Do Environmental Laws Matter for Corporate Ethics and Green Process Innovation in Environment Performance? The Moderating Role of Institutional Support

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Abstract

Drawing on institutional theory, this study disentangles the intricate relationships between environmental laws, corporate environmental ethics (CEE), green process innovation (GPI), and environmental performance. Using survey data from manufacturing firms in Pakistan, the study finds that environmental laws have a positive influence on GPI, and this association is mediated by CEE. Further, the effects of environmental laws on environmental performance are sequentially mediated by CEE and GPI. In addition, institutional support plays a positive moderating role in enhancing the effects of environmental laws on CEE, as well as the effects of CEE on GPI. Theoretical, practical, and policy-related contributions are offered.

Managerial Relevance

Managers in environmentally polluted countries should focus on enhancing their internal routines and innovative processes, as required by legal frameworks. Manufacturing SMEs should also cultivate relationships with political actors to help secure financial and technical support for green processes and innovations. Further, public policymakers should prioritize the development of more effective environmental laws and institutional support to facilitate the implementation of green process innovation.

Keywords: *environmental laws; corporate ethics; green process innovation; environmental performance; institutional theory.*

Introduction

As industrial organizations' practices bring about problems of environmental degradation, governments and practitioners are confronted by ethical, environmental and carbon neutrality challenges in tackling the problems, especially in the institutionally constrained settings of emerging countries [1]. In order to protect the environment, many businesses, nation-states, and NGOs have mobilized sustainable initiatives [2-4]. To this end, governments can play a crucial role in creating conditions to encourage organizations to develop environmentally friendly and sustainable strategies to realize carbon neutrality. Studies have advanced our understanding of regarding the role of governments in changing or incentivizing organizations to adopt sustainable practices. For example, Lambin and Thorlakson [5] conceptualized a policy ecosystem to posit how interactions between governments, NGOs, and private companies could affect the adoption of sustainable practices.

In this study, our main interest is a particular component of formal institutions—laws and regulations enacted by governments. Institutional theory [6, 7] that posits the formal laws can shape firms' beliefs and actions, and steer them towards enacting desired business practices [7, 8]. By regulating emissions and ensuring accountability, environmental laws provide the impetus for sustainability-oriented actions. For example, Liu, et al. [9] analyzed secondary data and found an increase in patent filings and firm performance after the introduction of environmental protection laws. While these studies have extended the nascent stream of research regarding the role of government in sustainable practices, there remains a lacuna, particularly pertaining to how firms' perceptions of environmental laws may influence their green innovation initiatives.

Pertinent to this study, green process innovation (GPI), which involves the modification of business processes to reduce the emission of hazardous waste and the

consumption of natural resources [10, 11], is a potential solution that is predicated on government actions. Yet, an underexamined topic is how environmental laws, and through what mechanisms, encourage or even mandate organizations to enact GPI initiatives. Supported by institutional theory [6, 7], we argue that effective environmental laws may enforce enterprises towards developing green process innovation as a core business practice [7, 8].

Even as environmental laws can mandate organizations to engage in green innovation [12], what still remains unclear are the mechanisms through which environmental laws can increase GPI. Understanding this mechanism is critical as the knowledge will shed light on how environmental mandates spur GPI, and inform the development of efficacious environmental laws for GPI. Indeed, the present limited understanding of the intervening mechanisms has led to scholars lamenting this research gap [13]. Sustainability and corporate ethics literature reveals that corporate environmental ethics (CEE) may be a potential driver of GPI [14, 15]. Law and ethics are often viewed as consolidative, as ethics is learned through laws, applied and eventually embraced [16]. This leads us to question whether CEE may play a role to intervene the effects of environmental laws on GPI. We thus offer this research question: "*To what extent are the effects of environmental laws on green process innovation (GPI) mediated by corporate environmental ethics (CEE)?"*

Further, some prior studies have found positive associations between environmental laws and environmental performance, typically defined as firms' achievement of environmental certifications, environmental and regulation compliance [17]. Li, et al. [10] suggest that environmental legitimacy leads firms to meet corporate carbon disclosure, an environmental performance related outcome. Formal institutions are characterized by imposing stringent obligations, legal requirements, and standards on firms to comply with [18]. Consequently, environmental laws have the potential to create incentives that motivate

firms to improve their environmental performance, develop environmentally friendly products, and foster green innovation [9].

However, despite the importance of environmental laws in bringing about environmental performance, extant research has not provided an in-depth analysis of how environmental laws can enhance environmental performance. Extending the previous research question, another purpose of this study is thus to examine: *To what extent are effects of environmental laws on environmental performance mediated via the two key mediators: CEE and GPI*? Drawing on institutional theory [6, 7], we further argue institutional support for formal environmental laws will impact how organizations can achieve their performance goal. As the previous two research questions suggest that the effects of environmental laws are mediated by CEE and GPI, it naturally raises the further question: *How does institutional support moderate the mediating effects of CEE and GPI on environmental laws?* Addressing this question will further illuminate the intervening mechanism through which environmental laws can increase GPI, and consequently enhance environmental performance.

The topic of environmental sustainability (specifically GPI in context of our research), is mostly confined to developed markets, where environmental laws are effective due to greater institutional capacity, economic development status and resources [19]. In contrast, developing countries often face systemic challenges that hinder their ability to enforce these laws. Indeed, a recent systematic review [13] has specifically noted the lack of green innovation studies in developing markets, including Pakistan, and has made calls for more insights into such markets.

To summarize, our study bridges critical research gaps by examining the underpinning mechanism (CEE and GPI) through which governments' environmental laws may influence organizations' environmental performance. It further demonstrates that the mechanism is moderated by the strength of institutional support. In doing so, our study offers

several theoretical contributions to engineering and technology management literature. First, while research on GPI has mostly examined firms' values and capabilities [20-23], or business outcomes [24], these studies have largely failed to account for the critical role that environmental laws play in fostering CEE, and their consequential effects on GPI and environmental performance. By capitalizing on unique data from the Pakistani manufacturing context, this study deepens scholarly understanding of institutional laws on adoption of sustainable business practices culminating in minimizing of resources consumption and reduce emissions.

Second, in answering calls for studies to account for both internal and external factors [25], we examine the complex interplay between external factors (environmental laws and institutional support) and internal factors (corporate ethics and GPI) in influencing environmental performance. While laws are important for GPI [9, 26], our study extends the knowledge by demonstrating that merely enacting laws alone may not drive environmental outcomes in developing countries. Particularly, we demonstrate that institutional support plays a key role in strengthening the effects of laws and corporate ethics on green innovation. We integrate insights from institutional theory [6, 7] in the sustainability context to demonstrate the efficacy of institutional support in driving sustainable behavior among developing-market firms that are typically resource-constrained and dependent upon government for innovations. By linking corporate ethics with institutional perspective, our study demonstrates the important role of institutional governance and support in sustainability context.

