



IMPACT OF CORPORATE GOVERNANCE ON GREEN INNOVATION: EVIDENCE FROM PAKISTAN

BAKHTAWAR SIDDIQUE

Lecturer, GCWU Sialkot, Institute of Arabic and Islamic Studies
bakhtawar.siddique@gcwus.edu.pk

DR. KHALID KHALIL

Assistant Professor, Department of Management Sciences, Iqra National University
Peshawar, Pakistan.

khalidkhalil774@yahoo.com

ORCID: <https://orcid.org/0000-0002-6848-561X>

SHAKEEL AHMAD

Ph.D Scholar, Department of Management Sciences and Commerce, Bacha Khan
University Charsadda KP, Pakistan.

FAUZIA AHMED

Lecturer IMS, University of Balochistan Quetta, Pakistan.

DR. MAHBOOB ULLAH

Assistant Professor, Department of Management Sciences, Abasyn University, Peshawar,
Pakistan.

mahboob.ullah@abasyn.edu.pk

DR. HM AZHAR USAMA

Assistant Professor, Department of Islamic Studies, The University of Lahore, Lahore,
Pakistan.

Corresponding Email. muhammad.azhar@ais.uol.edu.pk

Abstract

This research examines the influence of corporate governance on green innovation in Pakistan, utilizing data of firms listed on PSX from 2012 to 2022. This study has used ARDL method, by deploying agency theory and porter. The results from both short and long-term analyses reveal a positive and significant influence of corporate governance on green innovation in Pakistan. Specifically, the presence of independent and knowledgeable board members positively influences the organization's commitment to green innovation initiatives. Furthermore, effective monitoring and control mechanisms, such as audit committees and transparent financial reporting, play a vital role in fostering green innovation practices within organizations. Additionally, the study reveals that companies with stronger stakeholder rights and protection exhibit a higher propensity for engaging in green innovation activities. These results have important implications for policy-making, highlighting the need to consider the role of corporate governance in promoting sustainable green development through green innovation.

Keywords: *Corporate Governance, Green Innovation, Pakistan*

INTRODUCTION

Since the onset of the industrial revolution, nations worldwide have embraced industrialization, but not without incurring significant environmental costs. As industrialization expands, there is a growing awareness of environmental issues among the population. Consequently, firms have begun to place a greater emphasis on enhancing their environmental efficiency, driven by increasing environmental concerns (Ateeq et al., 2022). This has resulted in mounting pressure on firms and enterprises from various sectors of society, including civil society and environmental activists, urging them to fulfill their responsibilities towards environmental safety and protection.

The relationship between corporate governance and green innovation has gained considerable attention in recent years. Modern firms are increasingly recognizing the importance of investing in green research and development activities to drive eco-innovations. However, embracing environmentally sustainable practices involves a cultural shift within firms, necessitating the adoption of new production techniques, investment in green technologies, and the promotion of novel ideas. Gul et al., (2022) noted that achieving successful waste reduction and prevention requires significant managerial efforts, including the complex redesign of internal processes and the development of green competencies.

The Organization for Economic Cooperation and Development (OECD) has highlighted that traditional firms adhering to conventional business models may hinder their involvement in radical eco-innovation methods. Many existing firms are content with their current business models and lack systematic efforts to drive radical technological innovations (Khadka, (2023)). Thus, addressing more intricate research and development challenges becomes imperative for firms aspiring to engage in technological innovations. However, it is widely recognized that managerial entrenchment can impede managerial inclinations towards complex activities, suggesting a negative relationship between poor corporate governance and green innovation.


Existing literature suggests that firms and industries bear additional costs due to the implementation of stringent rules and regulations, which can adversely affect their competitive position, profitability, production, demand, and investment decisions. However, a modern perspective views environmental objectives and firm benefits as mutually reinforcing, with law and regulations serving as a "win-win" situation for firms by potentially enhancing long-term profitability and improving their competitive position.

