Driving sustainable business performance: The roles of circular economy policy, stakeholder pressure, and green culture

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A B S T R A C T

The aim of this study is to examine how circular economy policy (CEP) and stakeholder pressure (SP) influence sustainable business performance (SBP), with green business innovation (GBI) and top management commitment (TMC) acting as mediators and green culture (GC) as a moderator. Drawing on the Resource-Based View, Institutional Theory, and the Attention-Based View, the study proposes and tests an integrated research framework using survey data from 468 firms in Vietnam, an emerging economy facing increasing environmental and regulatory pressures. Partial least squares structural equation modeling (PLS-SEM) was used to analyze the data. The findings show that CEP and SP both have positive effects on GBI and TMC, indicating that regulatory and stakeholder forces jointly encourage sustainability-related strategies. GBI also positively influences TMC, suggesting that engagement in green innovation strengthens managers' commitment over time. TMC has the strongest direct effect on SBP and plays a key role in linking external pressures and innovation activities to sustainable performance outcomes. In addition, green culture strengthens the effects of CEP and SP on GBI but does not significantly moderate their effects on TMC, implying that top management commitment is more responsive to external pressures than to organizational culture. Overall, the study contributes to the sustainability management literature and provides practical implications for policymakers and managers seeking to enhance long-term sustainable business performance.

1. Introduction

The urgency of sustainable development has intensified as industrial expansion accelerates environmental degradation and resource depletion (Rockstrom et al., 2009), while climate change enforces stricter environmental practices. In this context, governments, international organizations, and civil society increasingly emphasize the circular economy - a model that reduces waste and maintains resources in continual use (Geissdoerfer et al., 2017; Kirchherr et al., 2017). Firms are therefore under growing pressure from regulators, consumers, and stakeholders to adopt circular strategies through reuse, recycling, and eco-design.

Stakeholder demands are central to this transition, as heightened expectations from customers, investors, and NGOs encourage green innovations (Rui and Lu, 2021). However, external pressure alone is insufficient; firms must also develop internal capabilities. Embedding environmental values into organizational culture is crucial for fostering sustainable orientations (Zhang et al., 2020). Likewise, investing in green business innovation (for example, developing eco-friendly products or cleaner production methods) gives firms the concrete tools to carry sustainability into practice. In combination, a strong green culture and active innovation practices enable firms to convert stakeholders and regulatory pressures into lasting improvements in environmental performance (Zhang et al., 2020).

Despite a growing literature on circular economic policies and stakeholder influence, important gaps remain. Much prior research has focused on the direct effects of circular economic regulations or stakeholder pressure on sustainability outcomes, with less attention to how these pressures generate results. In particular, the mediating role of top management commitment (TMC) is still underexplored. Top executives' engagement is

widely recognized as critical for driving environmental initiatives, as committed leadership is essential to implement new sustainability practices (Daily and Huang, 2001). Yet few studies have explicitly examined how TMC functions as a conduit through which external demands (from policy or stakeholders) translate into firm performance. Similarly, although a pervasive green organizational culture is understood to support sustainability goals (Zhang et al., 2020), its role in channeling stakeholder and institutional pressures into green innovations and performance gains has not been empirically verified in full.

To fill these gaps, the present study introduces and empirically examines a comprehensive model that brings together circular economy policy adoption (CEP), stakeholder pressure (SP), green culture (GC), green business innovation (GBI), and top management commitment (TMC) as antecedents of sustainable business performance. The model specifically explores the mediating roles of TMC and GBI in linking external pressures (CEP and SP) and organizational culture (GC) to performance outcomes. By doing so, it aims to illuminate the internal mechanisms and pathways through which institutional pressures are converted into tangible sustainability results.

By positioning top management commitment (TMC) as a connecting capability, the study adds to the Resource-Based View and institutional theory, showing how external demands can be converted into sustainable competitive advantage via innovation and organizational culture. In other words, committed leadership is conceptualized as the linchpin that harnesses stakeholder and policy demands to foster green innovation and build unique organizational resources. The findings carry practical implications, offering direction to managers as well as policymakers by highlighting the crucial role of executive leadership and corporate culture in turning circular economic mandates and stakeholder expectations into effective green practices. By clarifying the interplay between external drivers (regulations, stakeholder demands) and internal enablers (leadership commitment, green innovation, and culture), this study advances both theory and practice in sustainable business management.

2. Literature review and hypotheses development

Within the Resource-Based View (RBV), lasting advantage is believed to derive from firm-level resources that combine value, rarity, inimitability, and non-substitutability. In this regard, green business innovation (GBI) and top management commitment (TMC) are seen as strategic capabilities that strengthen firms' competitiveness and environmental performance (Dangelico and Pujari, 2010).

