

**Governance for a Greener Future: An Environmental Sustainability Analysis of Pakistani Firms**

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**ABSTRACT**

*This research study aims to explore the association between country-level governance and the environmental sustainability of Pakistani enterprises from 2014 to 2023. The World Governance Indicator (WGI), World Bank's Development Indicator and annual reports are the data sources. This research contributes to literature by employing governance elements at the country level instead of the firm level. In this investigation, the panel data were analyzed using GMM. The results imply that features of country governance promote the environmental sustainability of enterprises operating in Pakistan. The outcomes of this research study have broad consequences for enterprises, possible local and global shareholders, governments, and management. The present study's findings revealed that governance elements at the national level boost Pakistani enterprises' environmental performance. This knowledge is also important for the global and local potential that stands to profit from the governance elements.*

**Keywords:** Pakistan, Environmental sustainability, GMM, Country Governance

**INTRODUCTION**

Augmenting firm performance is preferable and can be impacted by corporate governance and business ethics (Erundu et al. 2004). Firm valuation requires an analysis of the shift in corporate governance (Morey et al. 2009). There has been an explosion in corporate governance research and practice since major accounting and corporate governance issues at several well-known companies, including Enron, Worldcom, HealthSouth, Parmalar, Alstom, and numerous others, were revealed at the beginning of the new millennium. The World Bank established a corporate governance forum in 1999 to enhance governance procedures. This topic has, in fact, been the subject of several empirical investigations.

Following the Enron scandal, several studies on corporate governance were released. In predicting financial crises, corporate governance has grown in importance. The global financial crisis has prompted policymakers to reevaluate the role of the financial system structure, particularly the ownership state of businesses and other types of corporate governance, and has called into question long-held beliefs about state ownership of financial institutions.

The connection relating the board of directors, directors, and shareholders is based on corporate governance, which makes each party's rights and responsibilities clear (Donnelly & Mulcahy 2008; Baros et al. 2013; Forker 2012; Hanif et al., 2023; Crrifo et al. 2015). The function of networks amongst CEOs who sit on boards and the detrimental effects on the governance of such companies are highlighted by Hallock, 1997; Khan, 2022; Bhagat & Bolton 2013). Corporate governance is important for business stability, performance, and value (Bhagat & Bolton 2008; Moreey et al. 2009). The government of the country is also crucial. When the rule of law is established and corruption is decreased, Ngobo and Fouda (2012) suggest that effective national government may enhance business performance. Voice and accountability, political stability and the absence of terrorism or violence, monitoring quality, government efficacy, rule of law, and corruption control are the six elements of country-level governance (Kaufmann et al. 2009).

Large and liquid financial systems may be developed in nations with effective governance, which includes the rule of law and particular legal protections for creditors and investors (La Porta et al. 1998). The rule of law reflects respect for property rights and judicial integrity. The rule of law measures how people trust and observe social norms. A higher rule of law score implies more trust in the judicial system (Kaufmann et al. 2009). According to Essen et al. (2013), businesses in nations with more advanced legal systems do better in times of financial crisis. When the rule of law is established and corruption is decreased, good national governance may enhance business performance (Ngobo and Fouda 2012). A stable and effective national government system may decrease financial market risks that harm economic development. Bruno and Claessens (2010) look at the relationship between business performance and legal investor protection at the national level and corporate governance procedures at the company level. The study's specific goal is to use the top 60 companies in Pakistan to investigate how the national government affects environmental sustainability.

## **LITERATURE REVIEW**

The formal institutional structure of the state plays a crucial role in determining how a society is run, but governance encompasses much more. In practice, governance is complex and situation-specific. It necessitates the interplay of official and informal procedures, regulations, and connections. Because of this, governance deals with power and establishes who has the authority to establish and oversee social norms. La Porta et al. (1999) assert that socio-political and other cultural theories provide the elements that determine how successful a government is. La Porta also concludes that cultural differences, together with religious and ethnic diversity, impact how the government functions. Islam and Montenegro (2002) suggested no correlation between institutional quality and social qualities. The researcher suggests improving the performance of bigger and better administrations while considering their size. However, Brunetti and Weder (1999) and Afonso et al. (2003) provided evidence in favour of the opposing view.