Finally, as we explain in detail later (see section 3.1), Pakistan served as a highly relevant context for this study. Despite being ranked among the world's most highly polluted countries [27] due to industrial waste and emissions [28], country lack resources and motivations towards ethical practices. Situating this study within a context of the

manufacturing industry in Pakistan not only answers calls for more green innovation studies in developing markets [13], it also offers valuable practical contributions to guide the governments and organizations in such markets to develop effective green innovation initiatives.

1. Literature and Hypothesis Development

Over the past three decades, sustainability-oriented research has gained momentum in the field of engineering management [29]. Fatima and Elbanna [30] propose extending business ethics literature to green innovation domain. While some attempts have been made regarding institutional factors such as the role of environmental regulation [31] and legitimacy pressure [25], there remains a dearth of research on regulation in driving the ethical behavior of firms, particularly in a resource-constrained and environmentally degraded developing markets (like Pakistan). Extending knowledge in this domain is important because corporate ethics, defined *as a firm's clear and concrete vision, mission and plan about the environmental policies, investments, culture and events* [32], may influence environmental performance via green innovation.

The main supporting theory of our study is institutional theory [6, 7], a framework for understanding how institutions shape organizational actions, behavior, and decision-making [also see these recent systematic reviews: 33, 34]. The theory is widely used in organizational studies to explain why organizations conform to established patterns or even resist change. In particular, our main interest is a particular component of formal institutions—laws and regulations enacted by governments. Drawing on institutional theory, we contend that environmental laws may enforce enterprises towards developing environmental ethics as a core business practice. This because laws provide a foundation for firms to develop a culture

of ethics-based programs As ethics often proceed from learning and then applying laws [16], we propose that:

H1: *Environmental laws positively influence corporate environmental ethics.*

Corporate ethics literature has established a positive relationship between ethics and sustainability initiatives [35]. In sustainability context, GPI is defined as *the modifications to manufacturing processes with the aim to lower energy consumption, reduce or even eradicate pollution, and recycle waste* [36]. As green innovations, such as GPI, are less likely to emerge from within, institutional pressure (i.e., laws) becomes an essential force for green innovation [37]. Given ethical values are pertinently important in emerging markets for successful legal implementation [38], it is an important to address this theoretical gap. Environmental laws that govern firms' sustainability initiatives can make the firms more responsible towards environmental-related issues [13]. When sustainability is embedded in corporate ethics, it leads to firms practicing green innovation [32]. Hence, it can be inferred that CEE mediates the influence of environmental laws on GPI.

Further, firms have to respond to regulatory pressure by adopting legitimate and ethical strategic options [39]. Especially in developing markets, firms may practice environmental activities just to attain legal compliance [40]. However, the extent of contribution to environmental actions may be driven by corporate ethics [41]. Hence, it is important to determine whether environmental laws result in GPI, and the extent that corporate ethics mediate this relationship. Given serious environmental concerns and lack of ethical responsibilities in business, the fundamental question is whether environmental laws in such a context can drive CEE for GPI.

H2: *Corporate environmental ethics mediate the effect of environmental laws on GPI.*

Institutional support is explained as *government financial, informational and policy related support*, that can be critical for ethical and sustainability initiatives [42]. As emerging market firms are often resource-constrained and dependent upon institutions for knowledge and crucial resources [43], this support is even more critical. Highly supportive governments that develop effective policies and support mechanism can help firms to achieve environmental sustainability goals by incentivizing and/or compensating them through various policy instruments, such as R&D tax incentives, liberal FDI policies, or emission trading system [44, 45]. In contrast, under low level of institutional support and presence of weak laws in emerging markets, firms often could not capture rents from social responsibilities and ethics [46].

The institutional support perspective shifts the analytical attention from institutional void or institutions being a constraint to 'government activism'[47]. The government regulations provide much desired institutional support to facilitate organizations' overcoming their inertia to green innovation ideas and investments [31]. Study based on a study of 71 countries between 1990 and 2014 argue that government institutions' steadfast support and funding are essential in adoption of green technology by firms within a country [48].

Similarly, we argue that formulating environmental laws is not sufficient to impact green innovations, until and unless they are framed to provide explicit institutional support for these activities. Such institutionalised support mechanisms provide impetus to the firms to take advantage to bring about green innovation in effect of environmental laws. Since, CEE brings environmental concerns of the firm forefront in strategic decision making by formalizing green beliefs [35]; hence, it is expected that institutional support structures will impact CEE.. Firms that have positive and strong commitment to environmental beliefs will dedicate efforts and resources to reduce waste and conserve environment [49]. Thus, CEE

will be a critical factor influencing environmental goals and resources committed to green innovation [32, 50], as argued above, and will be strengthened by higher institutional support.

Institutional support will facilitate that strategic decision making as it will moderate relationships between environmental law and CEE. Robust institutional support to formal environmental laws will help companies transcend to normative expectations within the industry, rather than remain just a legal requirement. This will strengthen CEE within organizations. Further, it will provide legitimacy to the pro-environmental culture within the organizations, which is essential for CEE to be formalized internally, and manifest in strategic decision-making.

H3a: *The effect of environmental laws on corporate environmental ethics is positive and stronger under high institutional support.*

Scholars (e.g., [44, 51]) contend that with increase in environmentalism and associated expectations, green innovation has become a significant tool for companies in their quest for competitive advantage. Green innovation contributes to competitive advantage by removing inefficient practices and increasing value of products/services [26, 52]. It thus seeks to bridge environmental protection and economic development by improving the processes that are energy saving, pollution preventing and waste recycling [32, 53]. As such, green innovation requires seeking knowledge externally and developing internal capabilities [54, 55], both of which involves conscious choice making by business leaders.

Despite the above benefits, businesses will invest in green technologies only if there is an economic value or need to do so. In this sense, institutional support provides decision makers with a strong economic and moral justification to pursue GPI. For instance, firms, when supported by the government, can increase their green utility model patents as an effect of government's regulations [56]. We therefore contend that a supportive institutional

environment, through various policy instruments, will demonstrate tangible economic outcomes, and help realize an organizational culture supportive of environmental cause. Hence, institutional support will positively moderate the relationship between CEE and GPI.