The perspective of institutional theory underscores the significance of coercive, normative, and mimetic pressures in directing how organizations behave. Regulatory requirements and stakeholders often stimulate green innovation as firms seek legitimacy and improved environmental outcomes (Delmas and Toffel, 2008; Liang et al., 2023).

From the perspective of upper echelons theory, corporate strategies are strongly influenced by executives' values and cognitive frameworks (Hambrick and Mason, 1984). Accordingly, in sustainability contexts, leadership vision and commitment become decisive factors in embedding environmental objectives within the organization's core activities (Aragón-Correa et al., 2008).

While each theoretical perspective provides a distinct explanation of sustainability behavior, their integration offers a more comprehensive understanding of how firms respond to environmental pressures. Institutional theory explains why organizations react to coercive and normative pressures - namely, to maintain legitimacy and satisfy stakeholder expectations. The Resource-Based View (RBV) and its natural-resource-based extension (NRBV), in contrast, describe how firms transform such external constraints into internal strategic capabilities such as green innovation and leadership commitment that enhance competitiveness. The Attention-Based View (ABV) complements both by illuminating the who - the cognitive processes through which top managers allocate attention and resources to sustainability issues.

In combination, these theories suggest that external institutional forces trigger organizational responses, but it is the firm's unique resources, capabilities, and managerial focus that determine whether such responses evolve into sustainable performance advantages. By linking macro-level institutional drivers, firm-level resources, and micro-level leadership attention, this study adopts an integrative lens that captures the full pathway from external pressures to internal transformation and performance outcomes.

2.1. Hypothesis development

Circular Economy Policy (CEP) can be viewed as a powerful institutional force that directs corporate strategies. From the perspective of institutional theory, coercive mechanisms such as government regulations and environmental standards compel firms to implement sustainable practices to preserve legitimacy and ensure long-term viability. Building on this, the Porter and Linde (1995) Hypothesis suggests that well-crafted environmental policies function not only as restrictions but also as catalysts for innovation, prompting firms to enhance efficiency, minimize waste, and explore new market opportunities. Instruments such as extended producer responsibility, recycling requirements, and eco-design regulations have been shown to push companies toward redesigning products and adopting cleaner production methods (Horbach, 2008; Geissdoerfer et al., 2017). Such policies

reshape firms' cost–benefit evaluations by making unsustainable practices less viable and simultaneously incentivizing the pursuit of greener alternatives. Therefore, it is reasonable to expect that:

H1: Circular economic policy positively influences green business innovation.

The effects of CEP are not limited to technological or operational innovation; they also extend to leadership behavior. Top management plays a central role in interpreting and responding to external institutional signals. López-Gamero et al. (2010) showed that regulatory frameworks can reshape managerial perceptions and lead to a more proactive stance toward sustainability. From the lens of the Natural Resource-Based View (NRBV), policy-induced pressure can encourage managers to recognize the strategic importance of green capabilities and allocate resources accordingly.

Commitment from top leaders is often a prerequisite for embedding sustainability into organizational routines (Daily and Huang, 2001). When regulations set clear expectations and penalties, senior managers are more likely to align strategic priorities with environmental objectives to safeguard corporate legitimacy and competitiveness. Accordingly, this study hypothesizes that:

H2: Circular economic policy positively influences top management commitment.

While regulatory policy provides coercive pressure, stakeholders such as customers, investors, and community groups exert normative and cognitive pressures that are equally influential. Stakeholder theory posits that firms cannot ensure long-term survival by focusing solely on shareholder value but must instead balance the expectations of multiple groups. Customers increasingly demand environmentally friendly products, investors emphasize ESG performance, and supply chain partners push for compliance with green standards.

Empirical studies confirm that stakeholder pressure is a significant antecedent of environmental innovation. For instance, Dangelico and Pujari (2010) highlighted how market demand for sustainable products spurs eco-innovation in product design. Similarly, Zhu et al. (2013) demonstrate that supplier and customer pressures propagate green practices across supply chains, creating systemic changes in industries. Hence, the following hypothesis is proposed:

H3: Stakeholder pressure positively influences green business innovation.

In addition, stakeholders demand directly shape managerial attitudes. Bansal and Roth (2000) argued that organizations are motivated to adopt environmental strategies to maintain legitimacy and reputation in the eyes of stakeholders. Buysse and Verbeke (2003) further show that proactive environmental strategies emerge when managers perceive stakeholders as highly salient. Thus, stakeholder pressures not only foster innovation but also strengthen leadership commitment. Therefore, we propose that:

H4: Stakeholder pressure positively influences top management commitment.