### **Voice and Accountability**

Voice and accountability are essential components of healthy government. The notion of voice embodies the capacity to communicate one's thoughts and ideas openly. Stated differently, individuals are entitled to openly voice their opinions about governmental priorities and procedures. Politicians and public officials are held accountable to the people whose lives are impacted by their choices and actions when their laws and regulations are inadequate. As a result, voice and responsibility are crucial markers of the

connection between a state and its people. It helps define the characteristics of all things and conveys the function across settings, claim Frink et al. (2008). According to another study, responsibility affects how many workers carry out, plan, and assess their work behaviour (Breaux et al., 2009). According to Frink et al. (2008), responsibility helps maintain social order and informs workers about job expectations. Additionally, it teaches several appropriate attitudes and behaviours for completing tasks. Hochwarter et al. (2007) also propose a progressive relationship between performance and responsibility.

Ha: There is a favorable association between Voice and Accountability and environmental sustainability.

### **Political Stability and Lack of Violence**

Organizing all the actions involved in creating and distributing resources is called politics. According to Leftwich (2006), political and social bargaining is crucial for individual and collective interests, and rules are crucial for political stability and predictability. Since terrorism and violence will have an impact on the administration, political stability and nonviolence are essential for good governance. According to Georgiou (2014), political instability occurs when conflicts are inside a nation's political structure. Previous research by Venieris and Gupta (1986) and Gupta (2008) indicates that political volatility impacts business success. Because it influences business choices, investments, and savings, political instability has a detrimental influence on stock market performance and economic development (Durnev, 2010; Chen & Rodden, 2013). However, some research revealed that political unrest might sometimes provide investors with commercial opportunities (Irshad, 2017; Ashraf et al., 2024; Masood & Serge, 2008).

Hb: There is an optimistic association between Political Stability and Lack of Violence and environmental sustainability.

### **Government Effectiveness**

Effective governance defines the standard of civil and public services independent of political pressure. It also outlines how to formulate and implement sound policies. Good governance and sound institutions are two distinct concepts that influence each other. It is the effectiveness of public employees and bureaucracy, the duties and functions of provincial governments and local governments, the technical and administrative skills of the government, the ability to govern, the efficacy of the creation of policies and programs, and the efficient use of resources that are all components of government effectiveness. According to Kaufman and Kraay (2003), every nation should adopt excellent governance. More specifically, it clarifies the government's capability to articulate and carry out sensible policies, allocate resources, and provide services effectively. Good governance is the process that enables citizens to choose, oversee, hold responsible, and change their government. Respect for the government and its institutions are a nation's economic progress. An effective government structure improves the environmental sustainability of businesses.

Hc: There is a favorable association between Government Effectiveness and environmental sustainability.

### **Regulatory Quality**

The capacity of the government to generate and enforce rules and regulations for improved development is known as regulatory quality. If the quality of the government's restrictions is high, then the country will progress towards being wealthy. The opposite event was responsible for the destruction of the nation's system. Consequently, financial success and regulatory quality will have a positive association. Because organizations are answerable to stakeholders for their performances, institutionalism discusses the need for institutions' roles not to take into consideration the market (Campbell, 2007). According to Li et al. (2019), businesses in progressive economies are often influenced by the government, whose oversight

pressure has a good effect on the businesses. Regulators are responsible for drafting laws, rules, and ordinances to oversee and control the economy. Superior regulatory constraints increase a firm's inducement to engage in more responsible operations, claim Berrone et al. (2013). Organizations that exhibit responsible behaviour are more likely to invest in green technologies and take environmental practices into account. Chen et al. (2005) draw attention to the influence of ownership structure and regulation on Chinese security organizations' performance. They assert that performance measurements and conditions imposed by the government will be positively correlated.

Hd: There is a positive connection between Regulatory Quality and environmental sustainability.

### **Rule of Law**

Government laws, regulations, and initiatives comprise the institution's traditional environment. The most crucial component for national progress and development and international competitiveness has been identified (Ahn & York, 2009; Jamal et al., 2024; Peng, 2010; Jamal et al., 2022; Ismail, 20011). According to institutional theory, normative forces typically impact innovators and investors. These demands might come from businesses or outside sources, such as the nation (Petzer et al., 2012). According to institutional theory, a stronger rule of law atmosphere in a nation enables investors and innovators to carry out investment transactions there. The institution's legal environment is established by the rule of law among the most important components. Simply put, it refers to the laws, fundamental infrastructure, policies, programs, rules, and services of the government that improve every aspect of the economy's operation (North, 1992). According to Ahn and York (2009) and Fogel et al. (2006), the rule of law outlines the scope of legal rights protection and enforcement for both individuals and corporate entities. By protecting people's property, the rule of law also fosters a business climate that promotes expansion (Haggard et al., 2008). The Fogel et al. (2006) claim that it gives the person transactional trust. However, Hausmann et al. (2005) contend it guarantees the nation's financial stability.

