

## Article

# Sustainable Leadership in Frontier Asia Region: Managerial Discretion and Environmental Innovation

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**Abstract:** Climate change brings severe impact to frontier Asia in the shape of its significant negative effect on workability and livability. Drawing on the upper echelon theory (UET), this study aims to investigate the mechanism and conditional factors of a sustainable leadership–environmental performance relationship. Employing cluster sampling, this study has collected data from small and medium enterprises in frontier Asian countries—Pakistan, India, and Bangladesh. In this study, the authors have collected 245 valid responses with a response rate of 41%. The authors have employed Structural Equation Modelling (SEM) analysis to test the proposed hypothesis. The present empirical findings confirm the significant effect of sustainable leadership on environmental innovation and the significant effect of environmental innovation on environmental performance. The current study confirms that sustainable leaders indirectly influence environmental performance through environmental innovation. Nevertheless, its effect on environmental innovations does not amplify in the presence of managerial discretion. To the best of our knowledge, this study is the first in its nature that has explored the integrated role of sustainable leadership, environmental innovation, managerial discretion, and environmental performance. Limitations and implications have been listed at the end of the study.

**Keywords:** green leadership; sustainable innovation; green innovation; sustainable performance; discretion; emerging markets; SMEs



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## 1. Introduction

In the presence of severe environmental management issues, numerous stakeholders such as Governments, regulators, non-government agencies, and customers are forcing organizations to adopt environmentally-friendly activities to lessen the negative impact of their operations on nature [1–4]. Certain factors such as consumer, institutional, and industry pressures are constantly pressurizing organizations to reduce their ecologically toxic behaviors [5]. Despite plenty of research on environmental performance, there is a lack of consensus as to why organizations show different performance in relation to environmental parameters [6]. Considering environmental challenges and the significance of natural resources, organization have shifted their perspective on the standpoint of running businesses by focusing on both financial performance and their contribution to nature [7]. Regarding burgeoning pressure from diverse stakeholders and regulators in the context of environmental degradation, organizations have adopted environmentally friendly business strategies [3,7]. Accordingly, the leadership of organizations have started taking environmentally-friendly business practices to cope with severe climate changes as a vital part of their agenda [8,9].

A pro-environmental business requires the firm to apply environmentally-friendly approaches at all levels of its operations, including upstream and downstream activities in order to reduce environmental damages [10]. In these efforts, organizations adopt environmental innovation strategies along with the enhancement of the firm's performance

and environmental performance. Environmental innovation, green innovation, and eco-innovation are synonymously used in extant studies [11,12]. Environmental innovation introduces new or improved processes, products, systems, and technologies that remove negative impacts on the environment [13,14]. Environmental innovation examines the effect of expenditures on environmental research and development (R&D), employees in the environmental sector, the environmental protection patents and the market performance of final products [14,15]. Environmental innovation improves the quality of life for everyone by using minimum natural resources and releasing minimum pollutants [11]. Accordingly, it has appeared as a vital approach to cope with environmental issues [16,17]. In line with these developments, environmental innovation has received tremendous interest in the last twenty years [18], yet, inefficient leadership practices hinder organizations from innovating activities [19,20].

Numerous scholars across diverse fields have agreed that leadership is the key and vital force to cultivate innovative capability in the dynamic market [19,21]. In the context of environmental challenges, sustainable leadership is known as highly effective leadership. Sustainable leadership practices emphasize sustained learning, long-lasting success, ethical, social, and responsible behavior, development of resources, environmental diversity, efficient stakeholder management, and amicable relationship with employees [22].

