MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 796-805

From ESG Practices to Competitive Advantage: The Mediating Role of Green Process Innovation and the Moderating Effect of Organizational Commitment

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Abstract

Purpose – This research investigates the impact of environmental, social, and governance (ESG) practices on competitive advantage. It further explores green process innovation (GPI) as a mediating factor within this relationship. Additionally, the study analyzes organizational commitment as a moderator that can either enhance or mitigate the effect of ESG practices on GPI and, ultimately, on competitive advantage. The focus of the study is on public sector energy companies in India.

Design/methodology/approach – Online survey data was collected form 300 working professional belonging to Indian public sector energy enterprises. Data was gathered via a structured survey conducted between September and December 2024. The conceptual model was developed and tested using partial least square structural equation modelling (PLS-SEM)

Findings – The findings indicate that ESG practices have a significant and positive effect on both green process innovation and competitive advantage. Additionally, green process innovation serves as a partial mediator in the relationship between ESG practices and competitive advantage, thus enhancing the strategic impact of adopting ESG initiatives. Furthermore, the moderating analysis demonstrates that organizational commitment significantly strengthens the connection between ESG practices and green process innovation.

Originality/value – This study enhances the existing literature on ESG practices within public sector enterprises, specifically in the energy sector. We offer new insights into the practical implementation of ESG efforts to achieve a sustainable competitive advantage in resource-intensive industries like energy. Our findings provide actionable recommendations for policymakers and managers seeking to align sustainability initiatives with organizational performance goals.

Keywords: Environmental; Social; Governance; Competitive Advantage; Green Process Innovation; Organizational Commitment: Energy Sector

1. Introduction

India's energy sector has undergone a significant transformation, with a growing focus on renewable energy to advance sustainability goals (IBEF, 2023). Over the past decade, the country has made notable progress in diversifying its energy portfolio, gradually reducing dependence on fossil fuels and setting an ambitious target of achieving 500 GW of non-fossil fuel energy capacity by 2030 (EY, 2024). Additionally, at the 26th United Nations Framework Convention on Climate Change (COP26) in November 2021, India pledged to achieve net zero emissions by 2070. The Union Budget of India 2025 announced tax incentives for net zero targets and sustainability-linked investments, coupled with a plan to replace coal with renewable energy in 81 thermal units by 2026, underscoring the government's commitment to a low-carbon transition. This commitment highlights the immense potential of the renewable energy sector, not only in building a cleaner future but also in unlocking broader opportunities for economic growth and innovation.

ESG is no longer viewed solely as a compliance requirement but as a vital driver of long-term value creation, risk mitigation, and corporate resilience (Nazir et al., 2024). ESG practices help firms enhance innovation capacity, reduce reputational and operational risks, and improve resilience in volatile markets (Ahmad et al., 2023). These benefits are particularly relevant for public sector energy enterprises in India, which face mounting pressures from regulators, investors, and civil society to act responsibly and transparently.

Parallel to the rise of ESG, green process innovation (GPI) has become an essential driver of sustainable competitiveness. Defined as the advancement of manufacturing and operational processes aimed at minimizing environmental harm (Chang, 2011), GPI focuses on reducing hazardous emissions, improving energy efficiency, and minimizing waste. These innovations not only help firms comply with environmental regulations but also enable them to gain a competitive edge through cost savings, resource optimization, and sustainable branding (Porter and van der Linde, 1995). Within this context, competitive advantage plays a central role. It represents a firm's ability to outperform competitors by delivering superior value through cost leadership, product differentiation, or niche strategies. Building on this, Barney (1991) posits that a firm achieves competitive advantage when it possesses resources that are valuable, rare, inimitable, and non-substitutable (VRIN). These resources, often shaped by sustainability practices and innovation capabilities, enable firms to secure a superior performance position. Furthermore, Teece et al. (1997) emphasize dynamic capabilities, a firm's capacity to integrate, build, and reconfigure internal and external competencies in response to changing environments, as a key driver of sustained competitive advantage. While the individual benefits of ESG practices and green process innovation are well documented globally (Boffo and Patalano, 2020; Chang, 2011), limited empirical research exists on their integrated impact, particularly within emerging economies such as India. Scholars have recently emphasized the importance of understanding how ESG adoption contributes to innovation-driven performance (Gillan et al., 2021). While green finance and innovation are shown to reduce environmental degradation, their direct linkage to organizational performance outcomes needs to be addressed in a comprehensive manner, particularly in public sector enterprises (Kumar et al., 2024). Moreover, most existing studies concentrate on CSR, green innovation, or ESG

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disclosure in isolation, often within the private sector (Mukhtar et al., 2024). Additionally, the Indian context presents unique challenges, including regulatory transitions, carbon emission targets, and green finance mechanisms, that merit independent investigation (Yadav and Dahiya, 2025).

Prior studies (Rahman et al., 2023; Baah et al., 2024) suggest that ESG performance contributes to competitive differentiation through innovation. Competitive advantage refers to a firm's ability to outperform peers by delivering superior value or achieving operational efficiencies (Porter, 1995). To attain sustained competitive advantage, top management support is increasingly important in today's global environment. Top management plays a decisive role in shaping and implementing sustainability strategies. Prior studies show that both managerial and non-managerial employees are more likely to commit to and engage with ESG practices when they perceive strong support from top management (Ramires and Veselova, 2024). A holistic understanding of how TMS drives ESG practices and how these practices translate into competitive advantage, particularly in resource-intensive and policy-driven sectors like energy, is still lacking.