He: There is a positive connection between the Rule of law and environmental sustainability.

### **Control of Corruption**

According to Calhoun (2011) and Transparency International (2013), corruption is the abuse of power for one's own gain. According to Judge et al. (2011), corruption is the misuse of administrative authority for private gain. Investors and innovators are hesitant to make investments in a nation where corruption is seen to be widespread. Due to inefficient investments, misallocation production resources, and increased transaction costs and uncertainty, corruption also lowers economic performance (Kaufmann & Wei, 2000; Jamal et al., 2021; Shleifer & Vishny, 1993). Additional research has looked at how corruption impacts business performance and economic growth, confirming the idea that corruption has an impact on the economy (Doh et al., 2003; Jamal et al., 2021; Rodriguez et al., 2006; Zeb et al., 2024); Uhlenbruck et al., 2006). Kaufman et al. (2011) assert no independence among these six country-level factors. For instance, it makes sense to say that a government is only considered functional if it is politically stable, less corruption results in more accountability, or the rule of law reduces the private benefit. Transparency International (2010) and the IMF (2011) both claim that improved country-level governance improves businesses' environmental sustainability. Significant governance problems in developing nations need research (Malik et al. 2018; Tahir et al. 2020). Thus, the researcher chose sampled counties.

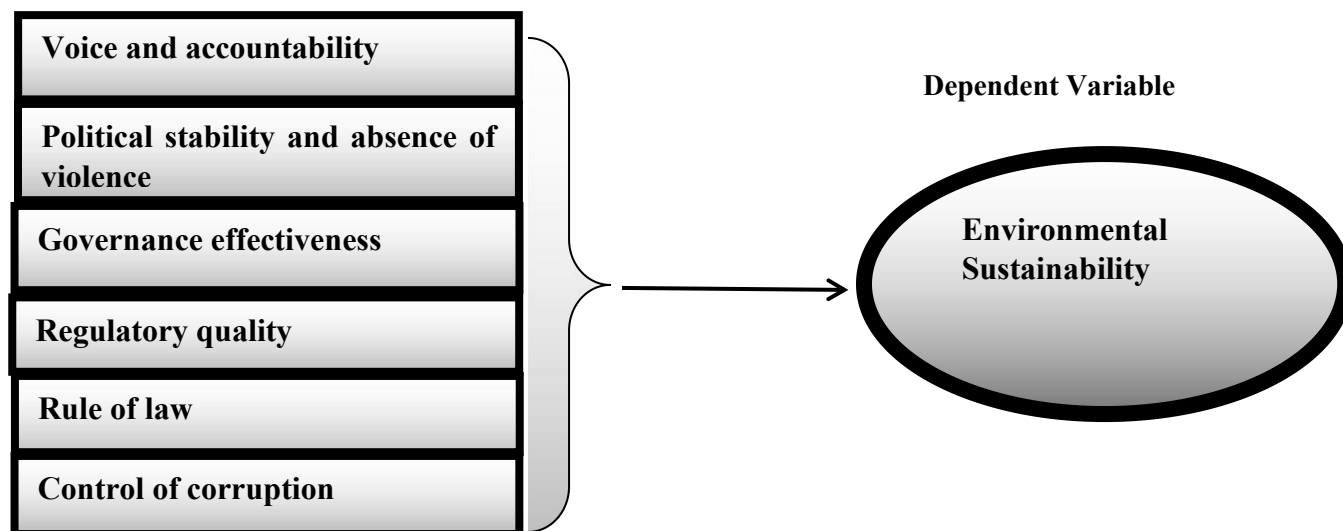
The stewardship and institutional theories suggest a positive relationship between governance. For this research study, the researcher thus makes the following assumptions based on the above theories and empirical literature:

Hf: There is a positive association between control of corruption and environmental sustainability.

### Conceptual Framework

The basic objective of this research study is to establish an association between environmental sustainability and governance at the national level. Accountability, political certainty, authoritative framework, government policies, Rule of Law, and the capacity of the nations to combat corruption are all factors that may be used to assess governance. However, the study's dependent variable is environmental sustainability.