Considering the upper echelon theory (UET) [23], the ideologies and cognitive boundaries of leaders affect the strategic choices of an organization. Accordingly, the orientation of leaders towards environmental innovation in conjunction with their ideas and understanding are considered as the key factors to encourage environmental innovation. Sustainable leaders have a strong propensity towards stakeholder-oriented approaches, and they are determined to achieve a wider scope of sustainable development. Being the key source of development and competitive advantage in developing countries and coping with environmental pollution, environmental innovation is considered as an ideal strategy for sustainable leaders to tackle environmental challenges and environmental performance by upgrading manufacturing processes, saving energy, reducing pollution, minimizing waste, and reducing the negative effects on nature [9,24]. Therefore, from the perspective of the upper echelon theory, this study postulates that sustainable leadership could enhance environmental performance through environmental innovation in the frontier Asia region. The frontier Asia region, which comprises three countries—Pakistan, India, and Bangladesh—faces severe challenges in the form of environmental degradation and pollution [25,26]. Additionally, the upper echelon theory consists of managerial discretion as a vital variable in its framework. According to Crossland and Hambrick (2011), a higher level of managerial discretion enhances the impact of top management on their behaviors and results. Therefore, the present research hypothesizes that sustainable leadership impacts on environmental innovation amplify with the increasing level of managerial discretion.

Considering the insufficiency of empirical evidence about the role of sustainable leadership and its relationship with environmental innovation [27,28], there are limited studies on the environmental performance of small and medium enterprises (SMEs) [3] and environmental challenges faced by the frontier Asia region. The present research fulfills the research gap by investigating the mediating effect of environmental innovation on the relationship of sustainable leadership with environmental performance and the conditional effect of managerial discretion. This study offers a two-fold contribution. First, the empirical findings shed light on the relationship between sustainable leadership, environmental performance, and environmental innovation. By applying the upper echelon theory (UET) on environmental research, the present study extends the theoretical standpoint on the background of environmental innovation. Second, the current research also evaluates managerial discretion as a conditional factor, which strengthens the conditional context of research on leadership and simplifies the apprehension of the boundary restrictions that enhances environmental innovation.

## 2. Literature Review

### 2.1. Theoretical Background

Upper echelon theory (UET) is a theoretical perspective that answers the questions “Does leadership affect a firm’s performance?” and “How may leadership affect firm performance?”. According to the upper echelon theory (UET), leadership’s experiences, values, and personalities affect their preferences [1], and through these choices, organizational performance” [2]. Considering this perspective, this study suggests the indirect effect of sustainable leadership on environmental performance through environmental innovation. Sustainable leadership practices develop around long-term perspectives, systemic innovation, workforce development, and quality [3,4]. Innovation is viewed as a strategy to impact a firm’s performance. In the developing markets, Porter’s (1990) model for innovation emphasizes the application of incremental innovation as it satisfies the requirements of stakeholders’ expectations. Furthermore, developing countries are facing resource-constraints, in the form of low technological capability, funds, and other complex matters, so that incremental innovation is considered as highly effective for them [5]. Environmental innovation, a form of incremental innovation, introduces minor improvements in previous versions of processes, products, employing available resources [11,29]. The theory of learning economies introduces the concept of incremental innovation. Considering the high embeddedness of learning processes into incremental innovation, sustainable leaders who encourage organizational learning and psychological safety among employees, and sustain lasting relations with stakeholders, may adopt environmental innovation in the market. Environmental innovation takes incremental steps towards environmental performance by introducing energy-efficient processes and redesigned products with efficient consumption of resources [6].

Leaders influence what happens to their organizations [1]. On the other hand, population ecology and new institutional theory claim that the impact of leaders on organizational outcomes is very low because of external forces and norms [7,8]. Upper echelon theory reconciles this view by introducing the concept of discretion. UET claims that the impact of leadership on organizational outcomes depends on how much managerial discretion they have. Discretion exists provided leaders have no constraint and sufficiency of alternatives. Managerial discretion emerges from the environment, organizational factors, and personality of leaders. According to upper echelon theory, the impact of leadership on organizational outcomes is directly proportional to managerial discretion. Numerous studies have assessed the moderating role of managerial discretion vis-a-vis upper echelon theory [9–11]. Accordingly, this study investigates the moderating role of managerial discretion on the relationship of sustainable leadership with environmental innovation.

