contexts. By observing how firms navigate institutional volatility, heterogeneous stakeholder priorities, and informal governance mechanisms, we are able to test the boundaries of stakeholder and value co-creation theories (outside-in approach), while also identifying theoretical and context-specific mechanisms, such as cross-sector non-market collaboration and relational governance \ (inside-out approach), that may be applicable beyond Pakistan. Our research findings illustrate that emerging markets are not just empirically interesting, but are theoretically generative, exposing assumptions that underpin Western-centric frameworks, thus providing important opportunities for theory refinement and extension (Morris et al., 2023).

6.3. Policy implications

This study offers important implications for policymakers by demonstrating how public interventions can influence firm behaviour and stakeholder outcomes through the mechanisms identified in the conceptual model. The findings regarding the importance of non-market collaborations, particularly in emerging markets characterised by institutional voids, positions the state as a central actor in shaping industrial network dynamics, enabling the co-creation of stakeholders' wellbeing through integrated institutional, financial, and relational mechanisms.

The serial mediation results indicate that non-market collaboration affects stakeholders' wellbeing only when firms are able to develop and deploy climate risk management strategies. Policymakers should therefore design interventions that enhance firms' capability-building processes, ensuring that institutional engagement translates into actionable strategies. This could include government and regulatory body providing financial and non-financial resources to firms in climate-risk management. Given Pakistani firms are resource-constrained, they may be reluctant to invest in sustainability initiatives. Policymakers could support firms by providing incentives, tax reliefs, or access to industrial networks and sustainable development programs.

Similarly, the interaction between shareholder pressure and non-market collaboration suggests that policy effectiveness is amplified when regulatory frameworks are aligned with financial market incentives. For example, by promoting environmental, social, and governance (ESG) disclosure standards and transparency, policymakers can increase investor scrutiny and engagement, which in turn exerts shareholder pressure on firms. This creates a complementary governance structure, in which regulatory and financial pressures jointly reinforce firms' adoption of sustainability-oriented strategies in B2B markets.

Regulatory bodies could also enhance firms' sustainability capabilities by organising workshops, symposia, and training programs and by incentivising educational institutions that offer sustainability-focused executive-level courses for managers. These regulatory interventions may help align firms' operational practices with societal and environmental objectives, facilitating ecosystem-wide value co-creation in emerging-market contexts.

6.4. Limitations and future research directions

This study is confined to non-market regulatory collaboration in climate-specific sustainability contexts. Future research may extend this work theoretically by exploring value co-creation and stakeholder

engagement in addressing other types of grand sustainability challenges.

Future research could examine the comparative effectiveness of different non-market actors, such as non-governmental organisations (NGOs) versus regulatory bodies, in climate-risk management. In addition, future research may explore specific forms of communication in value co-creation, including psychological or societal benefits, as well as other types of external pressure, such as government and NGOs' pressure that are not considered in the present study. Also, while we empirically capture the extent of firms' non-market collaborations with government bodies, we did not consider potential ethical nuances that may arise from the collaborations. Future research on this issue may shed further light on our conceptual model by considering how firms' commercial orientation may collide with public non-profit mandates in areas such as public policies or even crisis management.

Methodologically, self-reported perceptions in a cross-sectional context (Pakistan) may vary across stakeholder groups, our findings should be interpreted reflexively and contextually. Future research is encouraged to incorporate multi-source data and stakeholder-specific assessments to further generalise our findings. Similarly, complementing survey data with interviews or ethnographic studies can deepen insights into stakeholders' wellbeing and collaborative practices. Comparative studies across advanced and emerging markets could further enhance generalisability and enhance theoretical contributions by incorporating both outside-in and inside-out perspectives on non-market collaboration and value co-creation in diverse contexts (Morris et al., 2023).

Right retention statement

For the purpose of open access, the author has applied a Creative Commons Attribution (CC BY) licence to any Author Accepted Manuscript version arising from this submission.

Ethical disclosure statement

Given Huda Khan (is special issue editor and editorial review board at the Industrial Marketing Management) and Stefanos Mouzas (is special issue editor, editorial review board, and honorary board member at the Industrial Marketing Management), they had no involvement in the peer review of this article and had no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to another journal editor.

CRediT authorship contribution statement

Huda Khan: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Stefanos Mouzas:** Writing – review & editing, Writing – original draft, Conceptualization. **Zaheer Khan:** Writing – review & editing, Writing – original draft, Conceptualization. **Richard Lee:** Writing – review & editing, Writing – original draft.

Declaration of competing interest

Given Huda Khan is the currently special issue editor and editorial review board member and Stefanos Mouzas is also currently special issue editor, editorial review board, and honorary board member of the Industrial Marketing Management, they had no involvement in the peer review of this article and had no access to information regarding its peer review. Full responsibility of the editorial process of this article was held by the journal editor.