To bridge this gap, the present study empirically investigates the impact of Environmental, Social, and Governance (ESG) practices on green process innovation and competitive advantage, with a specific focus on the Indian energy sector. Moving beyond a compliance-oriented perspective, this research advances understanding of ESG practices as strategic enablers of innovation and superior performance in emerging economies. Importantly, the study incorporates organizational commitment as a moderating variable, positing that a higher level of collective commitment among employees strengthens the effectiveness of ESG practices in driving green process innovation and, ultimately, competitive advantage.

2. Hypotheses Development

2.1 Environmental, Social, Governance practices and green process innovation Environmental practices, such as minimizing material waste and reducing energy consumption, enable companies to achieve cost savings while enhancing process efficiency (Xu, 2024). The implementation of environmental management practices fosters the adoption of cleaner production technologies and sustainable operational processes, which collectively contribute to a reduced ecological footprint of manufacturing activities (Wang and Liu, 2022). Green process innovation yields long-term financial and operational benefits by optimizing resource utilization and minimizing production costs.

Firms that prioritize social responsibility emphasize ethical sourcing, fair labor practices, and employee engagement, all of which play a critical role in fostering process efficiencies and sustainable production methods (Yuan and Cao, 2022). By embracing strong social practices, organizations can enhance trust, collaboration, and shared values, thereby facilitating the emergence of environmentally friendly process innovations (Shad et al., 2019). Employees who feel valued and supported are more inclined to contribute ideas and engage in sustainability initiatives, leading to process improvements that reduce waste and resource consumption (Le, 2020).

Effective governance provides the necessary oversight and strategic direction for integrating environmental considerations into operational processes, promoting the adoption of green process innovations (Shad et al., 2019). Corporate governance mechanisms, including board oversight, sustainability committees, disclosure policies, and ethical compliance frameworks, ensure that environmental sustainability is integrated into business operations (Dwekat et al., 2025). These mechanisms encourage firms to embrace green process innovations by ensuring regulatory compliance, managing environmental risks, and responding effectively to stakeholder expectations.

H_1: Environmental, Social and Governance (ESG) Practices have a significant positive relationship with green process innovation

2.2 Environmental, Social, Governance practices and competitive advantage

Firms that adopt eco-friendly production processes enjoy reduced operating costs by enhancing energy efficiency and minimizing waste. Chen et al. (2006) found that green innovation not only reduces production waste but also improves resource productivity, ultimately leading to increased profitability and a stronger competitive advantage. Moreover, companies that invest in sustainable supply chains and green process innovations cultivate long-term resilience against market fluctuations and resource scarcity. Today, green management is widely acknowledged as a profitable strategy that offers first-mover advantages in sectors where sustainability is a crucial differentiator (Hart, 1995).

Organizations that emphasize social practices—such as fair wages, work-life balance, and employee well-being—experience heightened employee engagement and productivity (Lu et al., 2023). Research indicates that firms with robust social policies report lower turnover rates and greater innovation, which ultimately enhances their overall performance (Huselid, 1995). Furthermore, strong social practices facilitate compliance with labor laws, diversity policies, and ethical sourcing standards, thereby lowering legal risks and bolstering the company's reputation (Liao et al., 2015).

Companies that prioritize strong governance practices tend to attract more investors and gain improved access to capital. Studies suggest that firms with transparent governance structures consistently outperform their competitors in financial markets (Gompers et al., 2003). Additionally, having independent and diverse boards strengthens strategic decision-making and innovation, thus fostering corporate adaptability and competitiveness (Liao et al., 2015). Furthermore, companies recognized for their ethical governance cultivate greater brand loyalty and stakeholder trust, as consumers and business partners tend to prefer organizations with a proven commitment to ethical business conduct, contributing to a sustained competitive edge (Eccles et al., 2012).

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H_2: Environmental, Social and Governance (ESG) Practices have a significant positive relationship with competitive advantage

2.3 Green process innovation and competitive advantage

Green process innovation is closely aligned with the resource-based view (RBV) of the firm, which asserts that unique and valuable resources, such as sustainable production methods, can provide businesses with a competitive advantage (Barney, 1991). Moreover, Porter's Competitive Advantage Theory (Porter and van der Linde, 1995) indicates that when environmental initiatives are strategically integrated into business operations, they can enhance productivity and promote innovation, ultimately leading to advantages in cost leadership and differentiation. By investing in green process innovation, companies cultivate capabilities that are challenging for competitors to replicate, thereby establishing a sustainable competitive edge. Firms that adopt sustainable manufacturing processes can lower production costs while simultaneously improving product quality, which contributes to a competitive advantage in pricing and operational excellence (Zeng et al., 2011).