H3b: *The effect of corporate environmental ethics on GPI is positive and stronger under high institutional support.*

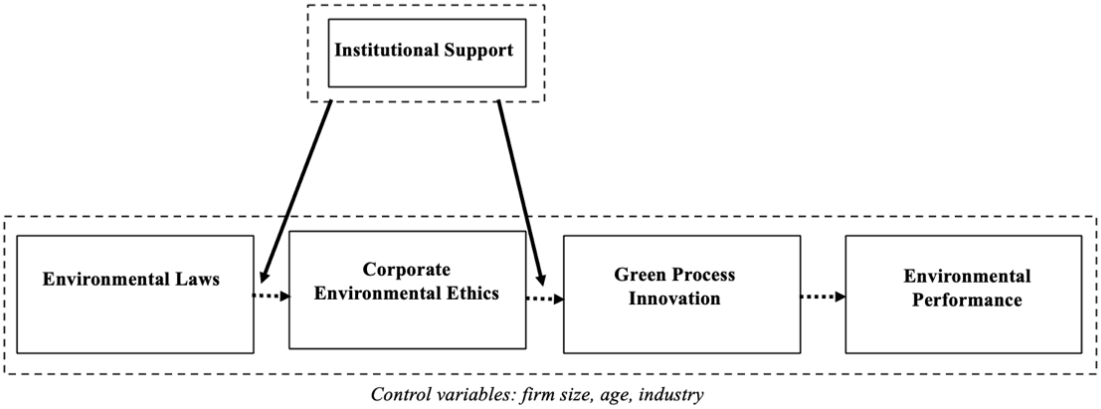
Despite the divergent thoughts on the impact of government regulations on green innovations, a systematic review [57] found that most articles support the idea that environmental regulations are an important contributor to induce green innovation in companies. However, there is a lack of studies that have examined the mechanisms through which environmental laws influence firms' environmental performance. Meanwhile, studies suggest that environmental laws mandate firms to act responsibly in line with the regulatory requirements by compelling them to develop a culture and codes of ethics [31]. In turn, these corporate ethics lead to outcomes such as legitimacy and performance [58-60]. Hence, it is inferred that the direct effect of environmental laws on environmental performance may be mediated by corporate environmental ethics.

Moreover, CEE are often evident through strategic actions such as responsible innovation [61]. When companies take up ethical responsibility for not harming the environment, they refine products and processes to ensure responsible innovation [62]. In this process of being ethical, innovations in processes that are more environment friendly and sustainable with a pursuit of protecting the environment become the basis for performance [63]. Some scholars e.g. [64] reported that green innovation mediates the relationship between CEE and sustainable performance. Therefore, we assert that the effects of environmental laws on environmental performance are sequentially mediated by CEE and GPI.

H4: *Environmental laws positively influence environmental performance via the mediation of corporate environmental ethics and GPI.*

Figure 1 shows conceptual framework.

Figure 1: Conceptual Framework



3. Methodology

3.1 Research context

This study was situated in Pakistan, ranked among the world's most highly polluted countries [27] due to industrial waste and emissions [28], and the world's 8th most vulnerable country in terms of climate change [65]. Yet, its Environment Protection Act is inadequately implemented [e.g., see 66], consequently enabling firms to sidestep their responsibilities in environmental policies and procedures. Indeed, Pakistan ranked the lowest among all South Asian countries in all dimensions of governance including laws and regulation quality [67, 68]. Pakistani firms often lack a sense of responsibility or ethics towards GPI, although such efforts can enhance environmental sustainability [69]. Further, they typically possess weak resource base and capabilities, and are dependent on government support for innovative developments. These prevailing conditions make Pakistan a highly relevant and practical context for this study.

Specifically, the manufacturing industry was chosen using a purposive sampling approach adopted for this study. While manufacturing is fundamental to economic development in many emerging countries, including Pakistan, its activities often result in serious environmental pollution [70, 71]. Hence, the manufacturing industry places importance on implementing environmental protection related activities and green strategies, and supports integrating sustainability practices in their processes [72, 73].

3.2 Research design and data collection procedure

A list of manufacturing firms was identified from the directory of Pakistan's Chamber of Commerce, and Industry. We constrained our sampling frame to SMEs as they represent 90% of businesses in Pakistan and are collectively a major contributor to the country's economic activity and growth. Using this sampling frame is also consistent with the Pakistani government's commitment to sustainable development goals by 2030 [74]. Initially, 159 firms as a sample were identified based on convenience sampling approach considering ease of access to the firms. Bilingual research assistants were appointed to personally visit firms for data collection during the end of 2021. The data was collected using a paper-based survey approach employing a quantitative research design. The personalized approach for data collection is suggested suitable due to lack of trust in less personalized approaches and reluctance in sharing opinions in less personalized approaches [75]. Out of the 159 firms, 108 firms who agreed to participate, completed the survey acknowledging their knowledge and involvement in GPI. After deleting the missing values for six cases, the final usable sample size was 102. This response rate equated to approximately 64%, consistent with a former study in the context of green business strategies in Pakistan [71]. Of the102 firms, 97 had between 50-250 employees while five had 50 or less employees. Their industries included packaging (18), electrical (8), chemical (25), food (20), textile (16), energy (4) and others

(11). Thirteen firms were between 5-10 years old, 56 where between 10-20 years old, and 33 were more than 20 years old. Of the participants, 97 were managers and there were five CEOs. G*power analyses showed that the sample size of 102 was greater than the required size (n=92) to produce a medium effect size (Cohen's d = 0.3; power=.8; α=.05) Further, a post-hoc G*power analysis using path-by-path correlations for the hypothesized relationships is .851 i.e. above the threshold of .800, indicating statistical power.

Being an ex-British colony, the questionnaire was developed in English, as the language was commonly used in business. The sampling criteria was one respondent per business. Prior to the data collection, the questionnaire was reviewed by an industry practitioner and independent expert researcher to ensure that it fulfilled the study's objective and was easy to understand. Via a screening question, only managers knowledgeable about their firm's level of green innovation practices participated in the study.

3.3 Scales

Participants were asked to consider and reflect on their companies' situation in the past two years, and then rated the questionnaire scales on 1-7 Likert points (1 = strongly disagree; 7 = strongly agree). As indicated in Table 2, all scales were drawn from high quality studies with established scale reliabilities. Similarly, the scale reliabilities in our study were higher than the reliability benchmark of .700, with lowest composite reliability of .805 (see Table 1 for the scale descriptions). The survey also captured the firm size, age and specific sector within the manufacturing industry to control for confounding effects. To statistically test for potential common method bias, the survey captured a theoretically unrelated construct about restaurant performance (via four items: friendliness of service personnel, availability of healthy meals, cleanliness of restaurant, presentation of meal) adapted from [76]. To avoid

potential common method bias using procedural remedies, we mixed the scale so that participants could not guess the relationships.

