

## GREEN FINANCE, CORPORATE GOVERNANCE, AND SUSTAINABLE PERFORMANCE: INVESTIGATING THE MEDIATING ROLES OF CSR AND GREEN INNOVATION

Maria Masood<sup>1</sup>, Qazi Shehryar<sup>2</sup>, Nibras Hussain<sup>3</sup>, Shoaib Zafar<sup>4</sup>

<sup>1</sup>Department of Commerce, University of the Punjab, Gujranwala Campus, Pakistan

<sup>2</sup>Chief Financial Officer (CFO) Balochistan Education Endowment Fund (BEEF) & Doctor of Business Administration Student INTI University Malaysia

<sup>3</sup>NYU School of Global Public Health

<sup>4</sup>Jiangsu University China,

<sup>1</sup>mariammasood712@gmail.com, <sup>2</sup>shehryarkhan066@gmail.com, <sup>3</sup>nh2815@nyu.edu,

<sup>4</sup>shoaib.publication@gmail.com

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Corresponding Author: \*

Maria Masood

### Abstract

In response to escalating environmental challenges, corporate sustainability has become a strategic necessity for businesses worldwide. However, despite increasing global attention, the pathways through which corporate governance and green finance contribute to sustainable performance remain underexplored, particularly in emerging economies like Pakistan. This study aims to investigate how corporate governance and green finance influence sustainable performance, considering the mediating roles of corporate social responsibility (CSR) and green innovation. Specifically, the study focuses on the textile sector in Pakistan, an industry facing significant environmental scrutiny and institutional pressures to adopt sustainable practices. Employing institutional theory as the guiding framework, the research examines the combined impact of governance and financial mechanisms within complex sustainability pathways. A quantitative, cross-sectional design was adopted to test the hypothesized relationships using data collected from 261 respondents in textile manufacturing firms in Pakistan. The study utilized purposive sampling, targeting managers with direct involvement in governance, finance, and sustainability initiatives. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via Smart PLS 4.0, which is well-suited for models with multiple mediation paths and does not require strict data normality assumptions. The results reveal that corporate governance and green finance both positively influence CSR, but only green finance demonstrates a positive association with green innovation. Surprisingly, corporate governance exhibited a significant negative effect on green innovation, suggesting that overly conservative governance structures may suppress innovation efforts in risk-averse settings. Mediation analysis confirmed that CSR significantly mediates the relationships between both corporate governance and sustainable performance, and green finance and sustainable performance. Green innovation mediates the effect of green finance on sustainable performance, though the mediation pathway between corporate governance and sustainable performance through green

*innovation was negative. These findings underscore the pivotal role of CSR and green innovation in operationalizing governance and financial strategies into tangible sustainability outcomes. The study contributes novel insights to sustainability literature by offering empirical evidence from an emerging market context, with practical implications for corporate managers and policymakers aiming to enhance sustainable performance through governance reforms and targeted green financial strategies.*

## INTRODUCTION

In the face of escalating global environmental challenges, businesses are increasingly being called upon to align their strategies with the principles of sustainability. The growing concern over climate change, resource depletion, and environmental degradation has propelled sustainable development to the forefront of international discourse (Chen et al., 2023). Sustainability is no longer an optional corporate agenda but a strategic imperative for achieving long-term organizational success (Kumar et al., 2023). Central to this transition is the recognition that businesses significantly influence environmental outcomes through their operational and financial decisions. Globally, the introduction of sustainability frameworks such as the United Nations Sustainable Development Goals (SDGs) has encouraged firms to adopt more responsible practices that balance economic, social, and environmental objectives (United Nations, 2015). The European Green Deal and similar national policies further emphasize the importance of sustainable corporate governance and green financial practices in shaping a low-carbon economy (European Commission, 2020). However, despite these policy advancements, many firms continue to face challenges in translating sustainability principles into actionable corporate strategies (Gerged et al., 2022).

Corporate governance plays a pivotal role in steering organizations toward sustainable outcomes. Strong governance mechanisms ensure that sustainability is embedded within corporate decision-making processes, promoting transparency, accountability, and ethical behavior (Abid et al., 2023). At the same time, green finance has emerged as a powerful catalyst for environmental innovation, facilitating investments in green technologies and eco-friendly practices (Li et al., 2023). Nevertheless, the integration of green finance and effective governance

into sustainable performance frameworks remains underexplored, particularly in developing countries (Khan et al., 2022). Corporate Social Responsibility (CSR) and green innovation are widely acknowledged as essential pathways through which organizations can achieve sustainability goals (Song et al., 2023). CSR represents a firm's commitment to contribute positively to society and the environment, extending beyond mere regulatory compliance (Carroll, 2021). Green innovation, on the other hand, refers to the development and implementation of novel processes, products, or practices that reduce environmental harm and improve resource efficiency (Lee et al., 2023). Despite the growing body of literature on these constructs, the interactive effects of corporate governance, green finance, CSR, and green innovation on sustainable performance remain fragmented and insufficiently addressed in empirical research.