### Independent Variables



**Figure 1: Showing the association between environmental sustainability and country governance**

### RESEARCH METHODOLOGY

#### Data

This research study assumes a quantitative approach and employs panel data, collected from multiple firms over ten years (2014–2023). The target population includes all non-financial firms listed on Pakistan's stock exchanges. The sample is drawn from prominent corporations listed on the Pakistan Stock Exchange. Data for the study's variables are sourced from the World Bank's Development Indicators, the World Governance Indicators (WGI), and firms' annual reports.

#### Variable Description

Environmental sustainability is the dependent variable in this study. This study employs the following factors to assess environmental sustainability: waste reduction, water consumption, CO2 emissions, energy consumption, and product innovation (Jamal et al., 2022; Jamal et al., 2021; Develle, 2021; Gerged, 2021; Miralles-Quirós et al., 2018; Xie et al., 2018).

The independent variables used in the study are governance indicators. Despite its measuring constraints, the World Bank has been actively analyzing governance qualities since 1996. This research used the World Bank's Governance Index (WGI), which offers comprehensive information on governance scores across six aggregate factors. The definitions of indicators specified by De Petrillo et al. (2009) are summarized here.



**Voice and accountability:** It describes how respondents evaluate how people may freely associate with the press, vote for their government, and access free media. The probability that violent and terrorist acts that contravene constitutional restrictions might overthrow the government is measured by political stability. People's opinions on the quality, capacity, and independence of public services from political influences and their recommendations for increased policymaking and implementation are also captured.

**Government effectiveness:** The word "government effectiveness" combines people's judgments on the quality, competency, and independence of public services from political pressures, as well as the values connected to increased policy creation and execution.

**Regulatory quality:** It evaluates the state's capacity to formulate and implement sound policies and regulations that support private sector development. The rule of law reflects public perceptions regarding their adherence to societal norms, the protection of private property, the effectiveness and reliability of law enforcement, and the perceived risk of criminal activity.

**Control of corruption:** It measures the extent to which public power is exercised for private gain, encompassing both petty and grand forms of corruption. These governance indicators—introduced initially by Kaufmann et al. (2002) have been widely adopted by policymakers, international organizations, and researchers (Dickson et al., 2021; Minghai, Khan et al., 2024; Schulenberg et al., 2020) to assess governance quality.

Grouped into six key dimensions, these indicators are based on perception-based assessments drawn from diverse sources, including think tanks, non-governmental organizations, government agencies, and consultancy firms operating in the investment sector.

### **Econometric model**

The paper applies dynamic GMM panel data estimation, among which the most popular methods are used to overcome crucial econometric issues like autocorrelation, fixed effects, and endogeneity. GMM is especially well-suited to working with panel data when N is large, but T is much smaller; this kind of structure may be called a small-T, large-N structure.

GMM is used when the functional relationship is linear and is very useful in controlling unobserved heterogeneity and possible bias of simultaneity that could occur due to endogenous explanatory variables. With the aid of internal instruments formed of lagged values of the variables, GMM will reduce inconsistent and inefficient parameter estimates, even when the regressors may be endogenous.

In the present research, a two-step system GMM estimator will be used to increase the reliability of the findings. The one-step estimator assumes homoscedasticity, but the estimates are consistent and not efficient. The two-step estimator includes a robust weighting matrix that accommodates the possibility of heteroscedasticity. The adjustment results in more efficient and reliable coefficient estimates, thus the two-step GMM approach is especially suitable in the empirical analysis of this study.

The following is the study's regression model:

$$ES_{i,t} = \alpha + \delta_0 ES_{i,t-1} + \delta_1 VA_{i,t} + \delta_2 PS_{i,t} + \delta_3 GE_{i,t} + \delta_4 RQ_{i,t} + \delta_5 RL_{i,t} + \delta_6 CC_{i,t} + \epsilon_{i,t}$$

The first equation illustrates the relationship between voice and accountability, political stability and the lack of violence, the effectiveness of governance, the quality of regulatory oversight, the rule of law, the control of corruption, and environmental sustainability. The symbols  $\alpha$ ,  $\delta$ , and  $\epsilon$  represent the equation's intercept, coefficient, and error term.

## ANALYSIS

### Descriptive Analysis

Descriptive statistics provide a detailed and succinct overview of the data table, enabling one to understand the most important attributes of the observed variables clearly. Such statistics contribute to identifying the overall trends and spreading these data, upon which an additional econometric analysis can be based.

The essential metrics that are normally covered in the descriptive analysis are the number of observations, the mean (average value), the standard deviation (which is a measure of the dispersion or variability about the mean), the minimum and maximum values (which show the range of the data). In unison, these measures give meaningful information on variables' central tendency, spread and general distribution.