H_3: Green process innovation has a significant positive relationship with competitive advantage

2.4 Mediating role of green process innovation

While environmental practices alone may not always produce immediate competitive benefits, their strategic value emerges when they foster green process innovations that enhance resource efficiency, reduce operational waste, and improve cost-effectiveness (Islam et al., 2024). Social practices similarly contribute to competitive advantage indirectly by cultivating a culture of innovation, ethical operations, and sustainable product differentiation. Furthermore, robust governance frameworks enable firms to prioritize long-term sustainability and allocate resources toward process innovation, leading to improved cost structures and strategic differentiation (Liao et al., 2015). In line with this, Martínez-Falcó et al. (2025) empirically established that environmental, social, and governance (ESG) strategies positively influence sustainable performance, with green innovation acting as a key mediating mechanism. Pinheiro et al. (2024) investigated the innovation ESG performance link in the energy sector across G20 nations. Their findings confirm that investment in R&D significantly boosts ESG performance, which subsequently improves both economic and financial performance, particularly in resource-intensive industries. This aligns with our model where green process innovation acts as a mechanism through which ESG practices enhance competitive advantage. Supporting this, Chang's (2011) study on the highlighted that corporate environmental ethics positively influence green product innovation, which, in turn, enhances competitive advantage. Hence, we postulate the following hypotheses:

H_4: Green process innovation will mediate the effect of ESG ((a)Environmental, (b) Social and (c) Governance) practices on competitive advantage

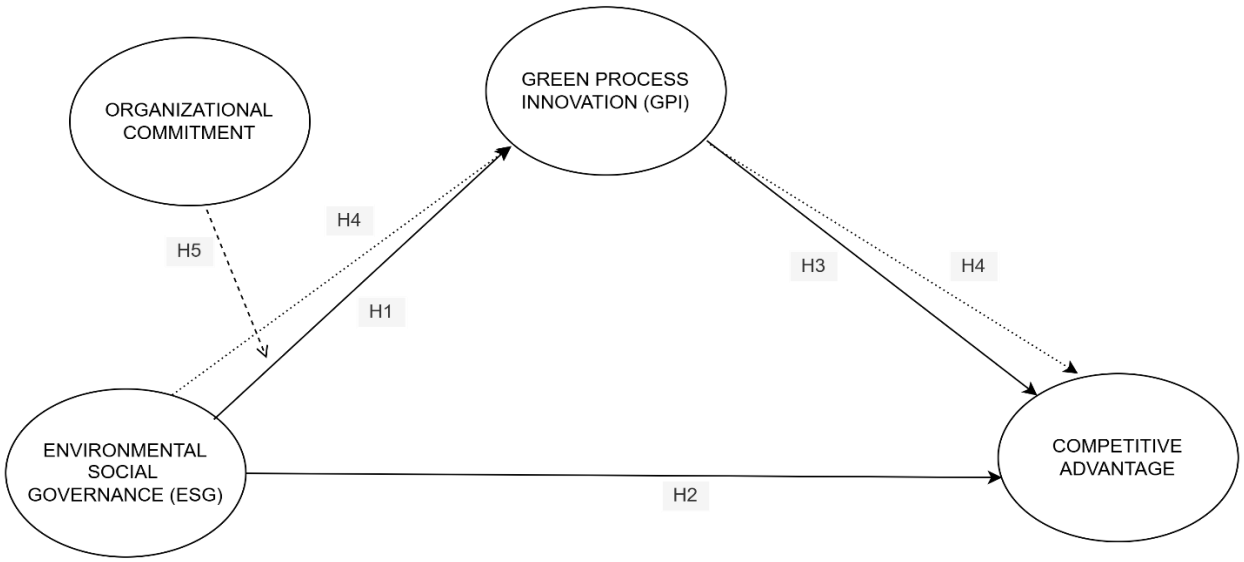

Figure 1: Conceptual Framework
Source: Authors Work

2.5 Moderating role of Organisational Commitment

A moderating effect occurs when a third variable influences the relationship between an independent variable and a dependent variable. Organizational commitment is vital for predicting positive employee behaviour that contribute to organizational success. It is defined as "the relative strength of an individual's identification with and involvement in a particular organization". It involves aligning one's self-concepts with the organizations. In addition, according to the empirical analysis results of Broadstock et al. the results of a meta-analysis of Bloomberg's ESG index on environmental responsibility activities, social responsibility activities, and governance activities confirmed that it had a positive effect on innovation capabilities, such as R&D activities, and financial performance, such as total profit. From these studies we formulate the following hypothesis:

H_5: Organizational Commitment moderates the relation between ESG ((a)Environmental, (b) Social and (c) Governance) practices on Green Process Innovation.

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3. Research Methodology

3.1 Measures and Items

The study utilized established measurement scales that had been used previously within the past literature. All variables Environmental, Social and Governance (ESG) practices, Green Process Innovation, Top management support and Competitive Advantage were measured using a five-point positive Likert scale ranging from "Strongly Agree" (5) to "Strongly Disagree" (1). In addition, other demographic details such as age, gender, educational qualification and organization's employee strength were also collected to understand the characteristics of respondents.

Environmental: The 4-item scale for environmental practices from Jin and Kim (2022) was applied. The items included, "Our company supports actual investments for environmental management"; and "Our company has a performance management and evaluation system for environmental management".

Social: The 4-item scale for social practices from Jin and Kim (2022) was applied. The items included, "Our company is evaluating the stakeholders' (partner firms) environmental, social, and governance (ESG) performance"; and "Our company is executing win-win partnership programs for stakeholders' growth.".