While previous studies have explored various factors influencing green innovation, limited attention has been given to the impact of corporate governance on these aspects within Pakistan's economy. This study aims to address this literature gap by analyzing the influence of corporate governance on green innovation in Pakistan, providing the first of its kind analysis in this context. The research questions to be addressed include:

- Does corporate governance promote green innovation?
- Do environmental law and policy play a role in green innovation?

LITERATURE REVIEW

Corporate governance has gained significant attention globally, particularly after major corporate scandals involving companies such as Adelphia Communications, Kmart, Chiquita



Brands Int., Enron, WorldCom, One Tel, Crescent Bank, Mehran Bank, Kabul Bank, ENGRO Group of Companies, Hascol Petroleum and others (Ullah et al., 2019). These scandals revealed that a weak CG system cannot effectively prevent fraud, deception, and corruption, eroding investor trust in the capital market. Consequently, regulatory authorities worldwide have made it mandatory for listed firms to adhere to corporate governance codes to ensure accountability, transparency, and fairness. Corporate scandals and agency theory are the underlying reasons for the emergence of corporate governance practices globally.

The concept of CG first gained prominence in the 1970s in the United States, while the Securities and Exchange Commission of Pakistan (SECP) introduced the CG code in March 2002 to promote fairness in the corporate sector of Pakistan. In the past decade, regulatory authorities in Pakistan have made significant efforts to enhance CG codes and practices (Ullah et al., 2019).

Corporate governance encompasses a set of rules and laws designed to direct and control all aspects of a firm's operations. It serves as a mechanism for guiding and monitoring corporate activities, protecting the interests of stakeholders. Corporate governance is considered an integral mechanism for overseeing corporate management and achieving organizational goals. Overall, corporate governance plays a crucial role in ensuring transparency, accountability, and effective corporate management (Shah et al., 2022).

The escalating global concern over climate change has presented humanity with a formidable challenge. While the implementation of environmental regulations has contributed to mitigating environmental issues to some degree, it has also resulted in increased economic costs associated with products and services. These circumstances have prompted policymakers and researchers to examine the interplay between environmental laws, industry competitiveness, and the social responsibilities of firms.

In this context, researchers (Rehman & Jan, 2022; Khan et al., 2020) have directed their attention towards exploring the diverse factors that influence environmental efficiencies. Key determinants under investigation include public policies, energy policies, and technological innovations. By examining these factors, researchers aim to gain insights into how they contribute to improving environmental performance and sustainability.

Numerous studies have explored the relationship between corporate governance and environmental sustainability, with a specific focus on green innovation. These studies emphasize the importance of effective corporate governance mechanisms in driving environmentally friendly practices within organizations. One important aspect examined in the literature is the role of board independence and expertise in promoting green innovation (Ullah et al., (2019). Independent and knowledgeable board members are found to positively influence a firm's commitment to environmental initiatives and innovation.

The presence of audit committees and transparent financial reporting is also identified as a crucial factor in enhancing green innovation. Effective monitoring and control mechanisms facilitate the implementation of sustainable practices and encourage innovation in environmental management. Shareholder rights and protection are highlighted as significant determinants of green innovation. Firms with stronger shareholder rights demonstrate a higher propensity for engaging in environmentally sustainable activities, indicating the importance of aligning stakeholder interests with environmental objectives.

Moreover, the literature emphasizes the role of executive compensation incentives in driving green innovation. When executive remuneration is tied to environmental performance indicators, organizations are more likely to prioritize and invest in eco-friendly innovation.

Underpinning theory: In the context of green innovation, agency theory suggests that effective corporate governance mechanisms, such as independent boards, transparent reporting, and incentive systems, can align the interests of shareholders and managers. This alignment encourages managers to prioritize green innovation and adopt environmentally sustainable practices, mitigating agency conflicts and promoting sustainable outcomes.