### 2.2. Sustainable Leadership and Environmental Innovation

Previous studies have concluded with the substantial impact of leadership spurring innovation [30–33]. Sustainable leadership has been recommended as highly effective leadership to deal with environmental challenges [34]. Strong sharing vision, support for ideas generation, knowledge sharing, long-lasting relationships, ethically and socially responsible behaviors are core attributes of sustainable leaders [28,35]. Specifically, sustainable leaders inspire and motivate employees to share new ideas and initiate innovative activities, which results in continuous development at the organizational level. Such practices also guarantee the positive behaviors of employees toward innovation initiatives. Sustainable leaders enhance employees’ out-of-the-box thinking ability by promoting knowledge sharing within organizations. Sustainable leaders also promote innovation by providing confidence and support to employees to spawn new ideas [36].

Individualized consideration “serves as a carrot” to fulfill employee’s personal needs [30]. Sustainable leaders are good at developing amicable relationships with diverse stakeholders, which arouses employee’s creativity and innovation. Through effective relationship management and stakeholder management, sustainable leaders offer learning opportunities that are mandatory for environmental innovation [37]. In addition, to the

best of our knowledge, there is no single empirical evidence on the relationship of sustainable leadership with environmental innovation. Therefore, the subsequent hypothesis is established.

**Hypothesis 1 (H1).** *Sustainable leadership significantly affects environmental innovation.*

### 2.3. Environmental Innovation and Environmental Performance

Based on Porter's competition theory, organizations expand their investment in R&D and modify production processes due to strict environmental regulations and policies that drive the advent of environmental innovation [11]. Organizations increase their environmental R&D expenditure and revamp their production processes. Environmental innovation helps organizations to enhance their productivity [14]. With the cutback of production cost, improved production processes, and product innovation, environmental innovation has an encouraging effect on the financial performance of the organization [14,38]. With advanced technology and clean production, environmental innovation negatively affects environmental pollution [39,40]. With increased environmental innovation, there is a downturn in environmental pollution [41]. According to Lee and Min (2015), environmental innovation reduces carbon emission and positively impacts firm performance. Environmental innovation, in parallel, improves both environmental and financial performance [39]. Therefore, the hypothesis below is developed.

**Hypothesis 2 (H2).** *Environmental innovation significantly affects environmental performance.*

### 2.4. The Environmental Innovation as Mediator

According to Juhro and Aulia (2019), the leadership of any organization substantially participates in the development of innovation quality which is related to process improvement. Sustainable leaders' practices develop around long-term perspective, innovation, socially responsible and ethical behavior, cordial relationship with stakeholders, and supportive organizational culture [35,37]. Singh et al. (2020) viewed strong vision, two-way communication, support for the generation of ideas, friendly relations with employees, and effective stakeholder management as a key facilitator of innovation [41]. Sustainable leaders also nurture generation and sharing of ideas, two-way communication, which leads to a mentally secure environment for innovation [33,36]. A polite relationship between top management and employees also plays a critical role in promoting creative activities within organizations [42], which is one of the fundamental practices of sustainable leadership [27]. By innovating incrementally, sustainable leadership practices introduce continuous improvements in products and processes at a small scale [43,44]. Effective research and development in environmental innovation influences environmental pollution negatively [45]. Environmental performance deals with the efficient use of resources [46]. It also evaluates the negative impact of products and processes on nature during different stages of its development [47]. To deal with negative environmental impacts, there is a need to have substantial investment research and development [48]. Through improved products, design, technology, and knowledge, organizations reduce their negative effects on nature. Hence, the hypothesis below is established.

**Hypothesis 3 (H3).** *Environmental innovation significantly mediates the relationship between sustainable leadership and environmental performance.*

### 2.5. The Contingent Role of Managerial Discretion

Drawing on the upper-echelon perspective, managerial discretion, which measures the limit to which managers have the freedom to establish goals and execute their ideas, shows their actual control on a firm's tactical decision-making and executive processes [23,46]. Being part of the organizational structure, top management is responsible for both internal and external affairs of organizations in the presence of certain power constraints. The effective implementation of a decision such as innovative activities by top management

depends on the extent to which they have autonomy. Crossland and Hambrick (2011) hold that strong managerial discretion drives a higher impact of top leadership on organizational outcomes [49]. Such an impact is weaker in the presence of high constraints faced by managers.