Table 1 shows the descriptive statistics of all the variables utilized in the research. This table is a preliminary overview of the dataset, and it provides a quick view of the content and assists in determining the possible anomalies, outliers, or data entry mistakes. Additionally, the presented statistics allow preliminary comprehension of the data structure, which is essential before further serious econometric modeling.

**Table 1: Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
ES	600	1.985	1.879	0	5.0
VA	600	-.776	.059	-.856	-.695
PS	600	-2.554	.155	-2.81	-2.267
GE	600	-.726	.076	-.818	-.598
RQ	600	-.641	.044	-.717	-.578
RL	600	-.794	.071	-.902	-.673
CC	600	-.934	.124	-1.087	-.778

*The table contains the descriptive statistics of Pakistan.*

### Correlation Matrix

The current paper analyzes whether there is any possible multicollinearity problem between the variables with the help of a correlation matrix. Table 2 shows a correlation matrix of the given data related to Pakistani firms. This matrix highlights the pairwise correlation coefficients between all variables included in the analysis, providing insight into the strength and direction of their linear relationships.

According to established econometric literature, such as Greene and Hensher (2003), Gujarati and Porter (2010), and Khan et al. (2022), a correlation coefficient exceeding 0.70 may indicate a potential multicollinearity problem. However, all correlation values in this study fall below the critical threshold of 70%, suggesting that none of the variables are highly correlated.

Therefore, based on the correlation analysis, there is no evidence of multicollinearity in the dataset. This supports the validity of the subsequent regression analyses, as multicollinearity can distort the estimation of coefficients and compromise the interpretability and reliability of econometric results.

**Table 2: Pearson Correlation Matrix**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ES	1						
(2) VA	0.163***	1					
(3) PS	0.731***	-0.024	1				
(4) GE	0.775***	-0.102**	0.893***	1			
(5) RQ	0.097*	0.005	0.094**	0.127***	1		
(6) RL	0.000	0.000	0.000	-0.000	-0.030	1	
(7) CC	0.087*	0.004	0.092**	0.124***	0.731***	0.025	1

*The Pearson correlation coefficients among the variables are shown in Table 2, along with the significance levels of each correlation. Table 1 has a description of the variables. Statistically significant values are represented by the symbols \*\*\*, \*\*, and \*, with 1%, 5%, and 10% meanings, respectively.*

### Generalized Method of Moments

This research uses the dynamic panel data estimator, often known as the Generalized Method of Moments (GMM), for estimation purposes. The empirical findings for Pakistan are presented in Table 3, offering a comprehensive analysis of the relationship between governance indicators and environmental sustainability (ES). The results confirm the statistical significance of the F-statistics for each variable, indicating the overall reliability of the regression model.

**Table 3: Estimation Results for Pakistan**

Regressor	Model	Prob: value
L.ES	-.383***	0.001
VA	.68**	0.021
PS	.292***	0.000
GE	.281***	0.000
RQ	17.65***	0.000
RL	5.841***	0.003
CC	.8317	0.573
Constant	0.215***	0.009
Year Dummies	NO	
AR(1)	0.027	16.34
AR(2)	0.685	0.367
Hansen	0.16	0.357
No. Of groups	60	-
No. Of instruments	43	-
No of observations	480	-

Table provides the GMM step two results. \*\*\*, \*\*and \* are significance at 1%, 5% and 10% respectively.

One of the key findings is the positive and statistically significant impact of Voice and Accountability (VA) on environmental sustainability. The positive coefficient suggests that greater transparency, citizen participation, and accountability mechanisms contribute to improved environmental outcomes among enterprises in Pakistan.

Such a finding supports the stakeholder theory that suggests that firms demonstrate a strong ability to respond to diverse stakeholder interests, which in the long run increases the organizational value. Weber



(2008) has further stressed the relevance of good governance in defining organizational growth and sustainability, crediting the notion that good institutional frameworks are critical.

As expected, the analysis has also shown the same, Political Stability (PS) also has a significant and positive influence on Environmental sustainability. These findings argue that stability in politics encourages superior effectiveness of regulations and encourages firms to invest in environmentally sustainable activities. The result aligns with the vast evidence of empirical research (e.g., Abdullahi et al., 2019; Jamal et al., (2024); Khyareh & Amini, 2021) that political stability is vital in influencing sustainable development outcomes.