External pressures, however, do not always translate uniformly into organizational action. The effectiveness of regulatory and stakeholder demands depends heavily on the presence of internal enabling conditions, such as a strong green culture (GC). Organizational culture embodies shared values, norms, and assumptions that shape behavior. When sustainability-oriented values are deeply embedded, employees and managers are more receptive to external environmental demands and less resistant to change. Green culture also enhances absorptive capacity - the firm's ability to recognize, assimilate, and exploit new knowledge. A culture supportive of environmental initiatives allows firms to better interpret policy requirements and stakeholder expectations, integrating them into innovative solutions (Jose Chiappetta Jabbour, 2011; Fang et al., 2022). Thus, we expect that green culture strengthens these relationships as follows:

H5a: GC positively moderates the CEP → GBI relationship (stronger under high GC).
H5b: GC positively moderates the CEP → TMC relationship.
H5c: GC positively moderates the SP → GBI relationship.
H5d: GC positively moderates the SP → TMC relationship.

Green business innovation, once implemented, generates tangible benefits such as cost savings, enhanced reputation, and entry into new markets. These benefits, in turn, capture managerial attention and encourage deeper commitment to sustainability. The Attention-Based View explains that top managers prioritize issues that demonstrate visible success and relevance to organizational goals. Furthermore, the issue-selling mechanism highlights how employees can present innovative successes to senior leaders, thereby securing further support.

Empirical evidence supports this feedback loop. Ghisetti and Rennings (2014) showed that environmental innovations often yield profitability gains, providing concrete evidence to managers that sustainability is not only a moral imperative but also a business opportunity. Therefore, we propose the following hypothesis:

H6: Green business innovation positively influences top management commitment.

Upper Echelons Theory posits that firm outcomes mirror the orientations and values of top executives

(Hambrick and Mason, 1984). Leaders who prioritize environmental objectives are more likely to direct resources, establish priorities, and design incentives that advance sustainable business performance (SBP). Prior research further highlights that managerial commitment is essential for the effectiveness of environmental management systems and green supply chain initiatives (Melnyk et al., 2003; Zhu et al., 2005). Beyond operational benefits, active leadership engagement also strengthens financial outcomes, as firms with robust sustainability performance often achieve higher valuations, stronger resilience, and greater stakeholder confidence (Friede et al., 2015; Khan et al., 2016). Based on these arguments, the following hypothesis is developed:

H7: Top management commitment positively influences sustainable business performance.

While external pressures and innovation initiatives contribute to firm performance, their effects are largely realized through indirect pathways. Top management commitment (TMC) acts as a central mediating mechanism, transforming institutional demands into concrete strategic actions. Prior evidence shows that managerial responsiveness is critical in linking external pressures to organizational outcomes (Colwell and Joshi, 2013). Similarly, research by Aragón-Correa et al. (2020) highlighted that firms facing comparable regulatory requirements often achieve different levels of performance depending on the extent of leadership involvement. Hence, the study argues that:

H8a: TMC mediates the CEP → SBP relationship.
H8b: TMC mediates the SP → SBP relationship.
H8c: TMC mediates the GBI → SBP relationship.

Green business innovation plays a pivotal role in linking external pressures with leadership commitment. Building on the Porter and Linde (1995) Hypothesis, stringent regulations and stakeholder demands are not only constraints but also triggers for eco-innovation, which in turn strengthens competitiveness and encourages executive engagement. Recent meta-analytical evidence supports the view that regulatory measures consistently foster positive innovation outcomes across different contexts (Zhang et al., 2024). Empirical findings from China further demonstrate that stricter environmental policies enhance the efficiency of green innovation, underscoring innovation's function as a bridge that translates external requirements into managerial commitment (Su, 2025). Therefore, the study proposes that:

H9a: Green Business Innovation (GBI) mediates the relationship between circular economy policy (CEP) and Top Management Commitment to environmental performance (TMC).

H9b: GBI mediates the relationship between Stakeholder Pressure (SP) and TMC.

The proposed conceptual framework and the relationships between the variables are illustrated in Fig. 1.

3. Research methodology

This research adopted a quantitative approach to test the relationships outlined in the conceptual framework (Fig. 1). Grounded in the Resource-Based View, Stakeholder Theory, and Leadership Theory, the model investigates the effects of circular economy policy (CEP) and stakeholder pressure (SP) on green business innovation (GBI) and sustainable business performance (SBP). Top management commitment (TMC) is positioned as a mediating factor, while green culture (GC) is considered a moderator. Data was gathered through a structured survey targeting executives and managers from sectors with significant environmental impact, including manufacturing, energy and utilities, transportation and logistics, construction, and agriculture and food processing. Because the model involves multiple constructs and mediating effects, structural equation modeling (SEM) with a partial least squares approach (PLS-SEM) was chosen for hypothesis testing.