Governance: The 4-item scale for governance practices from Jin and Kim (2022) was applied. The items included, "Our company discloses information and issues gravely affecting organizational decision-making"; and "Our company performs continuous disclosures (publishing sustainability management reports) externally on its board of directors".

Green process innovation: The 3-item scale for green process innovation from Chang (2011) was applied. The items included, "The manufacturing process of the company reduces the use of raw materials"; "The manufacturing process of the company effectively reduces the emission of hazardous substances or waste" and "The manufacturing process of the company reduces the consumption of resources – non-renewable resources".

Competitive advantage: The 6-item scale for competitive advantage from Chang (2011) was applied. The items included, "The company has better managerial capability than the competitors"; and "The corporate image of the company is better than that of the competitors". Organisational Commitment: The 3-item scale for organizational commitment from Jeong et al., and Kang and Kang was applied. The items included, "I am proud to tell others that I am part of this organization.": "I would be very happy to spend the rest of my career with this organization." and " I am willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful."

3.2 Sample and Data Collection

The data for this study was collected through an online survey method, employing purposive sampling to target professionals working in public sector energy enterprises throughout India. The survey was conducted from September to December 2024, resulting in a total of 300 valid responses. An initial pilot test was carried out with 35 participants to validate the questionnaire and ensure clarity in the responses. Following this pilot, we meticulously reviewed and refined the questionnaire with the assistance of academic experts in management and industry specialists from the energy sector.

The data analysis was performed using SmartPLS 4.0 software, selected for its predictive capabilities and its robustness in handling complex models and small-to-medium sample sizes (Sarstedt et al., 2023). PLS-SEM was particularly well-suited for this study due to its focus on prediction and its flexibility regarding non-normal data distributions.

3.3 Descriptive Statistics

The gender distribution indicates a significant male dominance, with 91% of the respondents identifying as male (n=273) and 9% as female (n=27). In terms of age, most of the respondents (51%) belong to age group of 51 years and above (n = 153) followed by those aged 31–40 years (32%, n = 96). Respondents aged 41–50 years accounted for 12.67% (n = 38), while the 21–30 years age group constituted the smallest segment, representing 4.33% (n = 13).Regarding educational qualifications, a large proportion of the respondents were undergraduates (53.33%, n = 160). The rest comprised postgraduates (26.67%, n = 80), doctorate holders (11.67%, n = 35), and those categorized under others (8.33%, n = 25).This demographic profile suggests that the sample primarily consists of experienced, male, and undergraduate respondents, with a substantial portion in senior age brackets, indicating strong representation from mid-to-late career professionals in the sector under study.

Table 1: Descriptive Statistics

Characteristics	Categories	Frequency	Percentage
Gender	Male	273	91%
	Female	27	9%
Age (in years)	21-30 years	13	4.33%
	31-40 years	96	32%
	41-50 years	38	12.67%
	51 years and above	153	51%
Educational Qualification	Undergraduate	160	53.33%
	Postgraduate	80	26.67%
	Doctorate	35	11.67%
	Others	25	8.33%

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Source: Authors Work

4. Data Analysis and Results

4.1 Measurement Model Analysis

In the initial phase, the measurement model was evaluated to establish the reliability and validity of the indicators (see Table 2). All factor loadings were above the recommended threshold of 0.708, indicating strong item representation of their respective constructs (Hair et al., 2019). To further assess internal consistency, Cronbach's alpha and Composite Reliability (CR) values were calculated, both of which confirmed the reliability of the measurement scales. The results (Table 2) reveal that Cronbach's alpha and CR values are well above the threshold value of 0.70 (Hair et al., 2019) for all constructs, indicating the consistency of the items in measuring the underlying constructs. Convergent validity was established as the Average Variance Extracted (AVE) values for all constructs surpassed the minimum acceptable level of 0.50, indicating that each construct adequately captured the variance of its associated indicators (Hair et al., 2019).

Discriminant validity was further assessed using the heterotrait–monotrait (HTMT) ratio (see Table 2). All HTMT values were below the recommended threshold of 0.90, indicating adequate discriminant validity among the constructs. Although the HTMT value between ESG and Organizational Commitment was marginally above the strict criterion of 0.85, it remained within acceptable limits, suggesting conceptual relatedness without multicollinearity concerns. (Hair et al., 2019)

Table 2: Measurement Model Analysis

Constructs	Items	Factor Loadings	Cronbach's Alpha	CR	AV	VIF
Environmental (EV)	EV1	0.762	0.946	0.948	0.631	2.442
	EV2	0.833				3.533
	EV3	0.815				3.089
	EV4	0.802				2.735
Social (SC)	SC1	0.802				2.658
	SC2	0.816				3.155
	SC3	0.811				2.716
	SC4	0.786				2.899
Governance (GV)	GV1	0.850				3.382
	GV2	0.669				1.866
	GV3	0.804				3.346
	GV4	0.766				2.954
Green Process Innovation (GPI)	GPI1	0.892	0.913	0.915	0.852	2.510
	GPI2	0.945				4.477
	GPI3	0.931				3.765
Competitive Advantage (CA)	CA1	0.899	0.944	0.945	0.782	3.580
	CA2	0.851				2.809
	CA3	0.878				3.157
	CA4	0.896				3.683
	CA5	0.890				3.829
	CA6	0.889				3.719
Organizational Commitment (OC)	OC1	0.871	0.741	0.947	0.597	1.122
	OC2	0.728				3.411
	OC3	0.709				3.361