Appendix A. Supplementary table of results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13
	SW	CLIMATE-RISK MANAGEMENT STRATEGIES (CRS)			VALUE CO-CREATION (VCO)						STAKEHOLDERS' WELLBEING (SW)		
EFFECTS	Direct (NM)	Direct (NM)	(NM + SP)	Interaction (SP X NM)	Direct (NM)	Direct (CRS)	Mediation (CRS)	Interaction (SPXNM)	Moderator (COC)	Full path (Interaction+ Mediator)	Mediation (CRS)	Mediation (CRS + VCO)	Full path (Interaction + Mediators)
<i>NM → CRS</i>		0.369 (0.002)	0.288 (0.022)	0.267 (0.032)			0.367 (0.003)	0.249 (0.046)	0.257 (0.038)	0.257 (0.038)	0.366 (0.003)	0.365 (0.003)	0.256 (0.039)
<i>SP → CRS</i>			0.273 (0.055)	0.318 (0.025)				0.359 (0.012)	0.367 (0.010)	0.367 (0.010)			0.364 (0.011)
<i>SPXNM → CRS</i>				0.193 (0.020)				0.191 (0.020)	0.185 (0.024)	0.184 (0.025)			0.183 (0.025)
<i>NM → VCO</i>					0.410 (0.001)		0.194 (0.078)	0.204 (0.061)	0.138 (0.209)	0.097 (0.385)		0.195 (0.076)	0.097 (0.382)
<i>CRS → VCO</i>						0.644 (<0.01)	0.591 (<0.01)	0.596 (<0.01)	0.530 (<0.01)	0.512 (<0.01)		0.592 (<0.01)	0.511 (<0.01)
<i>COC → VCO</i>									0.278 (0.002)	0.277 (0.003)			0.273 (0.003)
<i>COCXCRS → VCO</i>										0.146 (0.047)			0.143 (0.049)
<i>NM → SW</i>	0.277 (0.025)										0.191 (0.135)	0.070 (0.553)	0.078 (0.511)
<i>CRS → SW</i>											0.222 (0.044)	−0.155 (0.235)	−0.142 (0.248)
<i>VCO → SW</i>												0.639 (<0.01)	0.606 (<0.01)
CONTROLS													
<i>Indtype → CRS</i>		0.039 (0.666)	−0.024 (0.797)	−0.056 (0.542)			0.039 (0.661)	−0.064 (0.488)	−0.066 (0.476)	−0.066 (0.475)	0.039 (0.664)	0.040 (0.659)	−0.065 (0.483)
<i>Firm age → CRS</i>		0.104 (0.241)	0.104 (0.236)	0.095 (0.273)			0.105 (0.241)	0.095 (0.272)	0.097 (0.259)	0.097 (0.260)	0.105 (0.240)	0.105 (0.241)	0.097 (0.260)
<i>Firm size → CRS</i>		0.114 (0.278)	0.006 (0.962)	−0.036 (0.753)			0.114 (0.278)	−0.050 (0.660)	−0.059 (0.607)	−0.058 (0.612)	0.116 (0.271)	0.115 (0.275)	−0.056 (0.626)
<i>iC_effect → CRS</i>		−0.033 (0.697)	−0.013 (0.879)	0.016 (0.848)			−0.033 (0.697)	0.019 (0.817)	0.017 (0.836)	0.017 (0.839)	−0.033 (0.697)	−0.033 (0.700)	0.017 (0.840)
<i>Indtype → VCO</i>					−0.032 (0.716)	−0.040 (0.609)	−0.060 (0.441)	−0.062 (0.428)	−0.100 (0.197)	−0.084 (0.288)		−0.058 (0.455)	−0.091 (0.246)

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(continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13
	SW	CLIMATE-RISK MANAGEMENT STRATEGIES (CRS)			VALUE CO-CREATION (VCO)						STAKEHOLDERS' WELLBEING (SW)		
<i>Firm age → VCO</i>					0.082 (0.355)	−0.003 (0.967)	0.020 (0.796)	0.022 (0.781)	0.021 (0.781)	0.013 (0.868)		0.021 (0.791)	0.012 (0.881)
<i>Firm size → VCO</i>					0.003 (0.976)	0.026 (0.751)	−0.061 (0.504)	−0.070 (0.438)	−0.098 (0.270)	−0.070 (0.440)		−0.060 (0.509)	−0.070 (0.440)
<i>iC_effect → VCO</i>					0.026 (0.756)	0.063 (0.402)	0.045 (0.545)	0.045 (0.542)	0.056 (0.439)	0.083 (0.263)		0.046 (0.532)	0.072 (0.330)
<i>Indtype → SW</i>	0.101 (0.276)										0.093 (0.308)	0.131 (0.120)	0.130 (0.128)
<i>Firm age → SW</i>	0.026 (0.775)										0.003 (0.978)	−0.009 (0.911)	−0.010 (0.907)
<i>Firm size → SW</i>	0.093 (0.390)										0.070 (0.516)	0.105 (0.284)	0.103 (0.301)
<i>C_effect → SW</i>	−0.076 (0.389)										−0.068 (0.434)	−0.097 (0.221)	−0.100 (0.218)
MODEL FIT INDICES													
<i>CFI</i>	0.956	0.980	0.980	0.979	0.960	0.954	0.962	0.937	0.910	0.910	0.972	0.960	0.910
<i>TLI</i>	0.936	0.971	0.973	0.973	0.948	0.937	0.952	0.925	0.900	0.900	0.963	0.951	0.901
<i>IFI</i>	0.958	0.980	0.981	0.980	0.962	0.955	0.963	0.939	0.912	0.912	0.973	0.961	0.912
<i>RMSEA</i>	0.056	0.039	0.034	0.032	0.050	0.057	0.045	0.050	0.051	0.050	0.039	0.041	0.047
<i>χ²/df</i>	1.443 (<0.01)	1.210 (<0.01)	1.160 (<0.01)	1.143 (<0.01)	1.359 (<0.01)	1.461 (<0.01)	1.284 (<0.01)	1.345 (<0.01)	1.362 (<0.01)	1.348 (<0.01)	1.214 (<0.01)	1.242 (<0.01)	1.307 (<0.01)

*Bootstrap 5000 with 95% confidence intervals. Standardised coefficients (p-value) are reported.

NM = non-market collaboration with government and regulatory bodies; SH = shareholders' pressure; CRS = climate-risk management strategies; COC = collaborative communications; VCO = value co-creation; SW = stakeholders' wellbeing; iC_effect = likelihood of climate change related events affecting the sector in which the firm operates; indtype = industry-type.

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