A substantial volume of research has emphasized the role of corporate governance in promoting CSR and sustainability practices (Hunjra et al., 2023). Effective governance structures ensure that environmental and social considerations are integrated into corporate strategies, enhancing the firm's legitimacy and stakeholder trust (Aryssi et al., 2020). Green finance has gained momentum as a mechanism to fund environmentally sustainable projects, reduce carbon footprints, and support the transition to a green economy (Zhang et al., 2023). Financial institutions worldwide are increasingly channeling investments toward green bonds, renewable energy projects, and sustainable infrastructure (Tang & Zhang, 2020). CSR initiatives have been shown to positively influence a firm's sustainable performance by improving environmental management practices, stakeholder relations, and corporate reputation (Yousaf et al., 2023). Green innovation enhances a firm's competitiveness and operational efficiency by

fostering eco-friendly technologies and sustainable product designs (Xie et al., 2023). Although studies have individually examined these variables, there is a limited understanding of how corporate governance and green finance jointly influence CSR and green innovation to achieve sustainable performance, particularly in the context of emerging markets.

In developing countries like Pakistan, sustainability challenges are exacerbated by weak regulatory frameworks, limited access to green financing, and inadequate corporate governance structures (Abid et al., 2023). Despite increasing awareness of environmental issues, many Pakistani firms lag in adopting comprehensive CSR and green innovation practices (Khan et al., 2022). The financial sector in Pakistan has only recently begun to explore green finance initiatives, and their integration into mainstream corporate strategies remains nascent (State Bank of Pakistan, 2022). Consequently, there is an urgent need to investigate how corporate governance and green finance mechanisms can be leveraged to drive CSR and green innovation, ultimately enhancing sustainable performance within the Pakistani corporate landscape.

While prior studies have explored the individual impacts of corporate governance, green finance, CSR, and green innovation on sustainability, the combined and pathway-specific effects of these variables are insufficiently documented (Hunjra et al., 2023; Li et al., 2023; Song et al., 2023). Existing research largely focuses on developed countries, where governance structures and green financial systems are relatively mature. The paucity of empirical studies in emerging economies like Pakistan limits our understanding of how these dynamics unfold in contexts characterized by financial constraints, regulatory weaknesses, and low stakeholder pressure for sustainability (Khan et al., 2022). Specifically, the mediating roles of CSR and green innovation in the relationship between corporate governance, green finance, and sustainable performance remain underexplored.

The core problem addressed in this study is the lack of empirical evidence on how corporate governance and green finance influence sustainable performance through CSR and green innovation, especially in developing countries like Pakistan. This knowledge gap hinders policymakers, financial institutions, and

corporate leaders from developing effective strategies that align governance and financial practices with sustainability objectives. Without a clear understanding of these relationships, efforts to enhance corporate sustainability in such contexts may remain fragmented and ineffective. Addressing this problem is critical for several reasons. First, strengthening corporate governance and promoting green finance can significantly contribute to achieving national and international sustainability goals. Second, understanding the mediating mechanisms of CSR and green innovation provides valuable insights for firms aiming to improve their sustainable performance through socially responsible and environmentally innovative practices. Third, this study contributes to the limited body of knowledge on green finance and sustainability pathways in emerging markets, offering context-specific evidence that can guide future research and policy formulation. This research adds value by providing a comprehensive empirical analysis of the pathways through which corporate governance and green finance impact sustainable performance. It extends existing literature by integrating CSR and green innovation as mediators, offering a nuanced understanding of how sustainable outcomes can be achieved through multi-layered corporate strategies. The findings of this study are expected to inform corporate managers, investors, policymakers, and regulatory bodies in developing more effective frameworks for promoting sustainability in the corporate sector.

The potential contributions of this study are threefold. Firstly, it enriches theoretical perspectives on corporate sustainability by highlighting the interconnected roles of governance, finance, CSR, and innovation. Secondly, it offers practical insights for managers on how to strategically leverage governance and financial resources to foster green innovation and CSR initiatives. Thirdly, the study provides evidence-based recommendations for policymakers on designing supportive green finance policies and strengthening governance mechanisms to enhance sustainable performance at the firm level.