The study also found the opposite, which has a positive relationship between Government Effectiveness (GE) and environmental sustainability. This means that effective environmental performance is promoted by decent governance practices which incorporate effective and efficient delivery of public services, policy and effective implementation. The findings, however, indicate that some governance weaknesses still limit Pakistan's efforts regarding poor enforcement mechanisms and inefficiencies in institutions. The present study's findings align with those of Megaravalli and Sampagnaro (2018), who discovered that the quality of governance positively impacts environmental sustainability, which was also found in this study.

In addition, the findings depict that regulatory quality (RQ) is significantly related to environmental sustainability. Regulatory frameworks seem to affect investors positively; whereby their faith builds up with proper regulation, their shares gain value, and in the end, economic growth is enhanced. This confirms the work of Nebojsa et al. (2020) and Paitoon and Panawong (2023), who also stressed the importance of regulatory quality in improving corporate and environmental performance.

The empirical finding also exhibits a strong positive relationship between the Rule of Law (RL) and environmental sustainability, which is statistically significant. Sound legal systems which guarantee asset rights in property, contract enforcement and low legal uncertainties are vital in curtailing the cost of transaction, productivity and increases in competitiveness. In their turn, these aspects lead to an improved economic development and the establishment of better governance standards, according to Selvamani et al. (2023).

On the contrary, there is a weak and statistically insignificant association between Control of Corruption (CC) and environmental sustainability in Pakistan. This indicates that although they are relevant on theory, corruption control mechanisms might not substantially impact environmental practices as envisaged by the present institutional environment.

Diagnostic tests to justify the GMM estimations are also significant; thus, Table 4 shows the same results. First-order serial correlation AR(1) is present, which is normal in first-differenced models. There is only the lack of second-order serial correlation AR(2), which proves the correctness of the specified model. The Hansen test outcomes also confirm the validity of instruments utilized in the GMM estimation since none of the variables reject the null of the instrument validity. This means that the instruments will be relevant as well as exogenous.

Finally, the estimation would comprise 60 cross-sectional groups and 43 instruments, which is an agreeable level, and therefore, there would be no proliferation of instruments, thus making the model very robust. Overall, the empirical research highlights the importance of governance in determining environmental sustainability in Pakistan.

## CONCLUSION

The study examines how the governance of countries affects the environmental sustainability of companies that are in business in Pakistan between 2014 and 2023. However, the study differed from

many previous studies that concentrate on firm-specific governance characteristics in that this study analyzes governance in terms of a macro-level outlook, which gives a broader idea of how the national quality of institutions determines the actions of the companies regarding the environment.

The analysis of dynamic panel data utilizes the Generalized Method of Moments (GMM), an estimator that is quite powerful in encountering most econometric problems that include endogeneity, unobserved heterogeneity, and serial correlation. The empirical evidence gathered from Pakistan confirms the important role of national governance indicators in improving firms' environmental sustainability practices.

The implications of the findings are significant to many stakeholders and corporate managers, shareholders, policymakers, and the existing and potential local and foreign investors. Our findings indicate that upgrades in nation-level governance, the aspects of which are higher quality of regulations, more advanced rule of law, stronger voice and accountability, and more inclusive political stability, have a positive impact on the environmental sustainability initiatives of the firms.

These insights are beneficial to domestic and foreign investors. Awareness of the macro-level institutional environment may assist in directing investment choices because higher governance is usually associated with greater stability and sustainability of corporate activities. It also indicates that there is a lower risk of investment and a more foreseeable business environment, both of which are essential to strategic planning over the long term.

Further, the study implies that poor governance is usually common in emerging or developing economies, which may impede any corporate sustainability program and discourage investments. In this regard, the least developed societies, such as Pakistan, must focus more on institutional changes to enhance governance. These measures will involve strengthening judicial independence, handing a minor role to the political influence, transparency, and anti-corruption control measures.

Countries have made governance standards more conducive to sustainable corporate conduct and earned greater investor confidence, which may result in better performance in the stock markets and better development of the economy at large.

There are also several directions of future research that are proposed by the studies:

1. Additional discussion on macroeconomic issues that could affect the state and the sustainability of the environment.
2. Studies on more complicated links, e.g., the mediating or moderating influence of other macroeconomic or institutional factors on the governance-sustainability relation.
3. Research concerns the role of governance and market performance, especially in the emerging markets.
4. Comparative studies across countries in order to determine the extent to which the results are generalized across realities of the various institutional and economic settings.

Finally, this study highlights the role of good country governance on the effectiveness of firms' environmental sustainability. It offers a basis for policymakers and researchers to investigate further how institutional enhancements spur sustainable development and drive investment in emerging economies.

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