4. Analysis and Results

The factor loadings were determined using exploratory analysis with maximum likelihood technique. As Table 1 shows, all items loaded into their respective scales with lowest factor loading of .598. The average variance extracted were all >.50 and greater than the square of correlation between any two constructs. Hence, all measures were discriminately valid. The correlations between any two constructs ranged from .154 to .553, thus suggesting there were no potential collinearity problems. Following Lindell and Whitney [77]'s marker variable (restaurant performance) technique, there were also no evidence of common method bias that might impact the quality of relationships examined in the study [78].

Table 1: Exploratory Factor Analysis

Scales	Loading
Environmental laws [79] **(CR = .898; AVE = .688; M = 4.804; SD = 1.377)**	
Environmental laws contain stringent standards.	.851
Environmental laws are appropriate for Pakistani circumstances.	.836
Environmental laws are very clear.	.829
Environmental laws are effective in tackling environmental problems directly.	.802
Corporate environmental ethics [79] **(CR = .859; AVE = .605; M = 4.64; SD = 1.179)**	
The company has clear and concrete environmental policies.	.760
The company's budget planning includes the concerns of environmental investment or procurement.	.830
The company has integrated its environmental plan, vision, or mission to its marketing events.	.774
The company has integrated its environmental plan, vision, or mission to company's culture.	.744
Green process innovation from [32] **(CR = .853; AVE = .660; M = 5.094; SD = 1.284)**	
The manufacturing process of the company effectively reduces the emission of hazardous substances or waste.	.771
The manufacturing process of the company reduces the consumption of water, electricity, coal, or oil etc.	.783
The manufacturing process of the company reduces the use of raw materials.	.879
Institutional support from [42] **(CR = .901; AVE = .695; M = 4.67; SD = 1.468)**	
Government has provided us useful information and support for green innovation related initiatives.	.839
Government has provided us support in seeking financial resources for green innovation related initiatives.	.822

Government has provided us beneficial green innovation related policies and projects.	.833
Government has provided us direct financial support such as tax reduction or subsidy for green innovation related initiatives.	.839
Environmental performance [17] **(CR = .805; AVE = .514; M = 4.887; SD = 1.029)**	
Company has achieved important environment-related certifications.	.598
On average, overall environmental performance of our company has improved over the past 2 years.	.714
Improvement of environmental compliance.	.885
Complying with environmental regulations (i.e., emissions, waste disposal).	.636

CR= composite reliability; AVE=average variance extracted; M=mean; SD=standard deviation

Using SPSS software, the conceptual model was analyzed using Process Macro 58 (moderated mediation model) using 5,000 bootstrap samples with 95% confidence interval. This macro is commonly in examining moderated mediation effects e.g., [80]. The results of moderated-mediation model, reported in Table 2 and Table 3, show that environmental laws positively and significantly influenced, thus supporting H1.

The results in Table 2 also showed that institutional support positively influenced, as well as interacted with environmental laws to enhance. The positive moderation was significant under moderate and high institutional support conditions. Similarly, institutional support also positively influenced GPI and interacted with corporate ethics to enhance GPI). The positive moderation was significant under moderate and high institutional support conditions. The moderation plot in Figure 2 clearly depicts these effects. The results in Table 3 show that the direct effects of environmental laws on GPI were insignificant. However, the conditional indirect effects (EL→ CEE → GPI) were stronger under moderate and high institutional support conditions. These results support that mediation was positively moderated by institutional support. Collectively, these results supported H3a and H3b.

Table 2: Moderated-Mediation Model

CEE	**β**	**p-value**	**LLCI**	**ULCI**
EL	.369	<01	.189	.549
IS	.294	<.01	.121	.467
ELX IS	.202	.023	.029	.376
Controls				
Age	-.156	.224	-.401	.097
Industry	-.079	.078	-.167	.009
Size	-.369	.324	-1.109	.370
IS	**β**	**p-value**	**LLCI**	**ULCI**
Low	.116	.323	-.116	.348
Moderate	.449	<.01	.236	.662
High	.544	<.01	.274	.814
GPI	**β**	**p-value**	**LLCI**	**ULCI**
EL	*.155*	*.010*	*-.030*	*.341*
CE	*.197*	*.059*	*-.008*	*.402*
IS	*.309*	*.001*	*.123*	*.496*
CE X IS	*.209*	*.031*	*.020*	*.397*
Controls				
Age	*-.060*	*.650*	*-.319*	*.200*
Industry	*-.030*	*.512*	*-.122*	*.061*
Size	*.075*	*.844*	*-.685*	*.836*
IS	**β**	**p-value**	**LLCI**	**ULCI**
Low	*-.063*	*.662*	*-.351*	*.224*
Moderate	*.281*	*.017*	*.051*	*.510*
High	*.378*	*.009*	*.097*	*.660*

LLCI = lower-level confidence interval
ULCI = upper-level confidence interval

Table 3: Moderated-mediation effects

Variables	**β**	**LLCI**	**ULCI**
Direct effect	.155	-.032	.341
Conditional indirect effects (EL→ CEE → GPI)			
Low IS	-.007	-.096	.047
Moderate IS	.126	.034	.235
High IS	.206	.066	.370

Figure 2: Moderation Plot

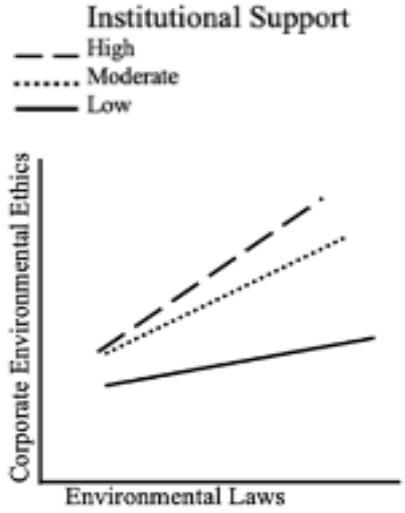


Figure 2a

Figure 2b

Prior studies have analysed moderated-mediation, and then mediation only models using Process Macros [81, 82]. Therefore, to determine the mediation only effects hypothesized in H2 and H4, we used Process Macro 6, which generates the index of mediation in the presence of first and second mediator, and when both mediators are added to the model, and the total effects. The direct regression effects of environmental laws on GPI are positive and significant. The results in Table 5 show that environmental laws positively related to the environmental ethics. The effects of environmental laws on GPI were significant and environmental ethics

influenced GPI. We can accept H2 as effects of environmental laws on GPI in presence of corporate ethics are insignificant.

To test hypothesis 4, we examined the two key criterion. First, the relationship between the independent variable (i.e., environmental laws) with the first mediator (i.e., corporate environmental ethics) and that of the independent variable (i.e., environmental laws) as well as first mediating variable (i.e., corporate environmental ethics) with second mediator in the model (i.e., GPI) should be significant. Table 4 confirms this condition. Second, the effects of the independent variable on the dependent variable are reduced in the presence of the mediator, and the second mediator should have a strongest positive effect on the dependent variable. The effects of environmental laws and environmental ethics were insignificant on environmental performance in the presence of GPI, which had the strong and positive effects.