Notes: CR: Composite Reliability, AVE: Average Variance Extracted and VIF: Variance Inflation Factor

Source: Authors Work

Table 3: Heterotrait-Monotrait Ratio (HTMT Ratio)

	CA	ESG	GPI	OC	OC x ESG
CA					
ESG	0.680				
GPI	0.598	0.761			
OC	0.796	0.876	0.824		
OC x ESG	0.439	0.649	0.396	0.702	

Source: SmartPLS 4

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ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 796-805

4.2 Structural Model Assessment

The structural model was evaluated using the bootstrapping procedure with 5,000 resamples in SmartPLS 4 to examine the hypothesized relationships among Environmental, Social, and Governance (ESG) practices, Green Process Innovation (GPI), Competitive Advantage (CA), and Organizational Commitment (OC). The results demonstrate strong empirical support for the proposed model.

The findings indicate that ESG practices have a significant and positive effect on green process innovation (see table 4), suggesting that firms adopting integrated ESG initiatives are more likely to implement environmentally efficient processes, cleaner technologies, and sustainable operational practices. This highlights the strategic role of ESG as a driver of green innovation rather than merely a compliance mechanism. (Hair et al., 2019; Sarstedt et al., 2023).

Furthermore, ESG practices exert a significant positive influence on competitive advantage (see table 4), implying that organizations engaging in responsible environmental management, socially inclusive practices, and robust governance structures are better positioned to enhance market differentiation, operational efficiency, and long-term competitiveness. (Hair et al., 2019; Sarstedt et al., 2023).

Green process innovation was also found to significantly and positively influence competitive advantage (see table 5), indicating that firms translating ESG principles into green operational innovations are able to achieve superior performance outcomes. This confirms the strategic importance of innovation as a mechanism through which sustainability initiatives contribute to competitive success. (Hair et al., 2019; Sarstedt et al., 2022, Chang., 2011)

Importantly, green process innovation partially mediates the relationship between ESG practices and competitive advantage (see tables 5 and 6). This suggests that while ESG practices directly enhance competitive advantage, a substantial portion of their impact operates indirectly through the firm's ability to innovate its processes in an environmentally responsible manner. Hence, ESG-driven innovation serves as a critical pathway linking sustainability initiatives to firm-level competitive outcomes.

The moderation analysis further reveals that organizational commitment significantly strengthens the relationship between ESG practices and green process innovation (see table 6). This indicates that the effectiveness of ESG initiatives in driving green innovation is contingent upon the extent to which employees and management are committed to organizational goals and values. Firms with higher levels of organizational commitment are better able to translate ESG strategies into meaningful green process innovations.

Overall, the results confirm that ESG practices function as an integrated strategic resource, directly and indirectly enhancing competitive advantage through green process innovation, with organizational commitment acting as a crucial boundary condition that amplifies this effect.

Table 4: Direct Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
ESG -> GPI (H_1)	0.255	0.254	0.075	3.422	0.001
ESG -> CA (H_2)	0.506	0.503	0.075	6.783	0.000

Source: SmartPLS 4

Table 5: Mediation Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
GPI -> CA (H_3)	0.197	0.199	0.067	2.940	0.003

Source: SmartPLS 4

Table 6: Moderating Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
OC -> GPI (H_4)	0.753	0.755	0.062	12.165	0.000
OC x ESG -> GPI (H_5)	0.081	0.080	0.018	4.635	0.000

Source: SmartPLS 4

5. Discussion

This study looked at how Environmental, Social, and Governance (ESG) practices affect green process innovation and competitive advantage in the Indian energy sector. We found strong evidence that ESG plays a significant role in building competitive advantage. Our results show that environmental, social, and governance practices positively impact green process innovation.

This supports earlier research (Chang, 2011; Wang and Liu, 2022) that suggests companies using environmentally friendly methods—like reducing waste, controlling carbon emissions, and optimizing resources—are more likely to create green process

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innovations. In India, this strong link may come from increased regulatory pressure and public concern over carbon emissions, especially in the energy sector. This mirrors findings from Aragón-Correa et al. (2008), who indicated that an environmental strategy in resource-heavy industries can bring both ecological and economic benefits. Unlike more developed markets, where these practices are often voluntary, firms in India may adopt them to comply with regulations and to gain access to green financing and public support (Bhatnagar et al., 2025).

Social practices also positively relate to green process innovation. This shows that socially responsible firms promote sustainability initiatives driven by employees and collaborate with stakeholders, creating a culture of innovation (Yuan and Cao, 2022). Companies that focus on employee well-being, diversity, and ethical labor practices tend to have more engaged workers, which helps them implement sustainable processes. In India, many energy firms are public sector undertakings (PSUs), and their social responsibility often includes community development. This broader focus may help explain the positive connection with innovation. However, compared to private companies, PSUs may prioritize procedures over performance, which is an area for future research.