On the other hand, the Porter hypothesis emphasizes the positive relationship between environmental regulations and green innovation. It argues that well-designed environmental regulations can stimulate green innovation by creating market incentives for firms to develop and adopt cleaner technologies and practices. In the context of corporate governance and green innovation, the Porter hypothesis suggests that strong governance mechanisms can enable firms to effectively respond to environmental regulations and capitalize on the innovation opportunities they present. By aligning their strategies and operations with environmental objectives, firms can gain competitive advantages and drive green innovation.

Together, agency theory and the Porter hypothesis provide complementary perspectives on the relationship between corporate governance and green innovation. While agency theory focuses on internal governance mechanisms and aligning the interests of shareholders and managers, the Porter hypothesis highlights the external factors, such as environmental regulations, that can influence firms' innovation behavior. Integrating these theories helps to understand how corporate governance practices and external environmental factors interact to shape green innovation within organizations.

Overall, the literature underscores the significance of robust corporate governance practices in promoting green innovation in the Pakistani context. The findings highlight the importance of independent boards, effective monitoring mechanisms, shareholder rights, and executive compensation incentives in driving environmentally sustainable practices and fostering innovation towards a greener future.

FRAMEWORK

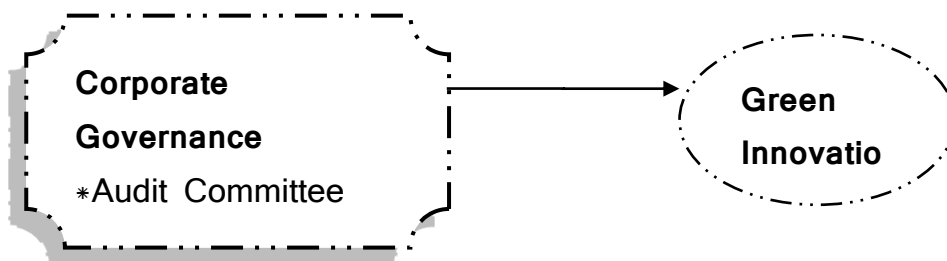


Figure No.1 Conceptual Framework

Hypotheses

The following hypotheses are developed to accomplish research objective:

H₀: There is no association between corporate governance and green innovation.

H₁: There is a positive association between corporate governance and green innovation.

Data

This study utilizes data from 105 manufacturing firms listed on the Pakistan Stock Exchange (PSX) across 21 different industries for the period of 2012 to 2022. Annual reports of these firms are the source of data for corporate governance. Descriptive statistics, Pearson's correlation matrix, and the generalized method of moments model are applied for data analysis using Stata. To ensure data quality, tests for data normality (Shapiro-Wilk test), multicollinearity (Variance Inflation Factors), autocorrelation (Wooldridge test), and heteroscedasticity (Wooldridge test) are conducted.

Descriptive Statistics

Table 1 presents the descriptive statistics for corporate governance and green innovation variables. The descriptive measures include minimum, maximum, mean, and standard deviation. The mean values range from 0.15 to 7, while the standard deviation ranges from 0.21 to 0.48, indicating that all the variables were appropriately utilized and exhibited sufficient variability.

Table 1
Descriptive Statistics of Variables (N=525)

Variables	Minimum	Maximum	Mean	Std. Deviation
AC	1.00	4.00	3.12	0.21
BSZ	6.00	11.00	7.00	0.45
BID	0.00	3.00	0.65	0.48
GI	0.05	2.34	0.17	0.29

Note: AC= Audit Committee, BSZ= Board Size, BID= Board Independence, GI= Green Innovation

Correlation Matrix

Table 2 demonstrates Pearson correlation that shows a significant association between CG (audit committee, board size and board independence) and green innovation. The findings revealed that facets of corporate governance positively correlates green innovation. The studies of (Agyei & Owusu, 2014; Ahmed & Hamdan, 2015; Masnoon & Rauf (2013) proved the present study outcomes.