Leaders do not innovate in silos. Managerial autonomy offers adequate latitude of actions to top managers to induce innovation at their optimum level [50]. Sustainable leadership, being at the interface of internal hierarchy and the external environment, has an integrative understanding of their organizational internal and market external innovation activities as compared to other employees. Their long experience and power vested in their positions enables them to offer holistic views about internal innovation activities within their organization [51]. The positions' prestige and high visibility of sustainable leadership within organizations offer them diverse opportunities to socialize with different stakeholders. The practices of sustainable leaders promote effective cordial relationships with diverse stakeholders. From the external market perspective, leadership holds exclusive information about the numerous stakeholders through its personal networking and social capital [52]. So, sustainable leaders offer unique insights to innovate incrementally because of their boundary spanning position, which is potentially beneficial to their firm. The stewardship perspective claims that leaders, with high managerial discretion, use resources more efficiently and effectively as compared to other employees in their organization [50]. Therefore, the hypothesis below is developed.

**Hypothesis 4 (H4).** *Managerial discretion moderates the sustainable leadership-environmental innovation relationship such as the impact of sustainable leadership, in the presence of higher managerial discretion, on the environmental innovation increases significantly.*

### 3. Research Methodology

With increasing climate issues and intensifying hazards, the Asia region is expected to face severe impacts across the globe [26]. On the basis of a country's exposure and response to environmental challenges, and its climate profile, the Asia region has been categorized into four types: advanced Asia, frontier Asia, emerging Asia, and China [25]. Frontier Asia has three countries Pakistan, India, and Bangladesh. Emerging Asia consists of Malaysia, Myanmar, Philippines, Indonesia, Laos, Thailand, Vietnam, and Cambodia. Advanced Asia covers countries namely Australia, New Zealand, South Korea, and Japan. According to Woetzel et al. (2020), environmental pollution has the highest negative impact on the frontier Asian countries. This region is experiencing extreme humidity and heat, which is deteriorating living ability and workability. By 2050, its average temperature is anticipated to rise by 2–4 °C. The anticipated average rise in the temperature would force the region to cope with lethal heatwaves. Because of severe climate change, the agriculture sector in this region is anticipated to decline by a minimum of 10% in yield annually [26]. Furthermore, SMEs are the backbone of the economic development of any country. In Asia, SMEs, besides having a huge positive impact on job creation, exports and income distribution, also consume most of the natural resources and are viewed as source of water, air pollution, and waste generation [53,54]. Considering all these facts and figures, this study considers SMEs in Frontier Asia region as the population.

Across the globe, SMEs have different definitions. SMEs are defined based on numerous characteristics such as the number of employees, annual sales, capitalization, amount of assets or a combination of these attributes. In Bangladesh, SMEs are defined as those enterprises which have less than 100 employees with a maximum Tk. 100 million [55]. India has categorized small and medium enterprises based on capital investment. In India, SMEs are required to invest up to Rs.10 m on machinery [56]. The Small and Medium Enterprises Development Authority has defined SMEs as having a number of employees up to 250 [54,57]. Regarding these definitions of SMEs in respective countries, this study has added screening questions in online survey form to ensure the validity of respondents.

Considering time, financial, and networking as constraints in collecting data from a massive population, the present study has employed a cluster sampling approach to classify SMEs in Frontier Asia—Pakistan, India, and Bangladesh—into different groups in relation to their geographical locations. Regarding the simple random sampling approach, the authors have collected data from the representatives of SMEs in Islamabad-Pakistan, Mumbai-India, and Dhaka-Bangladesh. Researchers have taken support from the local faculty members to collect data from SME representatives in their respective countries. By using networking, faculty members in respective countries have shared online survey links with the representatives of SMEs at their email addresses.

The G\* Power application has ruled a minimum of 68 responses as mandatory [1]. Considering an average response of 35.7% with a standard deviation of  $\pm 18.8$  in social studies [2], online survey forms were disseminated through emails to 200 representatives in each country of the frontier region. Overall, 245 representatives have responded with a response rate of 41.00%. 79, 95, and 71 representatives of SMEs from Islamabad, Pakistan; New Delhi, India; and Dhaka, Bangladesh have participated in this study. The individual response rate from Pakistan (32.24%), India (38.78%), and Bangladesh (28.98%) was also in compliance of vis-a-vis the 35.7% average response rate with a standard deviation of  $\pm 18.8$ . Furthermore, overall, and country-level responses in this study are also above minimum required respondents, i.e., 68 as suggested by G\*Power application in this study. So, a sample size with 245 participants (response rate 41%) was enough to analyze the hypothesis and deliver valid results.