The empirical context covered firms in manufacturing, energy and utilities, transportation and logistics, construction, and agriculture and food processing, recognized for their significant environmental footprint. A purposive sampling strategy ensured the inclusion of participants with practical knowledge in sustainability management, circular economy practices, and regulatory compliance. Respondents were primarily senior and mid-level managers overseeing strategic planning, operations, and sustainability-related activities. Purposive sampling was intentionally employed because expertise in sustainability management is not uniformly distributed across firms. The study sought respondents who possess practical experience in implementing or supervising environmental initiatives, as they can provide more informed and reliable assessments of firm-level practices. This approach is consistent with previous sustainability research (Colwell and Joshi, 2013), which emphasizes the importance of knowledgeable informants for perceptual data. Although non-probability sampling may limit statistical generalizability, it enhances the validity and relevance of insights drawn from specialized managerial perspectives.

Data was gathered through an online survey between March and April 2025. A total of 538 questionnaires were returned, of which 468 were retained after excluding incomplete or invalid responses. This sample size comfortably exceeded the recommended threshold for PLS-SEM, providing sufficient statistical power for model testing (Hair et al., 2019).
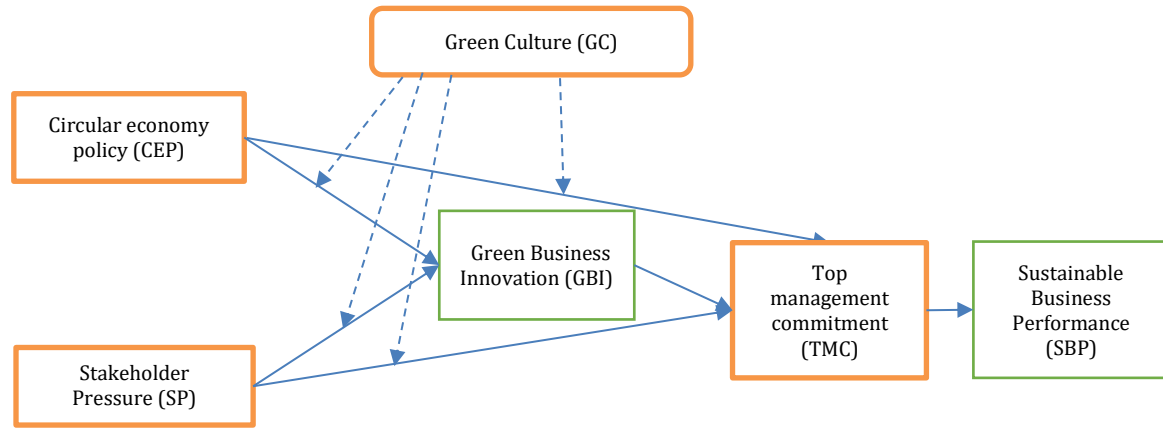
Fig. 1: Conceptual framework

All study constructions were measured using established multi-item scales adapted from prior research, with minor contextual adjustments. Responses were rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). To enhance clarity and content validity, a pilot test involving 50 managers was conducted. Feedback led to small revisions in wording, while the overall structure of the scales was preserved.

Table 1 summarizes the constructions, measurement sources, and number of items used in the survey.

Table 1: Measurement of constructions

Construct	No. of Items	Reference	Description
Circular economy policy (CEP)	7	Kirchherr et al. (2017) and Megawati et al. (2024)	Adoption of circular principles in organizational policies, operations, and supply chains
Stakeholder pressure (SP)	6	Rodríguez-Espíndola et al. (2022) and Hwang et al. (2016)	External pressures from regulators, customers, communities, and investors
Green culture (GC)	6	Fraj et al. (2011)	Shared organizational values, norms, and orientation toward environmental sustainability
Green business innovation (GBI)	8	Xu et al. (2024)	Product, process, and business model innovations driven by ecological considerations
Top management commitment (TMC)	4	Menguc and Ozanne (2005)	Leadership support, resource allocation, and prioritization of sustainability in strategy
Sustainable business performance (SBP)	8	Rodríguez-Espíndola et al. (2022) and Megawati et al. (2024)	Triple bottom line outcomes across economic, environmental, and social dimensions

Data analysis was performed using SmartPLS 4.0, following the standard two-stage procedure recommended in the SEM literature: (1) assessment of the measurement model and (2) evaluation of the structural model (Hair et al., 2019).

Measurement Model Assessment: Reliability was tested using Cronbach's alpha and composite reliability (CR). Convergent validity was evaluated through factor loadings and average variance extracted (AVE), while discriminant validity was assessed using the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio.

Structural Model Assessment. The structural model was evaluated using path coefficients and R^2 statistics. To assess the significance of direct, indirect, and total relationships, bootstrapping with 5,000 subsamples was employed. Predictive relevance (Q^2) was also analyzed to verify the model's forecasting power.