Table 5 shows that direct effects of environmental laws on environmental performance were insignificant. The sequential mediation of environmental ethics and GPI was positive and significant: *EL* → *CEE* → *GPI* → *EP*. The total indirect effects were positive and significant as well as the total effects providing support for the serial mediation effects hypothesized in H4.

Table 4: Mediation Model

	CEE			**GPI**			**EP**		
	β	**p**	**LLCI; ULCI**	**β**	**p**	**LLCI; ULCI**	**β**	**p**	**LLCI; ULCI**
EL	.346	<.01	.166; .525	.191	.056	-.005; .387	.085	.335	-.089; .259
CEE				.265	.012	.060; .470	.155	.099	-.030; .339
GPI							.487	<.01	.311; .663
Control variables									
Age	-.210	.120	-.476; .056	-.119	.390	-.393; .155	.124	.306	-.115; .363
Ind.	-.069	.148	-.163; .025	-.001	.845	-.106; .087	.077	.074	-.008; .161
Size	-.482	.228	-1.27; .306	-.053	.897	-.861; .755	-.149	.675	-.851; .553

Table 5: Direct, Total and Indirect Effects

Variables	β	LLCI	ULCI
Direct effect (EL → EP)	.085	-.089	.259
Total effect	.276	.088	.463
Indirect effects			
EL → CEE → EP	.053	-.025	.155
EL → GPI → EP	.093	.000	.202
EL → CEE → GIP → EP	.045	.008	.098
Total indirect effect	.191	.077	.316

5. Discussion

Using data from institutionally constrained settings of Pakistani manufacturing firms, the present study was guided by the following pivotal questions: 'To what extent do environmental laws affect environmental performance through the two key mediators, CEE and GPI?' and 'To what extent does institutional support moderate the effects of environmental law on CEE and GPI?'" We integrate insights from institutional theory [6, 7, 83] to develop and test a comprehensive model on this relationship. The findings show that environmental laws influence corporate environmental performance via the sequential mediating roles of CEE and GPI respectively. Further, this mediating mechanism is positively moderated by institutional support. By answering calls for studies to account for both internal and external factors [25], we specifically examine the role of external institutional factors (environmental laws and institutional support) in driving internal (corporate ethics and green innovation) behavior for environmental performance. The observation that external factors, such as environmental laws and institutional support, influence corporate ethics and green product innovation (GPI) is important. In contrast to prior research suggesting that the innovation atmosphere is often driven by managerial characteristics and leadership style [84], this study demonstrates that external factors, such as environmental laws can motivate and compel firms to embrace environmentally sustainable activities, such as green product

innovation and corporate ethics. Our study extends prior knowledge by elucidating the role of environmental laws in enhancing corporate environmental performance via CEE and GPI. In doing so, the study builds on and extends the scholarly discourse on green innovation [23].

5.1. Theoretical implications

The present study offers a number of vital contributions to existing literature. First, this study provides insights and empirical validation on how environmental laws can enhance environmental performance via the adoption of CEE leading to GPI. The study uncovers the mechanism through which both internal and external factors play a role in green innovation process [25]. Prior research has mostly examined the effects of institutional drivers such as environmental laws on environmental performance [85], our findings on CEE driving green process innovation and environmental performance add to the corporate ethics and sustainability literature on manufacturing firms. This contribution is particularly important because corporate ethics is often dependent upon interacting institutional factors [86]. We contribute to the literature on innovation drivers in emerging economies [87] by revealing the effects of environmental laws in an emerging market context with serious environmental degradation problem, Pakistan. Given the recent call for extending the work on responsible innovation in context of Asian markets (that includes Pakistan) [13], this research extends the body on knowledge on how manufacturing firms in such a context can contribute to green process innovations.

Related to above, past studies taking an institutional perspective in green developments have mostly examined issues of institutional pressure [88]. Our contribution extends by examining the role of institutional support and demonstrating that this support is particularly critical in a context of resource-dependent firms and their sustainable practices in developing countries. Our findings suggest that environmental laws' efficacy for corporate

ethics, and corporate ethics efficacy for GPI are enhanced in the presence of institutional support in context of a developing country. Moreover, our findings extend the application of institutional theory [31], integrating ethics and sustainability literature [see also, [89] to provide insights on how environmental laws influence environmental performance via ethics and GPI. Thus, this relationship is highly contingent upon support from government. Hence, government institutions play a crucial role in enhancing the effects of laws on firms' ethics, and firm's ethics on sustainable practices.

5.2. Practical and policy implications

This study offers several important takeaways for the practitioners and policy makers. First, in developing markets such as Pakistan, environmental laws can be a very effective mechanisms in igniting behavioral change in organizations and influencing their adoption of ethical practices. Thus, there is a role for public policy makers to aggressively drive change via effective environmental directives. In addition, managers should proactively foster political ties to obtain resources, information and support for integrating environmental goals into company's strategic foundations and developments. These would enhance the companies' environmental performance in terms of achieving certifications, compliance and regulations. The analysis indicates that engineering managers (specifically manufacturers) in an environmentally depleted emerging market should inevitably cooperate with stakeholders in production processes for GPI engagement. The processes must be aligned with the laws and corporate ethics and values. Hence, firms should engineer strong internal corporate ethics. Owing to the extensive resource commitment required for GPI in emerging markets [90], firms should make efforts in seeking institutional (specifically government) collaboration and support to be more ethical and GPI oriented.

Policy makers benefit from this study by understanding the pivotal role government laws and directives can play in promoting corporate ethics in emerging economies, that consequently facilitates GPI. Governments should create awareness programs regarding sustainability and environment protection amongst industry groups. By providing incentives, government should encourage businesses to actively engage in ethical and responsible practices.

5.3. Future research directions and limitations

First, the study is based on SMEs and manufacturing firms, which make it difficult to generalize the observations to the context of large and service firms. Second, our sample of 102 Pakistani firms is relatively small given the large number of SMEs operating in the country. Additionally, this study focused on a particular developing country context with its unique institutional impediments. Future studies could examine firms from stable institutional settings of advanced economies and then compare with other emerging economies such as India and Iran. These shortcomings also open up opportunities for future researchers to seek larger samples from different types of firms such as engineering MNEs and state-owned enterprises. While this study did account for some control variables, future studies could test other possible confounding effects such as firm's innovativeness, firm performance, turnover, and productivity. Finally, it would be useful to triangulate and complement our findings with secondary data and interviews to provide more nuanced interpretations. Exploring these areas would go a long way in assessing the generalizability of the findings.