Governance practices also significantly affect green process innovation. Strong corporate governance—through transparent sustainability reports, board oversight, and ethical practices—drives environmental and technological progress (Shad et al., 2019; Dwekat et al., 2025). In India, where concerns about transparency and corruption are common, firms with good governance are more likely to attract investments and maintain stakeholder trust. The introduction of Business Responsibility and Sustainability Reporting (BRSR) norms by SEBI has encouraged listed firms to formalize their ESG disclosures, possibly contributing to the positive relationship observed. However, unlike Western firms with established governance practices, Indian companies may still be developing their governance systems, which could affect the depth of innovation driven by ESG practices.

The study demonstrates that green process innovation significantly enhances competitive advantage. Companies that implement sustainable manufacturing practices experience benefits such as cost reduction, resource efficiency, and market differentiation, which bolster their competitive standing (Zeng et al., 2011). In India, firms that adopt green technologies may take advantage of government incentives—such as tax exemptions and subsidies—as well as improved supply chain efficiency, leading to reduced costs and enhanced brand positioning.

The mediation analysis indicates that green process innovation partially mediates the relationship between ESG practices and competitive advantage. This finding suggests that while ESG practices inherently contribute to competitive advantage, their impact is magnified when organizations incorporate green process innovation into their operations. This aligns with previous research, highlighting that sustainability-driven technological advancements enable firms to develop differentiated products and achieve cost-efficient operations, ultimately resulting in greater profitability and improved market positioning (Chen et al., 2006; Eccles et al., 2012). In the context of India, where the integration of ESG into business strategy is still evolving, this insight emphasizes the necessity for firms to translate ESG objectives into actionable innovations to maximize value.

Furthermore, the moderation analysis reveals that organizational commitment significantly enhances the relationship between ESG practices and green process innovation. This indicates that the effectiveness of ESG initiatives in fostering green innovation depends on the degree of commitment from both employees and management to the organization's goals and values. (Jeong et al., and Kang and Kang). Firms with a higher level of organizational commitment are better positioned to convert ESG strategies into impactful green process innovations.

6. Implication

6.1 Theoretical Implication

This study contributes significantly to theoretical discourse by extending the Resource-Based View (RBV) into the public sector context of Environmental, Social, and Governance (ESG) practices. According to RBV, organizations can attain a sustainable competitive advantage through the development and utilization of valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). Our findings indicate that when ESG practices are internalized through green process innovation, they function as strategic intangible assets that meet VRIN criteria, even within the bureaucratic and regulation-driven framework of public enterprises. This extension broadens RBV's applicability beyond private, profit-driven firms to include state-owned entities that are committed to sustainability-driven performance.

Moreover, by incorporating Stakeholder Theory (Freeman, 1984), we emphasize that ESG initiatives in the public energy sector are influenced not only by resource optimization but also by the necessity to satisfy the expectations of a diverse array of stakeholders, including governments, regulators, communities, and investors. The integration of green process innovation as a mediating mechanism further enhances the ESG framework, illustrating a tangible pathway through which ESG commitments can lead to both operational and strategic outcomes. Consequently, our study enriches the theoretical landscape by positioning ESG as both a stakeholder-driven imperative and a resource-based catalyst for competitive advantage within public institutions.

6.2 Practical Implications

This study highlights the importance for managers and corporate leaders to include ESG practices in their core operations. ESG compliance should be viewed not only as a legal obligation but also as an opportunity to foster innovation, enhance efficiency, and secure long-term profitability. By thoroughly embedding ESG principles, companies can develop strengths that provide a competitive edge in today's environmentally conscious and dynamic market. These insights are particularly relevant for public energy firms and regulators in India. Businesses are encouraged to integrate ESG into critical activities such as emission

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ISSN: 1053-7899
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management, procurement, and employee training to promote green innovations and outperform competitors. To support this, the Ministry of Energy could introduce targeted incentives like tax rebates for clean technology adoption and subsidies for greener upgrades. Simultaneously, regulators such as SEBI can improve the BRSR framework by linking ESG scores to access to green bonds or preferred listing conditions. They might also consider establishing ESG audit committees and encouraging performance comparisons among publicly listed companies. Collectively, these measures will help to position ESG as a strategic asset rather than merely a compliance requirement.

7. Conclusion and Future Directions

This study explores the complex relationship between Environmental, Social, and Governance (ESG) practices, green process innovation (GPI), and competitive advantage within the Indian energy sector. The findings provide empirical evidence that ESG practices significantly influence both GPI and competitive advantage, underscoring their essential role in shaping sustainable business strategies. Additionally, the results confirm that GPI acts as a partial mediator, suggesting that firms can enhance their competitiveness not only through direct adoption of ESG practices but also by leveraging process innovations that align with sustainability objectives.

By connecting theoretical insights to practical implications, this research reinforces the resource-based view and stakeholder theory. It emphasizes that ESG strategies, when integrated into core innovation processes, can generate substantial organizational benefits beyond mere compliance or reputation management. This positions ESG not just as a reporting requirement but as a strategic lever for value creation in sectors sensitive to sustainability.

Despite these contributions, the study has several limitations. First, the sample is limited to public sector enterprises, which may differ significantly from private firms in terms of governance structure, market orientation, and regulatory compliance. This focus may restrict the generalizability of the findings to other organizational contexts. Second, the cross-sectional nature of the data limits the ability to make causal inferences about the relationships between ESG, innovation, and competitive advantage over time. Third, reliance on self-reported measures introduces the possibility of common method bias and social desirability effects, especially given the increasing awareness of ESG among corporate stakeholders.