The frequency analysis revealed that there were 60% male and 40% female respondents. Respondents in this study were mostly 25 to 35 years old and had working experience of 11–15 years. 65% of the respondents in the present study had a master's degree. In this study, most respondents were from India (39%). The least respondents in the present study were from Bangladesh (29%). Table 1 represents the details of respondents in present research.

This study measured sustainable leadership by adopting a scale of 15-measurement items from the study of Iqbal and Ahmad (2020) [28]. To measure environmental performance, the present study adopted four items from the study of Maletič et al. (2016) [45], which adopted 4 measurement items of environmental innovation from the Eiadat et al.'s (2008) study [58]. As it is hard to directly measure managerial discretion (Hambrick and Finkelstein, 1987) this study measured it based on four measures—tenure, duality, long-term incentive plans, and the base salary of top management, adopted from the study of Hadani et al. (2015) [50]. Moreover, SMEs deal with the challenges such as resource constraints with reference to their size and type of industry to promote innovative activities [59]. Accordingly, the authors have taken both firm-level variables, namely, the number of employees, year of operations, and type of ownership and industry level variables such as development stage and industry type, as the control variables in the present research.

Prior to hypothesis testing, the present study underwent the checking of missing values, outliers, response bias, normal distribution, common method bias, and multicollinearity issue. The mandatory marking of all questions in the online survey form guaranteed the non-appearance of missing values in this research. The Z-scores of all cases were found less than 3.29 in SPSS, which ensured missing of any outliers.

In this study, skewness and kurtosis values of all variables extend from 0.051 to 1.565, and from  $-1.309$  to 1.909, respectively, which comes within the limit of +3 and  $-3$ . Correspondingly, there was a normal distribution of data. This study applied a 5-point Likert scale to measure variables. According to Sekaran and Bougie (2016), mean values are considered low, medium, and high, provided they are less than 2.99, lie in the range of 3 to 3.99, or greater than 4, respectively [60]. In this study, environmental innovation was found at a low level (mean value = 2.907) in frontier Asia countries. The rest of the variables, such as sustainable leadership, managerial discretion, and environmental performance had mean values in the range of 3 to 3.99 so this indicates the fair presence in organizations (See Table 2).

**Table 1.** Demographic Analysis.

Categorical Variables	Frequency	Percentage	Valid Percentage	Cumulative Percent
Gender				
Female	148	60.4	60.41	60.41
Male	97	39.6	39.59	100
Age				
<25	14	5.71	5.71	5.71
25–35	105	42.86	42.86	48.57
36–45	81	33.06	33.06	81.63
46–55	30	12.24	12.24	93.88
>55	15	6.12	6.12	100.00
Education				
PhD	11	4.49	4.49	4.49
Master	159	64.90	64.9	69.39
Degree	67	27.35	27.35	96.74
High School Certificate	8	3.27	3.27	100
Designation				
General Manager	62	25.31	25.31	25.31
Manager	131	53.47	53.47	78.78
Executive	45	18.37	18.37	97.14
Others	7	2.86	2.86	100
Number of Employees				
<10	17	6.94	6.94	6.94
10–50	67	27.35	27.35	34.29
51–100	131	53.47	53.47	87.76
100–150	21	8.57	8.57	96.33
>150	9	3.67	3.67	100
Experience				
<5 Years	27	11.02	11.02	11.02
5–10 Years	51	20.82	20.82	31.84
11–15 Years	117	47.76	47.76	79.59
16–20 Years	34	13.88	13.88	93.47
>20 years	16	6.53	6.53	100
Country				
Pakistan	79	32.24	32.24	32.24
India	95	38.78	38.78	71.02
Bangladesh	71	28.98	28.98	100.00