References

[1] E. H. Bulte and D. P. Van Soest, "Environmental degradation in developing countries: households and the (reverse) Environmental Kuznets Curve," *Journal of Development Economics,* vol. 65, no. 1, pp. 225-235, 2001.

[2] J. Pinkse and A. Kolk, *International business and global climate change*. Routledge, 2009.

[3] B. Adams, *Green development: Environment and sustainability in a developing world*. London: Routledge, 2019.
[4] S. A. Sarkodie and V. Strezov, "Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries," *Science of the Total Environment,* vol. 646, pp. 862-871, 2019.
[5] E. F. Lambin and T. Thorlakson, "Sustainability standards: Interactions between private actors, civil society, and governments," *Annual Review of Environment and Resources,* vol. 43, no. 1, pp. 369-393, 2018.
[6] D. C. North, *Institutions, institutional change and economic performance*. Cambridge University Press, 1990.
[7] P. J. DiMaggio and W. W. Powell, "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields," *American Sociological Review,* vol. 48, no. 2, pp. 147-160, 1983.
[8] W. Scott, "Institutions and organizations (2nd [thoroughly rev. and expanded] ed.)," *Thousand Oaks, CA.[etc.]: Sage,* 2001.
[9] Y. Liu, A. Wang, and Y. Wu, "Environmental regulation and green innovation: Evidence from China's new environmental protection law," *Journal of Cleaner Production,* vol. 297, p. 126698, 2021.
[10] D. Li, M. Huang, S. Ren, X. Chen, and L. Ning, "Environmental legitimacy, green innovation, and corporate carbon disclosure: Evidence from CDP China 100," *Journal of Business Ethics,* vol. 150, no. 4, pp. 1089-1104, 2018.
[11] R. Imran, M. N. Alraja, and B. Khashab, "Sustainable performance and green innovation: Green human resources management and big data as antecedents," *IEEE Transactions on Engineering Management,* vol. 70, no. 12, pp. 4191-4206, 2021.
[12] M. Zhang, W. Zeng, Y. K. Tse, Y. Wang, and P. Smart, "Examining the antecedents and consequences of green product innovation," *Industrial Marketing Management,* vol. 93, pp. 413-427, 2021.
[13] M. Christofi, H. Khan, and L. Iaia, "Responsible innovation in Asia: A systematic review and an agenda for future research," *Asia Pacific Journal of Management,* pp. 1-43, 2022.
[14] M. M. Rahim, "Improving social responsibility in RMG industries through a new governance approach in laws," *Journal of Business Ethics,* vol. 143, pp. 807-826, 2017.
[15] Y. Huang, D. L. Surface, and C. Zhang, "Corporate social responsibility and sustainability practices in B2B markets: A review and research agenda," *Industrial Marketing Management,* vol. 106, pp. 219-239, 2022.
[16] M. S. Blodgett, "Substantive ethics: Integrating law and ethics in corporate ethics programs," *Journal of Business Ethics,* vol. 99, no. 1, pp. 39-48, 2011.
[17] S. Asadi *et al.*, "Investigating influence of green innovation on sustainability performance: A case on Malaysian hotel industry," *Journal of Cleaner Production,* vol. 258, p. 120860, 2020.
[18] G. I. Galinato and H. H. Chouinard, "Strategic interaction and institutional quality determinants of environmental regulations," *Resource and Energy Economics,* vol. 53, pp. 114-132, 2018.
[19] "RRBM Co-founders of (2017) A vision for responsible research in business and management: Striving for useful and credible knowledge, Position Paper, accessible from www.rrbm.network." [Online]. Available: http://www.rrbm.network.
[20] Y. Guo, D. A. Yen, R. Geng, and G. Azar, "Drivers of green cooperation between Chinese manufacturers and their customers: An empirical analysis," *Industrial Marketing Management,* vol. 93, pp. 137-146, 2021.

[21] X. Yu, Y. Tao, D. Wang, and M. M. Yang, "Disengaging pro-environmental values in B2B green buying decisions: Evidence from a conjoint experiment," *Industrial Marketing Management,* vol. 105, pp. 240-252, 2022.
[22] C. B. Gabler, O. S. Itani, and R. Agnihotri, "Activating Corporate Environmental Ethics on the Frontline: A Natural Resource-Based View," *Journal of Business Ethics,* pp. 1-24, 2022, doi: 10.1007/s10551-022-05201-2.
[23] X. Xie, J. Huo, G. Qi, and K. X. Zhu, "Green process innovation and financial performance in emerging economies: Moderating effects of absorptive capacity and green subsidies," *IEEE Transactions on Engineering Management,* vol. 63, no. 1, pp. 101-112, 2015.
[24] C. B. Gabler, R. G. Richey Jr, and A. Rapp, "Developing an eco-capability through environmental orientation and organizational innovativeness," *Industrial Marketing Management,* vol. 45, pp. 151-161, 2015.
[25] D. Li, M. Zheng, C. Cao, X. Chen, S. Ren, and M. Huang, "The impact of legitimacy pressure and corporate profitability on green innovation: Evidence from China top 100," *Journal of Cleaner Production,* vol. 141, pp. 41-49, 2017.
[26] X. Chen, N. Yi, L. Zhang, and D. Li, "Does institutional pressure foster corporate green innovation? Evidence from China's top 100 companies," *Journal of Cleaner Production,* vol. 188, pp. 304-311, 2018.
[27] AirNews. "Pakistan ranked as second-most polluted country in world
Read more At:
https://www.aninews.in/news/world/asia/pakistan-ranked-as-second-most-polluted-country-in-world20210317025240/." https://www.aninews.in/news/world/asia/pakistan-ranked-as-second-most-polluted-country-in-world20210317025240/ (accessed 01.02.2025).
[28] Dawn. "Hazy Lahore declared most polluted city in the world." https://www.dawn.com/news/1655402 (accessed.
[29] J. Sarkis, T. De Bruijn, and Q. Zhu, "Guest editorial: Sustainability in engineering management—Setting the foundation for the path forward," *IEEE Transactions on Engineering Management,* vol. 60, no. 2, pp. 301-314, 2013.
[30] T. Fatima and S. Elbanna, "Corporate social responsibility (CSR) implementation: a review and a research agenda towards an integrative framework," *Journal of Business Ethics,* pp. 1-17, 2022, doi: 10.1007/s10551-022-05047-8.
[31] Y. Eiadat, A. Kelly, F. Roche, and H. Eyadat, "Green and competitive? An empirical test of the mediating role of environmental innovation strategy," *Journal of World business,* vol. 43, no. 2, pp. 131-145, 2008.
[32] C.-H. Chang, "The influence of corporate environmental ethics on competitive advantage: The mediation role of green innovation," *Journal of Business Ethics,* vol. 104, pp. 361-370, 2011.
[33] D. Risi, L. Vigneau, S. Bohn, and C. Wickert, "Institutional theory-based research on corporate social responsibility: Bringing values back in," *International Journal of Management Reviews,* vol. 25, no. 1, pp. 3-23, 2023.
[34] A. Saikia, S. N. Bhattacharya, and R. Dwivedi, "Institutional theory and multinational corporation internationalization strategy: a systematic review and future research agenda," *International Journal of Emerging Markets,* 2024.
[35] Y. Guo, L. Wang, and Q. Yang, "Do corporate environmental ethics influence firms' green practice? The mediating role of green innovation and the moderating role of personal ties," *Journal of Cleaner Production,* vol. 266, p. 122054, 2020.