4. Results and discussion

Findings confirmed that all constructions achieved acceptable levels of reliability and validity. Both Cronbach's alpha and composite reliability (CR) exceeded the 0.70 threshold, factor loadings were above 0.70, and average variance extracted (AVE) values surpassed 0.50, indicating strong internal consistency and convergent validity (Fornell and Larcker, 1981).

Discriminant validity was verified using the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio: the square root of AVE for each construct was greater than its correlations with other constructs, and all HTMT values were below 0.85 (Henseler et al., 2015). Together, these results confirm that the measurement model demonstrates satisfactory reliability along with convergent and discriminant validity. Furthermore, to assess the potential issue of common method bias (CMB), the full collinearity assessment approach proposed by Kock (2015) was applied. The variant inflation factor (VIF) values for all constructions ranged from 1.660 to 2.790, which are well below the threshold of 3.3. Hence, common method bias is not considered a serious concern in this study. The detailed results of the measurement model assessment, including reliability and validity, are summarized in Table 2.

After establishing the reliability of the measurement model, the analysis advanced to the structural model to assess the proposed hypotheses. The results of the path coefficient analysis (Table 3 and Fig. 2) confirm that all direct effects are positive and statistically significant at the 1% level, strongly supporting the research hypotheses. For example, CEP has a strong positive effect on GBI (β = 0.430; t =

12.894; p < 0.001) and a smaller but still significant effect on TMC (β = 0.218; t = 4.610; p < 0.001). Similarly, SP has a positive effect on both GBI (β = 0.336; t = 10.065; p < 0.001) and TMC (β = 0.226; t = 5.391; p < 0.001). In terms of the moderating role, GC increased the impact of CEP on GBI (β = 0.144; t =

3.970; p < 0.001) and that of SP on GBI (β = 0.088; t = 2.799; p < 0.01). However, GC did not have a moderate effect on the relationship between CEP, SP, and TMC. This suggests that green culture mainly strengthens the relationships related to innovation, rather than managerial commitment.

Table 2: Measurement model results

Construct	Cronbach's α	CR	AVE	Indicator loading range	HTMT (max)	VIF range
CEP	0.921	0.922	0.678	0.776- 0.853	0.578	1.970 - 2.676
GBI	0.905	0.910	0.602	0.728- 0.861	0.674	1.727 - 2.790
GC	0.903	0.905	0.673	0.791- 0.854	0.467	1.985 - 2.594
SBP	0.912	0.917	0.621	0.712- 0.851	0.626	1.683 - 2.641
SP	0.898	0.901	0.662	0.753- 0.845	0.452	1.754 - 2.385
TMC	0.841	0.848	0.676	0.783- 0.868	0.046	1.660 - 2.198

The results of the mediation analysis also showed that TMC played a mediating role in the relationship between CEP, SP, GBI, and SBP; all paths were statistically significant (p < 0.001). At the same time, GBI was also a mediating variable between CEP and

SP with TMC, demonstrating that environmental practices and stakeholder pressure influence leadership commitment through green innovation motivation.