**Table 2.** Descriptive Analysis.

Construct	Mean	Std. Deviation	Skewness	Kurtosis
Environmental innovation	2.907	0.336	1.565	1.909
Managerial discretion	3.346	0.440	0.950	1.084
Sustainable leadership	3.243	0.492	0.051	−1.309
Environmental performance	3.062	0.3683	0.858	0.787

In cross-sectional studies, common method variance is viewed as a potential issue. The present study has employed Harman's single-factor analysis and the confirmatory factor analysis (CFA) to assess common method variance. In the Harman's single-factor method, all items are loaded on a single factor while running exploratory factor analysis. According to Podsakoff (2012), Harman's single factor test indicates no common method variance provided the percentage variance extracted of the single factor is less than 50% [61]. In this study, Harman's single-factor analysis revealed the absence of common method variance as the single factor, explaining 33.47% of the total variance. Moreover, the confirmatory factor analysis (CFA) technique in this study has also provided acceptable fit indices with minute variance between proposed and observed model

(comparative fit index (CFI) = 0.883 < 0.90, Goodness-of-fit index (GFI) = 0.965 > 0.95, Standardized root-mean-square residual (SRMR) = 0.067 < 0.08, Root-mean-square error of approximation (RMSEA) = 0.0872 > 0.08). Both, the Harman's single factor test and confirmatory factor analysis revealed the absence of common method variance in this study.

As this study covers SMEs in frontier Asia—Pakistan, India, and Bangladesh—and has one independent variable, that is sustainable leadership, so the application of one-way analysis of variance (ANOVA) was mandatory to assess any statistical difference among respondents in these three countries. Results of one-way ANOVA revealed no response bias issues from respondents in the frontier Asia region (See Table 3). Furthermore, this study has investigated the multicollinearity issue by assessing values of variance inflation factor (VIF) of all predictors. VIF values were found to be less than 5.0 for all predictors [62] so, the present study is free of multicollinearity issues.

**Table 3.** Analysis of variance (ANOVA).

Construct		Sum of Squares	df	Mean Square	F	Sig.
Sustainable leadership	Between groups	1.074	4	0.268	0.400	0.808
	Within groups	161.672	241	0.670		
	Total	162.745	245			
Environmental performance	Between groups	1.956	4	0.489	1.322	0.263
	Within groups	89.099	241	0.369		
	Total	91.055	245			
Environmental innovation	Between groups	0.038	4	0.009	0.030	0.998
	Within groups	75.761	241	0.314		
	Total	75.8	245			
Managerial discretion	Between groups	1.038	4	0.259	0.485	0.746
	Within groups	128.897	241	0.534		
	Total	129.934	245			

In this study, the measurement analysis was conducted to investigate the internal consistency and construct validity. The measurement analysis exposed few items of sustainable leadership, managerial discretion, and environmental innovation with factor loading less than 0.40. In the presence of factor loading less than 0.40, Hair et al. (2017) recommended deleting such items [62]. Therefore, two items of sustainable leadership and one item of managerial discretion were deleted. Re-running of the measurement test revealed that values of all factor loadings of all constructs in this study were greater than 0.50, and their corresponding average variance extracted (AVE) values also exceeded the critical value of 0.50 (See Table 4). Therefore, all constructs in the present study had adequate convergent validity. The Fornell–Larcker criterion was also found to be acceptable (See Table 5), which is a clear indication of sufficient discriminant validity [63]. Hence, the construct validity was confirmed in the present study.

The empirical findings of the hypothesis in this study are shown in the table below. The sustainable leadership significantly influences environmental innovation ( $\beta = 0.4630$ ,  $p < 0.05$ ). And environmental innovation significantly influences environmental performance ( $\beta = 0.359$ ,  $p < 0.05$ ) (See Table 6). Therefore, hypotheses H1 and H2 are supported in this study. Furthermore, structural model analysis exposed that sustainable leaders significantly affect environmental performance through environmental innovation in frontier Asia ( $\beta = 0.166$ ,  $p < 0.05$ ). Hence, the indirect effect of sustainable leaders on environmental performance through environmental innovation is confirmed. Therefore, hypothesis H3 is accepted. The present study reinforces the importance of sustainable leadership practices to deal with environmental challenges in the frontier Asia region. Moreover, values of coefficient of determination (R Square) for environmental innovation and environmental performance in this study are 0.672 and 0.528, respectively.