[36] Y.-S. Chen, S.-B. Lai, and C.-T. Wen, "The influence of green innovation performance on corporate advantage in Taiwan," *Journal of Business Ethics,* vol. 67, no. 4, pp. 331-339, 2006.
[37] X. Zhao and B. Sun, "The influence of Chinese environmental regulation on corporation innovation and competitiveness," *Journal of Cleaner Production,* vol. 112, pp. 1528-1536, 2016.
[38] M. Shadnam and T. B. Lawrence, "Understanding widespread misconduct in organizations: An institutional theory of moral collapse," *Business Ethics Quarterly,* vol. 21, no. 3, pp. 379-407, 2011.
[39] Y. Zhou, S. Zhu, and C. He, "How do environmental regulations affect industrial dynamics? Evidence from China's pollution-intensive industries," *Habitat International,* vol. 60, pp. 10-18, 2017.
[40] F. Küskü, "From necessity to responsibility: Evidence for corporate environmental citizenship activities from a developing country perspective," *Corporate Social Responsibility and Environmental Management,* vol. 14, no. 2, pp. 74-87, 2007.
[41] D. M. Payne and C. A. Raiborn, "Sustainable development: the ethics support the economics," *Journal of Business Ethics,* vol. 32, no. 2, pp. 157-168, 2001.
[42] H. Li and K. Atuahene-Gima, "Product innovation strategy and the performance of new technology ventures in China," *Academy of management Journal,* vol. 44, no. 6, pp. 1123-1134, 2001.
[43] Y. Ying, S. Wang, and Y. Liu, "Make bricks without straw: Eco-innovation for resource-constrained firms in emerging markets," *Technovation,* vol. 114, p. 102517, 2022.
[44] M. Porter and C. Van der Linde, "Green and competitive: ending the stalemate," *The Dynamics of the eco-efficient economy: environmental regulation and competitive advantage,* vol. 33, pp. 120-134, 1995.
[45] P. Berrone, A. Fosfuri, L. Gelabert, and L. R. Gomez-Mejia, "Necessity as the mother of 'green'inventions: Institutional pressures and environmental innovations," *Strategic Management Journal,* vol. 34, no. 8, pp. 891-909, 2013.
[46] L. Min Foo, "Stakeholder engagement in emerging economies: considering the strategic benefits of stakeholder management in a cross-cultural and geopolitical context," *Corporate Governance: The international journal of business in society,* vol. 7, no. 4, pp. 379-387, 2007.
[47] M. Washington and M. J. Ventresca, "How organizations change: The role of institutional support mechanisms in the incorporation of higher education visibility strategies, 1874–1995," *Organization Science,* vol. 15, no. 1, pp. 82-97, 2004.
[48] H. Sun, B. K. Edziah, C. Sun, and A. K. Kporsu, "Institutional quality, green innovation and energy efficiency," *Energy policy,* vol. 135, p. 111002, 2019.
[49] Z. Liao, "Institutional pressure, knowledge acquisition and a firm's environmental innovation," *Business Strategy and the Environment,* vol. 27, no. 7, pp. 849-857, 2018.
[50] Y.-S. Peng and S.-S. Lin, "Local responsiveness pressure, subsidiary resources, green management adoption and subsidiary's performance: Evidence from Taiwanese manufactures," *Journal of Business Ethics,* vol. 79, pp. 199-212, 2008.
[51] M. A. Berry and D. A. Rondinelli, "Proactive corporate environmental management: A new industrial revolution," *Academy of Management Perspectives,* vol. 12, no. 2, pp. 38-50, 1998.
[52] R. Kemp and M. Volpi, "The diffusion of clean technologies: a review with suggestions for future diffusion analysis," *Journal of Cleaner Production,* vol. 16, no. 1, pp. S14-S21, 2008.

[53] C. Li, W. Xia, and L. Wang, "The transfer mechanism of pollution industry in China under multi-factor combination model—Based on the perspective of industry, location, and environment," *Environmental Science and Pollution Research,* vol. 28, pp. 60167-60181, 2021.
[54] U. Awan, M. G. Arnold, and I. Gölgeci, "Enhancing green product and process innovation: Towards an integrative framework of knowledge acquisition and environmental investment," *Business Strategy and the Environment,* vol. 30, no. 2, pp. 1283-1295, 2021.
[55] U. Awan, S. Nauman, and R. Sroufe, "Exploring the effect of buyer engagement on green product innovation: Empirical evidence from manufacturers," *Business Strategy and the Environment,* vol. 30, no. 1, pp. 463-477, 2021.
[56] L. Wang, Y. Long, and C. Li, "Research on the impact mechanism of heterogeneous environmental regulation on enterprise green technology innovation," *Journal of Environmental Management,* vol. 322, p. 116127, 2022.
[57] J. M. L. S. Borsatto and C. L. Bazani, "Green innovation and environmental regulations: A systematic review of international academic works," *Environmental Science and Pollution Research,* pp. 1-18, 2021.
[58] Z. Wei, H. Shen, K. Z. Zhou, and J. J. Li, "How does environmental corporate social responsibility matter in a dysfunctional institutional environment? Evidence from China," *Journal of Business Ethics,* vol. 140, no. 2, pp. 209-223, 2017.
[59] M. P. Miles and J. G. Covin, "Environmental marketing: A source of reputational, competitive, and financial advantage," *Journal of Business Ethics,* vol. 23, no. 3, pp. 299-311, 2000.
[60] S. K. Singh, J. Chen, M. Del Giudice, and A.-N. El-Kassar, "Environmental ethics, environmental performance, and competitive advantage: Role of environmental training," *Technological Forecasting and Social Change,* vol. 146, pp. 203-211, 2019.
[61] M. Tourky, P. Kitchen, and A. Shaalan, "The role of corporate identity in CSR implementation: An integrative framework," *Journal of Business Research,* vol. 117, pp. 694-706, 2020.
[62] A. Di Vaio, R. Hassan, G. D'Amore, and R. Tiscini, "Responsible innovation and ethical corporate behavior in the Asian fashion industry: A systematic literature review and avenues ahead," *Asia Pacific Journal of Management,* pp. 1-45, 2022, doi: 10.1007/s10490-022-09844-7.
[63] R. Adams, S. Jeanrenaud, J. Bessant, D. Denyer, and P. Overy, "Sustainability-oriented innovation: A systematic review," *International Journal of Management Reviews,* vol. 18, no. 2, pp. 180-205, 2016.
[64] J. Aftab, N. Abid, H. Sarwar, and M. Veneziani, "Environmental ethics, green innovation, and sustainable performance: Exploring the role of environmental leadership and environmental strategy," *Journal of Cleaner Production,* vol. 378, p. 134639, 2022.
[65] D. Eckstein, V. Künzel, and L. Schäfer, "Global climate risk index 2021," *Who Suffers Most from Extreme Weather Events,* pp. 2000-2019, 2021.
[66] Dawn. "Industrial pollution." https://www.dawn.com/news/1683024/industrial-pollution (accessed 05.02.2025).
[67] N. Abid, M. Ikram, J. Wu, and M. Ferasso, "Towards environmental sustainability: exploring the nexus among ISO 14001, governance indicators and green economy in Pakistan," *Sustainable Production and Consumption,* vol. 27, pp. 653-666, 2021.
[68] WGI. "World Governance Indicator." (accessed 01.02.2025).