Table 3: Structural model results

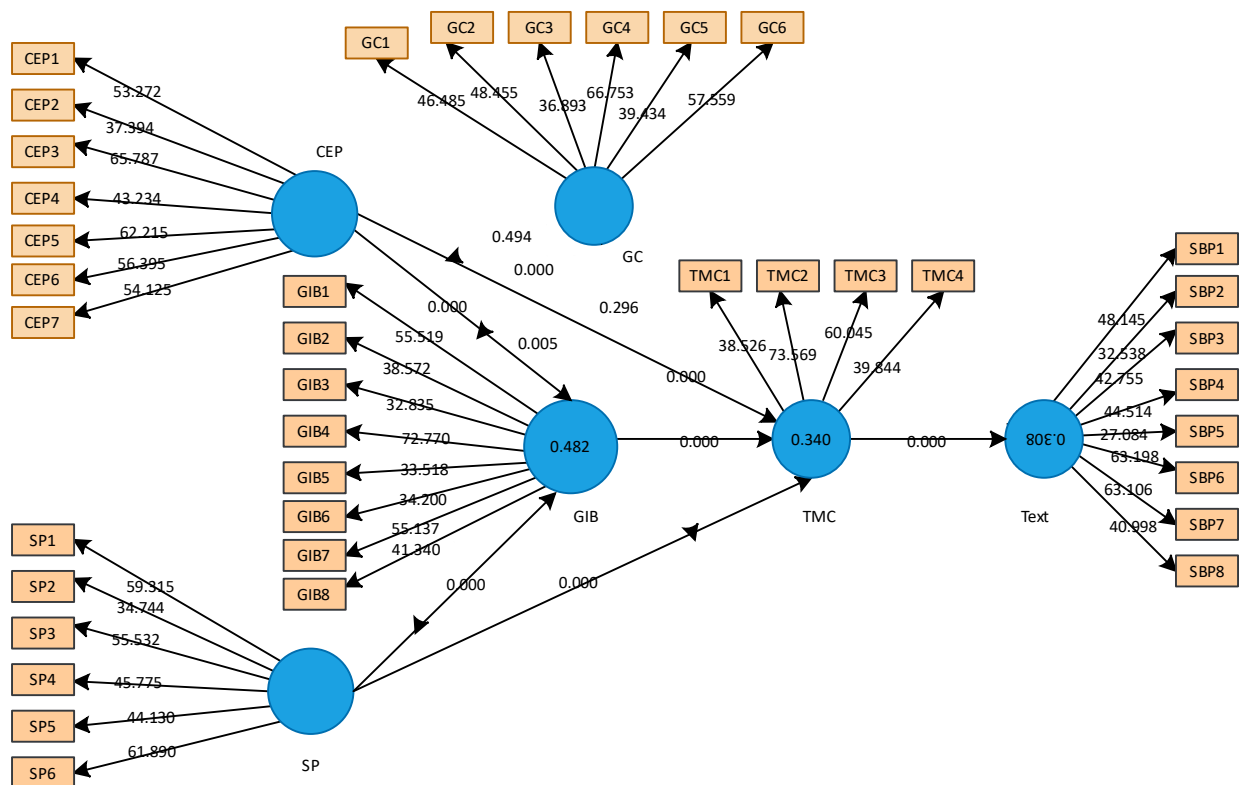| Hypothesis	Path	β	t- value	P-value	Results
H1	CEP -> GBI	0.430	12.894	0.000	Supported
H2	CEP -> TMC	0.218	4.610	0.000	Supported
H3	SP -> GBI	0.336	10.065	0.000	Supported
H4	SP -> TMC	0.226	5.391	0.000	Supported
H5a	GC x CEP -> GBI	0.144	3.970	0.000	Supported
H5b	GC x CEP -> TMC	0.027	0.684	0.494	Not supported
H5c	GC x SP -> GBI	0.088	2.799	0.005	Supported
H5d	GC x SP -> TMC	-0.039	1.044	0.296	Not supported
H6	GBI -> TMC	0.230	4.533	0.000	Supported
H7	TMC -> SBP	0.555	18.467	0.000	Supported
H8a	CEP -> TMC -> SBP	0.121	4.394	0.000	Supported
H8b	SP -> TMC -> SBP	0.125	5.174	0.000	Supported
H8c	GBI -> TMC -> SBP	0.128	4.274	0.000	Supported
H9a	CEP -> GBI -> TMC	0.099	4.193	0.000	Supported
H9b	SP -> GBI -> TMC	0.077	4.234	0.000	Supported

Fig. 2: Structural model

The results also show that the model explains a considerable share of the variance in the dependent variables. More precisely, circular economy policy (CEP), stakeholder pressure (SP), and green culture (GC) collectively explained 48.2% of the variance in green business innovation (GBI). Furthermore, GBI together with SP accounted for 34.0% of the variance in top management commitment (TMC), whereas GBI and TMC jointly explained 30.8% of the variance in sustainable business performance (SBP) (Table 4). According to the guidelines of Hair et al. (2019), these R^2 values reflect moderate to strong explanatory power. The Q^2 values obtained from the blindfolding technique are all positive (GBI = 0.464; TMC = 0.296; SBP = 0.279), confirming the predictive ability of the model. These results demonstrate that the model not only explains the data well but also has high predictive ability, emphasizing the robustness of the model in exploring the drivers of sustainable business performance.

Table 4: Model explanatory power and predictive relevance

Endogenous construct	R^2	Q^2
GBI	0.482	0.464
SBP	0.308	0.279
TMC	0.340	0.296

The findings indicate that circular economy policies (CEP) significantly foster green business innovation (GBI), supporting H1. This aligns with the Porter and Linde (1995) Hypothesis, which holds that well-designed environmental regulations can spur efficiency and technological innovation. Consistent with this, Dangelico (2016) identified environmental regulations as key external drivers of green innovation. In Vietnam, for example, new laws on extended producer responsibility have pushed firms to adopt closed-loop practices – such as recycling packaging and reducing plastic waste – thereby catalyzing product and process innovations. These real-world responses mirror the theoretical expectation that regulatory pressures (like CEP) serve as a catalyst for eco-innovations.