In light of these limitations, several avenues for future research arise. First, future studies could employ longitudinal designs to track the evolving role of ESG practices and green innovation on firm performance, particularly as ESG standards develop in emerging markets like India. Second, there is an opportunity to expand the sample to include private firms, allowing exploration of sectoral or ownership-related variations in ESG implementation and outcomes. Third, a comparative study across industries or countries could provide valuable cross-contextual insights, helping to assess whether the observed relationships hold in less regulated or more innovation-driven sectors.

In conclusion, this study enhances our understanding of how ESG practices, when strategically aligned with innovation mechanisms, can serve as a catalyst for sustainable competitive advantage. As India moves toward a greener and more inclusive economy, these insights offer valuable guidance for managers, investors, and policymakers aiming to align environmental responsibility with business excellence.

References

Ahmad, H., Yaqub, M., & Lee, S. H. (2023). Environmental, social, and governance-related factors for business investment and sustainability: A scientometric review of global trends. *Environment, Development and Sustainability*, 26(2), 2965–2987.

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., & García-Morales, V. J. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of Environmental Management*, 86(1), 88–103.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. https://doi.org/10.1177/014920639101700108

Berrone, P., & Gomez-Mejia, L. R. (2009). Environmental performance and executive compensation: An integrated agency-institutional perspective. *Academy of Management Journal*, 52(1), 103–126.

Bhatnagar, S., Sharma, D., & Singh, V. V. (2025). Green finance and investment in India: Unveiling enablers and barriers for a sustainable future. *Journal of Cleaner Production*, 493, 144908.

Boffo, R., & Patalano, R. (2020). *ESG investing: Practices, progress and challenges*. Éditions OCDE, Paris.

Chang, C.-H. (2011). The influence of corporate environmental ethics on competitive advantage: The mediation role of green innovation. *Journal of Business Ethics*, 104(3), 361–370.

Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, 81(3), 531–543.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2012). The impact of corporate sustainability on organizational processes and performance. *Management Science*, 60(11), 2835–2857.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191.

Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Pitman, Boston.

Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, 66, 101889.

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate governance and equity prices. *Quarterly Journal of Economics*, 118(1), 107–155.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 796-805

https://doi.org/10.1162/00335530360535162
Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152.
Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24.
Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, 20(4), 986–1014.
Hasan, M. B., Verma, R., Sharma, D., Moghalles, S. A. M., & Hasan, S. A. S. (2024). The impact of environmental, social, and governance (ESG) practices on customer behavior towards the brand in light of digital transformation: Perceptions of university students. *Cogent Business & Management*, 11(1), 2371063.
Islam, Md. J., Som, H. Md., Hashim, R. A., & Rahman, Md. S. (2024). Impact of green product innovation, green process innovation, and green competitive advantage on the sustainable performance of garment firms in Bangladesh: A conceptual framework. *International Journal of Academic Research in Business and Social Sciences*, 14(11), 2062–2083.
Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.
Jeong, S.-C., Sung, H.-N., & Shin, J.-I. (2025). The Impact of ESG Management Activities on the Organizational Performance of Manufacturing Companies in South Korea: The Moderating Effect of Job Position. *Sustainability*, *17*(12), 5233. https://doi.org/10.3390/su17125233
Jin, M., & Kim, B. (2022). Effects of ESG activity recognition factors on innovative organization culture, job crafting, and job performance. *Administrative Sciences*, 12(4), 127.
Dwekat, A., Abu Alia, M., Abdeljawad, I., & Meqbel, R. (2025). Governing for the green: How European board attributes are driving environmental innovation. *Corporate Social Responsibility and Environmental Management*, 32(2), 2128–2146.
Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration*, 11(4), 1–10. https://doi.org/10.4018/ijec.2015100101
Kumar, J., Rani, G., Rani, M., & Rani, V. (2024). Do green banking practices improve the sustainability performance of banking institutions? The mediating role of green finance. *Social Responsibility Journal*, 20(10), 1990–2007.
Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review*, 47(4), 409–424.
Liu, H., & Xu, Y. (2024). The impact of ESG ratings on the quality and quantity of green innovation of new energy enterprises. *Frontiers in Energy Research*, 12, 1382139.
Lu, J., Guo, S., Qu, J., Lin, W., & Lev, B. (2023). "Stay" or "Leave": Influence of employee-oriented social responsibility on the turnover intention of new-generation employees. *Journal of Business Research*, 161, 113814.
Makridou, G., Doumpos, M., & Lemonakis, C. (2024). Relationship between ESG and corporate financial performance in the energy sector: Empirical evidence from European companies. *International Journal of Energy Sector Management*, 18(4), 873–895.
https://doi.org/10.1108/ijesm-01-2023-0012
Martínez-Falcó, J., Sánchez-García, E., Marco-Lajara, B., & Millán-Tudela, L. A. (2025). Unraveling the relationship between ESG strategy and sustainable performance in the Spanish wine industry: A structural equation analysis. *Social Responsibility Journal*, 21(5), 962–986.
Mason, C. H., & Perreault, W. D. Jr. (1991). Collinearity, power, and interpretation of multiple regression analysis. *Journal of Marketing Research*, 28(3), 268–280.
Mukhtar, B., Shad, M. K., Woon, L. F., Haider, M., & Waqas, A. (2024). Integrating ESG disclosure into the relationship between CSR and green organizational culture toward green innovation. *Social Responsibility Journal*, 20(2), 288–304.
Ozata Canli, S. N., & Sercemeli, M. (2025). The impact of environmental, social and governance (ESG) disclosures on corporate financial performance in the energy sector. *International Journal of Energy Sector Management*, Emerald. https://doi.org/10.1108/ijesm-09-2024-0039
Ozilhan Ozbey, D., Coskun Degirmen, G., Berk, O. N., Sardagi, E., Celep, E., Koc, D., & Gozen, E. (2024). Green core competencies, green process innovation, and firm performance: The moderating role of sustainability consciousness—A mixed method study on golf hotels. *Sustainability*, 16(10), 4181.
Pinheiro, A. B., Panza, G. B., Berhorst, N. L., Toaldo, A. M. M., & Segatto, A. P. (2024). Exploring the relationship among ESG, innovation, and economic and financial performance: Evidence from the energy sector. *International Journal of Energy Sector Management*, 18(3), 500–516. https://doi.org/10.1108/ijesm-02-2023-0008
Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment–competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118. https://doi.org/10.1257/jep.9.4.97
Rahman, H. U., Zahid, M., & Al-Faryan, M. A. S. (2023). ESG and firm performance: The rarely explored moderation of sustainability strategy and top management commitment. *Journal of Cleaner Production*, 404, 136859.
Rohendi, H., Ghozali, I., & Ratmono, D. (2024). Environmental, social, and governance (ESG) disclosure and firm value: The role of competitive advantage as a mediator. *Cogent Business & Management*, 11(1), 2297446.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 796-805