[69] M. Shahzad, Y. Qu, S. A. Javed, A. U. Zafar, and S. U. Rehman, "Relation of environment sustainability to CSR and green innovation: A case of Pakistani manufacturing industry," *Journal of Cleaner Production,* vol. 253, p. 119938, 2020.
[70] L. Wu and H. Liu, "How bricolage influences green management in high-polluting manufacturing firms: The role of stakeholder engagement," *Business Strategy and the Environment,* 2022, doi: 10.1002/bse.3111.
[71] M. Yasir, A. Majid, and H. Qudratullah, "Promoting environmental performance in manufacturing industry of developing countries through environmental orientation and green business strategies," *Journal of Cleaner Production,* vol. 275, p. 123003, 2020.
[72] A. Sharma, G. R. Iyer, A. Mehrotra, and R. Krishnan, "Sustainability and business-to-business marketing: A framework and implications," *Industrial Marketing Management,* vol. 39, no. 2, pp. 330-341, 2010.
[73] B. J. Mariadoss, P. S. Tansuhaj, and N. Mouri, "Marketing capabilities and innovation-based strategies for environmental sustainability: An exploratory investigation of B2B firms," *Industrial Marketing Management,* vol. 40, no. 8, pp. 1305-1318, 2011.
[74] PakistanToday. "Green SMEs: A turning point for Pakistan's economy." https://www.pakistantoday.com.pk/2022/03/23/green-smes-a-turning-point-for-pakistans-economy/ (accessed 25.01.2015).
[75] Z. Khan, Y. K. Lew, and S. Marinova, "Exploitative and exploratory innovations in emerging economies: The role of realized absorptive capacity and learning intent," *International Business Review,* vol. 28, no. 3, pp. 499-512, 2019.
[76] J. Zhou, F. T. Mavondo, and S. G. Saunders, "The relationship between marketing agility and financial performance under different levels of market turbulence," *Industrial Marketing Management,* vol. 83, pp. 31-41, 2019.
[77] M. K. Lindell and D. J. Whitney, "Accounting for common method variance in cross-sectional research designs," *Journal of Applied Psychology,* vol. 86, no. 1, pp. 114-121, 2001.
[78] N. F. Piercy, D. W. Cravens, N. Lane, and D. W. Vorhies, "Driving organizational citizenship behaviors and salesperson in-role behavior performance: The role of management control and perceived organizational support," *Journal of the Academy of Marketing Science,* vol. 34, no. 2, pp. 244-262, 2006.
[79] Y. Bai, S. Song, J. Jiao, and R. Yang, "The impacts of government R&D subsidies on green innovation: Evidence from Chinese energy-intensive firms," *Journal of Cleaner Production,* vol. 233, pp. 819-829, 2019.
[80] A. Achi, O. Adeola, and F. C. Achi, "CSR and green process innovation as antecedents of micro, small, and medium enterprise performance: Moderating role of perceived environmental volatility," *Journal of Business Research,* vol. 139, pp. 771-781, 2022.
[81] D. Y. Kim and H.-Y. Kim, "Influencer advertising on social media: The multiple inference model on influencer-product congruence and sponsorship disclosure," *Journal of Business Research,* vol. 130, pp. 405-415, 2021.
[82] H. R. Abbu and P. Gopalakrishna, "Synergistic effects of market orientation implementation and internalization on firm performance: Direct marketing service provider industry," *Journal of Business Research,* vol. 125, pp. 851-863, 2021.
[83] M. W. Peng, S. L. Sun, B. Pinkham, and H. Chen, "The institution-based view as a third leg for a strategy tripod," *Academy of Management Perspectives,* vol. 23, no. 3, pp. 63-81, 2009.

[84] Y. Xie *et al.*, "Leadership style and innovation atmosphere in enterprises: An empirical study," *Technological Forecasting and Social Change,* vol. 135, pp. 257-265, 2018.
[85] S. H. M. Zailani, T. K. Eltayeb, C. C. Hsu, and K. C. Tan, "The impact of external institutional drivers and internal strategy on environmental performance," *International Journal of Operations & Production Management,* vol. 32, no. 6, pp. 721-745, 2012.
[86] R. Jeurissen, "Institutional conditions of corporate citizenship," *Journal of Business Ethics,* vol. 53, no. 1-2, pp. 87-96, 2004.
[87] E. A. Henao-García and R. A. C. Montoya, "Management innovation in an emerging economy: an analysis of its moderating effect on the technological innovation–performance relationship," *IEEE Transactions on Engineering Management,* vol. 70, no. 1, pp. 128-141, 2021.
[88] G. Qi, Y. Jia, and H. Zou, "Is institutional pressure the mother of green innovation? Examining the moderating effect of absorptive capacity," *Journal of Cleaner Production,* vol. 278, p. 123957, 2021.
[89] R. Hasan, M. M. Kamal, A. Daowd, T. Eldabi, I. Koliousis, and T. Papadopoulos, "Critical analysis of the impact of big data analytics on supply chain operations," *Production Planning & Control,* vol. 35, no. 1, pp. 46-70, 2024.
[90] A. Gupta, R. K. Singh, and M. M. Kamal, "Blockchain technology adoption for secured and carbon neutral logistics operations: barrier intensity index framework," *Annals of Operations Research,* pp. 1-34, 2024.