**Table 4.** Convergent Validity.

Construct	Items	Loadings	CR	AVE
Sustainable Leadership	In your firm, leadership acts in a sustainable, socially responsible manner.	0.566	0.874	0.589
	In your firm, leadership acts in a sustainable, environmentally responsible manner.	0.609		
	In your firm, leadership acts in a sustainable, ethically responsible manner.	0.723		
	In your firm, leadership's decisions are made while considering the entire organization.	0.642		
	In your firm, leadership officially recognizes when a mistake is made that affects sustainability.	0.527		
	In your firm, leadership is willing to correct mistakes that affect sustainability.	0.531		
	In your firm, leadership attempts to use unique, innovative methods to resolve sustainability issues.	0.572		
	In your firm, leadership puts purpose before profit.	0.613		
	In your firm, leadership balances sustainable social responsibility with profits.	0.574		
	In your firm, leadership demonstrates sustainability by persevering through all types of change.	0.562		
	In your firm, leadership is concerned about how sustainability affects employees.	0.629		
	In your firm, leadership communicates sustainability decisions to all involved.	0.599		
Environmental Innovation	In your firm, leadership attempts to build a culture of sustainability through its communication efforts.	0.509	0.817	0.535
	Your organization reduces toxic waste.	0.868		
	Your organization increases investment in clean technologies.	0.712		
	Your organization introduces new forms of environmental management.	0.781		
Environmental Performance	Your organization takes steps towards air and/or water pollution prevention.	0.518	0.797	0.505
	There is an increase in the efficient consumption of raw materials.	0.662		
	There is a reduction in resource consumption (electricity, water, thermal energy).	0.719		
	There is an increase in the percentage of recycling materials.	0.897		
Managerial Discretion	There is a decrease in the waste ratio (e.g., kg per unit of product).	0.512	0.774	0.538
	There are abundant available resources that can be mobilized by the leadership in your firm.	0.854		
	In your firm, the leaderships generally have freedom in decision-making.	0.732		
	In your firm, the leadership is appointed for a longer time period.	0.590		

**Table 5.** Fornell-Larcker Criterion.

Construct	1	2	3	4
Environmental innovation	0.731			
Managerial discretion	0.705	0.733		
Environmental performance	0.358	0.359	0.711	
Sustainable leadership	0.604	0.661	0.331	0.767

**Table 6.** Hypothesis testing.

Hypothesis	$\beta$	S.D	T Statistics	p Values	LLCI	ULCI
Sustainable leadership> Environmental innovation	0.463	0.043	10.730	0.000	0.378	0.545
Environmental innovation> Environmental performance	0.359	0.087	4.118	0.000	0.294	0.429
Sustainable leadership> Environmental performance	0.166	0.045	3.672	0.000	0.123	0.216
Sustainable leadership * Managerial discretion> Environmental innovation	-0.216	0.047	4.592	0.000	-0.310	-0.124

(\*) stands for interaction of sustainable leadership and managerial discretion.

Table 6 illustrates that the interaction term of sustainable leadership and managerial discretion has no substantial positive impact on environmental innovation ( $\beta = -0.216$ ,  $p < 0.05$ ). As a result, hypothesis H4 is rejected in this study. According to available empirical evidence, the effect of sustainable leadership on environmental innovation does not increase as the importance of managerial discretion increases. Higher levels of managerial discretion stifle the relationship between sustainable leadership and environmental innovation. Higher levels of managerial discretion stifle the relationship between sustainable leadership-environmental innovation.

#### 4. Discussion

The current study is the first of its kind to present empirical findings on the interrelationship between environmental performance, environmental innovation, managerial discretion, and sustainable leadership. In this study, all four hypotheses were proven to be significant.