Sarstedt, M., Hair, J. F., & Ringle, C. M. (2023). PLS-SEM: Indeed a silver bullet—Retrospective observations and recent advances. *Journal of Marketing Theory and Practice*, 31(3), 261–275.
Shad, M. K., Lai, F.-W., et al. (2019). Enterprise risk management implementation and firm performance: Evidence from the Malaysian oil and gas industry. *International Journal of Business and Management*, 14(9), 47.
Shehawy, Y. M., Khan, S. M. F. A., & Madkhali, H. (2024). An integrated SEM–ESG framework for understanding consumer's green technology adoption behavior. *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-024-02231-1
Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
Wang, M., & Liu, Z. (2022). How do green innovation strategies contribute to firm performance under supply chain risk? Evidence from China's manufacturing sector. *Frontiers in Psychology*, 13, 894766.
Xu, S., Li, H., Chen, J., Huo, J., & Kuang, X. (2024). Sustainable competitiveness through ESG performance: An empirical study on corporate resilience. *Journal of Competitiveness*, 16(3).
Yadav, M., & Dahiya, S. (2025). Can green finance and innovations promote environmental sustainability: Empirical evidence from India. *Social Responsibility Journal*, 21(6), 1301–1318.
Yuan, B., & Cao, X. (2022). Do corporate social responsibility practices contribute to green innovation? The mediating role of green dynamic capability. *Technology in Society*, 68, 101868.
Zeng, S. X., Meng, X. H., Zeng, R. C., Tam, C. M., & Tam, V. W. Y. (2011). How environmental management driving forces affect environmental and economic performance of SMEs: A study in Northern China. *Journal of Cleaner Production*, 19(13), 1426–1437.

Constructs	Items	Item Statements	Source
Environmental	EV1	Our company propels carbon emissions-reducing activities	Jin and Kim (2022)
	EV2	Our company supports actual investments for environmental management	
	EV3	Our company has a performance management and evaluation system for environmental management	
	EV4	Our company is involved in eco-friendly business operations	
Social	SC1	Our company is implementing a policy for its members' employment stability	Jin and Kim (2022)
	SC2	Our company is evaluating the stakeholders' (partner firms) environmental, social, and governance (ESG) performance	
	SC3	Our company is executing win-win partnership programs for stakeholders' growth	
	SC4	Our company carries out social donation and corporate social responsibility (CSR) activities for communities	
Governance	GV1	Our company adopts the ethical regulations of its members	Jin and Kim (2022)
	GV2	Our company discloses information and issues gravely affecting organizational decision-making	
	GV3	Our company performs continuous disclosures (publishing sustainability management reports) externally on its board of directors	
	GV4	Our company holds general shareholders' meetings and shares agenda to protect shareholders' rights	
Green Process Innovation	GPI1	The manufacturing process of the company effectively reduces the emission of hazardous substances or waste	Chang (2011)
	GPI2	The manufacturing process of the company reduces the consumption of resources – non-renewable resources	
	GPI3	The manufacturing process of the company reduces the use of raw materials	
Competitive Advantage	CA1	The quality of the products or services that the company offers is better than that of the competitors' products or services	Chang (2011)
	CA2	The company is more capable of R&D than the competitors	
	CA3	The company has better managerial capability than the competitors	
	CA4	The company's profitability is better than the competitors	
	CA5	The corporate image of the company is better than that of the competitors	
	CA6	The competitors are difficult to take the place of the company's competitive advantage	
Organizational Commitment	OC1	I am proud to tell others that I am part of this organization.	Jeong et al.,
	OC2	I would be very happy to spend the rest of my career with this organization.	
	OC3	I am willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful.	