Similarly, the study finds that stakeholder pressure (SP) positively affects GBI, confirming H2. This is in line with stakeholder theory and institutional theory, which posit that firms must heed the demands of customers, communities, regulators, and investors to maintain legitimacy. In practice, heightened societal demands for environmental transparency and corporate responsibility compel firms to innovate green solutions. Empirical studies show that as stakeholder pressure intensifies, particularly from governments and customers, firms tend to increase their engagement in green innovation (Phan and Baird, 2015; Testa and Iraldo, 2010). Such findings are consistent with the evidence from China's manufacturing sector reported by Zhu et al. (2007), as well as with subsequent studies highlighting how external pressures drive the adoption of greener organizational practices and sustainable supply chain innovations (Zhu et al., 2013).

The study's analysis also reveals that both CEP and SP raise top management commitment (TMC) to environmental goals. Hypotheses H3 and H4 are supported: firms under stricter circular economic regulations report stronger leadership pledges towards sustainability, and firms facing greater stakeholder scrutiny likewise see their executives deepen green commitments. This finding fits an institutional view: governments and regulators exert coercive pressures that push firms to formalize environmental strategies as a matter of legitimacy. Likewise, stakeholder salience theory suggests managers will prioritize issues raised by stakeholders who are powerful, legitimate, and urgent. In effect, when customers or community activists press for green action, leaders respond by integrating those concerns into corporate strategy. For example, recent studies find that leaders with visibility of stakeholder expectations (and who perceive them as urgent) increase their support for sustainability initiatives. In sum, this study indicates that external pressures – whether from policy or stakeholder demands – motivate top management to publicly commit to green innovation strategies.

The study further observes the conditional effect of organizational culture. A strong green organizational culture (GC) amplifies the positive impact of CEP and SP on innovation (supporting H5a and H5c) but does not significantly change their influence on leadership commitment (H5b and H5d unsupported). Resource-based and natural-resource-based views suggest that culture is an intangible resource: a deeply ingrained pro-environmental ethos enables a firm to better leverage external demands for competitive gain. Consistent with this, firms with robust environmental cultures are more adept at converting regulatory and stakeholder pressures into concrete innovative outcomes. By contrast, it is found that leadership commitment appears less sensitive to culture. This implies that managers' attention is initially grabbed by the external signals themselves (policy mandates or stakeholder urgings) rather than by internal norms. Such a result is in line with attention-based theory: executives first respond to pressing signals from outside the firm, and only subsequently (if at all) does existing culture shape the nuances of their response. In effect, while a "green" culture helps push through innovation projects once started, it does not significantly alter the initial effect of external pressures on executive priorities. The absence of a significant moderating effect of green culture on the relationship between external pressures and top management commitment warrants further reflection. One plausible explanation lies in the temporal nature of cultural influence. In emerging markets such as Vietnam, regulatory compliance and stakeholder legitimacy often demand immediate managerial attention, while the development of a deeply rooted green culture is a gradual process. As a result, executives may prioritize short-term responses to coercive or normative pressures rather than draw

upon cultural norms when committing to sustainability actions. Another possible reason is that leadership commitment represents a cognitive and strategic response, which tends to be driven more by external incentives and perceived risks than by value-based internal motivations. Hence, while a strong green culture facilitates innovation processes, it may not directly shape the initial managerial decision to commit resources under external scrutiny.

Interestingly, the study's results show that successful green innovation positively influences leadership; GBI has a positive effect on TMC, supporting H6. In practice, this reflects a "learning-by-doing" dynamic. When eco-innovations yield cost savings, market rewards, or reputational gains, executives take notice and reinforce their commitment to sustainability. This is broadly consistent with the dynamic capability's perspective: firms build confidence (and capabilities) through successful innovation, leading leaders to allocate even more resources to green projects. In other words, demonstrated innovation success legitimizes further top-down support – managers learn from results and thus raise their sustainability ambitions.

Among the examined predictors, top management commitment demonstrated the strongest influence on sustainable business performance, thereby supporting hypothesis H7. The structural results show that the path coefficient from leadership commitment to sustainability outcomes is the highest, underscoring the pivotal role of senior executives in shaping environmental and social achievements. Prior research highlights that managerial involvement is indispensable for embedding sustainability into corporate practices and advancing green initiatives. For instance, Daily and Huang (2001) emphasized the importance of leadership support in implementing environmental management practices, while Colwell and Joshi (2013) showed that top management commitment significantly enhances corporate ecological responsiveness and overall performance. Consequently, organizations whose executives actively champion environmental objectives and integrate them into the core business strategy are more likely to convert innovation into sustainable results. This finding is consistent with Aragón-Correa and Sharma (2003), who argued that without proactive leadership engagement, it is difficult for firms to achieve both environmental and financial goals.