Hypothesis H1's empirical findings are comparable to those of previous studies [33,36,61,62], all of which claim and provide similar positive associations. Organizations will spur gradual product advancement due to top management's vision and directions [61]. In the face of a high-power, distanced society, leaders promote the development and implementation of innovative activities [62]. Furthermore, Iqbal et al. (2021) found that in emerging markets like India and China, sustainable leadership influences frugal innovation, which is characterized as the introduction of low-cost, sustainable, value-added products and services with minimal use of local resources. Entrepreneurial bricolage, according to Iqbal et al. (2020), amplifies the sustainable leadership-frugal innovation in the resource-constrained market.

End-of-pipe technologies are recommended for improving environmental performance because they are the least innovative and incremental [63]. Process innovation drives environmental performance by reducing energy consumption, carbon dioxide emissions, rising waste recycling, promoting resource consumption, and promoting sustainable manufacturing [64]. Similarly, Martnez-Alonso et al. (2019) found that process innovation has an important impact on manufacturing firms' sustainable economic success [65]. Iqbal et al. (2021) discovered that frugal innovation has a major effect on environmental performance in Pakistani manufacturing firms [33]. As a result, the empirical evidence supporting hypothesis H2 is consistent with previous research led by El-Kassar and Singh (2019), Martnez-Alonso et al. (2019), and Iqbal et al. (2021).

Previous studies [33,66–71] have concluded that leadership and the cultural climate play a key role in the development of environmental innovation that improves efficiency performance [72]. Similarly, Alrowwad and Abualoush (2020) found that innovation mediates the relationship between transformational leadership and organizational performance in Jordanian banks [73]. Hoonsopon and Puriwat (2020) investigated the effect of leadership on the fuzzy front end and discovered that managers' directive-path goal behaviors have a positive impact on the production of environmental innovation, which increases the performance of new products [74]. The effect of sustainable leadership on environmental performance is found to be mitigated by frugal innovation [33].

The latest empirical evidence also adds to the body of knowledge by examining the conditional impact of managerial discretion on the phenomenon of sustainable leadership practices and environmental innovation. Managerial discretion, agreeing to the upper echelon, increases the effect of leaders on their actions and outcomes [23]. However, the current results support the arguments of proponents of agency theory [50], who see managerial discretion as a negative by-product of poor corporate governance that operates against shareholders' interests. Additionally, leaders can engage in political activities to improve their role within firms while increasing managerial discretion. In the presence of high managerial discretion, empirical research has also verified the rise in agency costs and the capacity to manipulate audit, low oversight, and a decreased priority given to shareholders' interests [69,70]. Self-serving behaviors and non-productive optimizing

strategies may be used to abuse managerial discretion [74,75]. Higher managerial discretion has the ability to constrain environmental progress by diverting attention away from personal benefits such as prestige, reputation, and compensation package, as well as personal social capital and post-retirement career [76,77].

#### 4.1. Implications

The present findings have substantial implications for shareholders, top management, and policymakers as well. Practitioners are encouraged to foster a creative and open communication environment in their organizations based on existing scientific findings. They could also use the current results as a benchmark for studying their own strengths and limitations to incrementally innovate, which might lead to better environmental efficiency. Furthermore, recent studies persuade business owners, managers, entrepreneurs, and academicians to place a greater emphasis on environmental innovation, which has emerged as a way to alleviate the adverse consequences of extreme climate change.

The current study also adds to our understanding of how managerial discretion interacts with sustainable leadership when it comes about to environmental innovation. Given the potentially negative effect of managerial control, shareholders who are concerned about leadership direction and are served by a board of directors are advised not to take any point made by executives in relation to corporate engagement and policy options at face value. Their claim and viewpoint may end up being ineffective for the shareholders. Their claims and opinions can only serve to further their own personal objectives.

#### 4.2. Limitations and Future Recommendations

The current research retains its own set of limitations. Since this study was cross-sectional in nature, it is possible that it did not completely clarify the causal relationship, so future studies might consider a longitudinal approach. The current empirical findings can be validated in the future by studies with large and small sample sizes. Future research should include control variables such as organizational sector and country of origin, as well as a multi-level approach to improve subject matter knowledge. Despite managerial discretion, other confounding factors such as national culture must be considered to determine the impact of sustainable leadership on overall environmental innovation. Testing the same model in different markets could solve the study's generalization issue.

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