Table 2
Corporate Governance and Green Innovation

Variables	AC	BSZ	BID	GI
AC	--			
BSZ	0.17*	--		
BID	0.21*	0.27**	--	
GI	0.25**	-0.49**	-0.29**	--

Note: **Correlation is significant at p<0.01 (2-tailed), *Correlation is significant at p<0.05 (2-tailed), AC= Audit committee, BSZ= Board Size, BID= Board Independence, GI= Green Innovation

MODEL EQUATIONS

GI is regressed with CG (audit committee, board size and board independence):

$$GI_{it} = \pi_{it} + B1\{AC_{it}\} + B2\{BSZ_{it}\} + B3\{BID_{it}\} + \mu_{it} \quad (\text{Equation 1})$$

In aforementioned both equations (1), GI represents green innovation, AC indicates Audit committee, BSZ denotes Board Size, BID mean Board Independence, π indicates constant term, μ_{it} indicates the error term, B denotes beta and, $_{it}$ signifies individual firm and time. The hypotheses were tested by using panel data generalized method of moment regression model to analyze the effect of corporate governance on green innovation.

Corporate Governance and Green Innovation: The author estimated equation 1 and the outcomes are shown in Table 3 that indicates the effect of CG on GI. The results predicts that all facets of CG jointly predicts 69% change in GI ($R^2= 0.69$, $F= 56.8$, $\Delta R^2= 0.58$, and $P<0.05$). The outcomes show beta value of 0.17 for audit committee, -0.20 for board size, and -0.16 for board independence, t-value 1.29 for Audit committee, -2.02 for board size, and -2.10 for board independence with p-value 0.001 for Audit committee, 0.011 for board size, and 0.004 for board independence.

The results in Table 3 predict that dimension of CG (audit committee) positively and significantly influence CS. The results of this research are supported by the previous studies in the same area (Ahmed & Hamdan, 2015; Jon MacKay, 2012; Muhammad, Shah, & Islam, 2014; Quigley & Hambrick, 2012) that have proved a positive association of audit committee with GI.

Table 3
Corporate Governance and Green Innovation

DTE	B	t	p-value
AC	0.17	1.29	0.001
BSZ	-0.20	2.02	0.011
BID	-0.16	2.10	0.004

N= 735, F Value = 56.8, P Value = 0.001, R-squared = 0.69, and Adjusted R² = 0.58

Note: **= $p<0.01$, *= $p<0.05$, AC= Audit committee, BSZ= Board Size, BID= Board Independence, GI= Green Innovation

DISCUSSION

The first hypothesis of current research was to check that audit committee positively and significantly affects GI. Empirical analysis supports the positive and significant relationship between audit committee and GI (Abels & Martelli, 2013; Ahmed & Hamdan, 2015; Jon MacKay, 2012; Muhammad, Shah, & Islam, 2014; Okiro et al.,2015; Quigley & Hambrick, 2012).

CG is not the end in itself. CG is a mean to support corporate financial stability and sustainable growth. It helps corporations to access capital for long term investments at low cost, mitigate risk, maximize performance, and ensure that all corporate stakeholders are fairly treated.

Conclusion

Encouraging green innovation requires effective corporate governance, well-formulated environmental regulations, and environmental policies that stimulate such initiatives. The

results from both short and long-term analyses reveal a positive and significant influence of corporate governance on green innovation in Pakistan. Specifically, the presence of independent and knowledgeable board members, audit committee, and board size positively influences the organization's commitment to green innovation initiatives, suggesting that corporate governance can be utilized as a policy tool to enhance GI in Pakistan.

SUGGESTIONS

Based on these findings, the study offers policy suggestions:


- Optimize the mechanism of corporate governance to promote sustainability through GI aligning with stakeholder expectations.
- Control the influence of large investors to enhance the implementation of GI, ensuring that management retains decision-making powers.
- The government of Pakistan should adopt environmental regulations in code of CG that promote GI and incentivize firms to invest in research and development for enhancing GI.

FUTURE RESEARCH

The study acknowledges limitations and suggests areas for future research, including incorporating additional measures of corporate governance and green innovation, comparing developed and developing economies, and exploring the impact of corporate governance on environmental sustainability and clean energy consumption.

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