Finally, our mediation analyses clarify how these relationships unfold (supporting H8a–H8c and H9a–H9b). The study finds that the effect of CEP and SP on SBP operates largely through TMC: in other words, external pressures only improve sustainability performance when leaders actively pursue environmental strategies. This reinforces Delmas and Toffel's (2004) insight into the fact that policy impacts depend on managerial engagement. Similarly, we observe a chained mediation (CEP/SP → GBI → TMC → SBP): policies and pressures spur green innovations, which in turn increase leadership commitment, culminating in higher sustainable performance. This chain effect highlights innovation as the bridge between external demand and executive action – green innovation becomes the evidence-based foundation that earns executives' strategic trust and fuels their further commitment.

Overall, these findings illuminate the mechanism by which external drivers (regulations and stakeholder demands) translate into real performance gains via innovation and leadership. Our results add empirical support to the Porter and Linde (1995) Hypothesis in a circular-economy context, and they underscore the importance of intangible assets (culture) and dynamic capabilities in enabling sustainability. They also enrich stakeholder and institutional theories by detailing how different pressures funnel through organizational processes. By tracing these pathways, we offer a comprehensive picture of how strategic environmental management unfolds - from pressure to innovation to leadership to performance.

5. Theoretical and practical implications

This study contributes to several theoretical perspectives. The evidence on the effects of circular economy policies supports the Porter and Linde (1995) hypothesis, indicating that environmental regulations can stimulate innovation in emerging markets. The findings also reinforce Stakeholder Theory and Institutional Theory by showing that external pressures not only promote green innovation but also strengthen managerial commitment. In addition, the results extend the Resource-Based View (RBV) and the Natural Resource-Based View (NRBV) by identifying green culture as an intangible resource that enhances innovation. Its limited influence on leadership is consistent with the Attention-Based View. Furthermore, the reciprocal relationship between innovation and leadership supports dynamic capabilities theory and highlights the mediating role of leadership in converting external pressures into sustainable outcomes (Delmas and Toffel, 2008).

The findings have important implications for policymakers and firms. Policymakers should design circular economy policies that combine regulatory enforcement with incentives, such as tax benefits, green financing, and pilot programs, to encourage both compliance and innovation. For firms, external pressures should be viewed as opportunities to improve competitiveness, with leaders interpreting stakeholder demands as strategic signals. Developing a green organizational culture through training and incentive systems can transform external pressures into innovation, while integrating sustainability objectives into corporate governance can reduce the risk of greenwashing. Small and medium-sized enterprises (SMEs) can begin with small-scale initiatives to build credibility and gradually strengthen leadership commitment.

6. Conclusion

The model shows that circular economy policies (CEP) and stakeholder pressure (SP) are key drivers of green innovation and top management commitment. Green culture (GC) mainly moderates the effects of policies and external pressure on innovation. Green business innovation (GBI) both influences and is strengthened by top management commitment, which plays a central role in translating external drivers into sustainable performance. Overall, these findings extend existing theories and offer practical implications for both policy and managerial decision-making.

Despite its theoretical and empirical contributions, this study has several limitations. First, the cross-sectional research design limits causal inference. Future studies using longitudinal data could better capture how policy pressure, innovation, and leadership commitment change over time. Second, the use of purposive sampling, although helpful in targeting knowledgeable respondents, may reduce the generalizability of the findings across industries. Third, while diagnostic tests indicate that common method bias is not a limited concern, reliance on self-reported data from a single survey may still introduce perceptual bias. This issue could be addressed in future research through multi-source or time-lagged data. Fourth, the study focuses on firms in Vietnam, which operate within specific institutional and cultural contexts. Comparative research across countries or economic systems could examine whether the proposed relationships hold under different regulatory environments. Finally, future studies could extend the model by including additional moderators, such as digital transformation capability, environmental regulation stringency, or leadership style, to provide a more detailed understanding of how sustainability-oriented strategies lead to performance outcomes.

List of abbreviations

ABV	Attention-based view
AVE	Average variance extracted
CMB	Common method bias
CEP	Circular economy policy
CR	Composite reliability
ESG	Environmental, social, and governance
GBI	Green business innovation
GC	Green culture
HTMT	Heterotrait–monotrait ratio
NGOs	Non-governmental organizations
NRBV	Natural resource-based view
PLS-SEM	Partial least squares structural equation modeling
Q^2	Stone–Geisser's Q-square
R^2	Coefficient of determination
RBV	Resource-based view
SBP	Sustainable business performance
SEM	Structural equation modeling
SMEs	Small and medium-sized enterprises
SP	Stakeholder pressure
TMC	Top management commitment
VIF	Variance inflation factor

Compliance with ethical standards

Ethical considerations

The study adhered to ethical guidelines for research involving human participants. All participants were informed about the purpose of the study and provided their voluntary consent before participating. No personally identifiable information was collected, and data was anonymized to ensure confidentiality. The research protocol was reviewed and deemed exempt from formal ethics committee approval due to the non-invasive nature of the survey and the anonymity of responses.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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