#### **Theoretical Foundation:**

Recent research of sustainable corporate practice has created significant scholarly discourse as to which

theoretical position should be used to investigate that interface of corporate governance, green finance, corporate social responsibility (CSR), green innovation, and sustainable performance. Stakeholder theory as an example is presented as an integrative theory that explains the ways by which organizations balance the expectation of internal and external stakeholders through quest of achieving sustainability (Freeman et al., 2010). On the other hand, resource-based view (RBV) focuses on the internal capabilities and resource that companies ought to develop in order to obtain competitive advantage out of sustainability practices (Hart, 1995). The two views are both valuable, but they tend not to fully describe the various forces and motives that are available at the same time to influence corporate responses to its environmental and social responsibility. Legitimacy theory, which is often used to justify the tendency of organizations to enact socially conscious and environmentally responsible activities that cater to gaining societal acceptance (Suchman, 1995) brings the focus to external attitudes to the exclusion of the economic rationale that could be involved in firms becoming sustainable. More holistic, however, is the lens of institutional theory, which takes into consideration the social, regulatory and economic pressures to which organizations are made to comply with the existing norms of sustainability (DiMaggio and Powell, 1983). Institutional contexts nudge companies into conformity with similar ethical practices established by the international community

through coercive, normative, and mimetic forces that encourage companies to adopt specific corporate governance procedures and apply green finance solutions (Gerged et al., 2022). In turn, organizations make investments in CSR and green innovation to remain legitimate and competitive, as well as compliant in the context of their respective institutions (Arayssi et al., 2020). As an example, the business can be interested in green finance not only because it increases its internal profitability but also to meet the changes in regulatory standards and social demands that favor environmental sustainability (Zhang et al., 2023). Similarly, additions of CSR and green innovation to the corporate strategy can be seen as the reaction to the normative pressure of the industry and idealized standards within the society that praise responsible business behavior (Song et al., 2023). To this extent, institutional theory is already in a position to best describe the wider societal, fiscal, and governance-related influence motivating overall sustainable performance since the corporate strategies are already embedded in institutional contexts bestowing sustainability-oriented conducts privileges and non-conformities penalizations (DiMaggio & Powell, 1983). In turn, institutional theory provides a comprehensive perspective according to which the interrelationships within the proposed model could be reasoned, showing how and to what extent corporate governance and green finance influence CSR, green innovation, and the final sustainable performance.

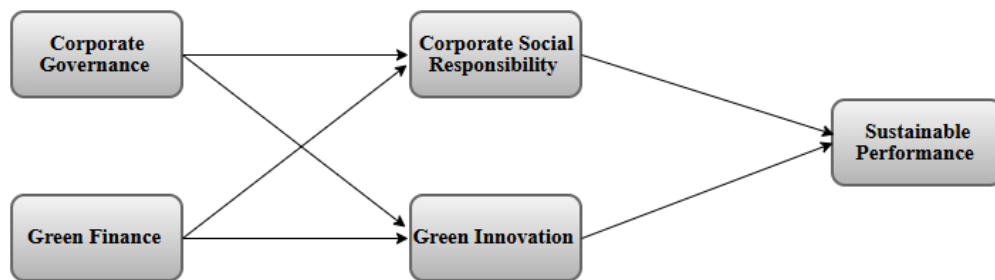


Figure 1: Research Model

**Hypotheses Development:**

The relationship between corporate governance (CG) and corporate social responsibility (CSR) is one of the agendas of modern discourse as researchers

provide theoretical and empirical arguments to give reasons to their interdependence. At an institutional theory perspective, the corporate governance mechanisms are not intended and intended to

maximize the wealth of shareholders only but involved in a larger constellation of institutional forces that shapes the behavior of an organization (DiMaggio & Powell, 1983). Indicators of such forces include: temporal coercive pressures through regulators, temporal normative pressures through industry standards, and temporal mimetic pressures via the competitive benchmark of peer companies all of which have a potential to make practitioners adopt socially responsible practices as part of governance structures (Gerged et al., 2022). Coercive pressures often come in the form of environmental regulations, labor laws and corporate governance codes and are forcing companies to increasingly incorporate CSR into their strategic decision-making so as to prevent punishment and loss of their license to operate (Arayssi et al., 2020). Normative pressures are created as the stakeholders (such as consumers, employees, and investors) expect more transparency and responsibility in the social and environmental sphere (Hunjra et al., 2023). Greater the terms of governance infrastructure, the more likely organizations are to formalize CSR policies in the light of such hopes or expectations because institutionalizing CSR is a way to formalize a socially responsible behavior within an enterprise.

Good corporate governance offers the institutional framework and governance systems that are required to bridge corporate and social goals. The independence of the boards, the presence of sustainability committees, and stakeholder-based models of governance create formal means through which societal responsibility strategies may be initiated and tracked (Li et al., 2023). The evidence gained empirically shows that more effective governance forces firms to develop a more notable level of exercise dedicated to CSR programs; a study performed by Abid et al. (2023) reveals that the quality of the corporate governance is associated with increased corporate social responsibility work. Bhatia (2022) also affirms research by Gerged et al. (2022) that board diversity, concentration of ownership, and board transparency contribute positively to CSR outcomes, thus paying much-needed attention to structures of governance when it comes to institutionalizing CSR as part of company strategy. Moreover, companies usually copy the governance and corporate social responsibility behavior of the

most successful players in the market to be at an equal position with corporate giants and managed the reputation effects, which also correlate with the pressure to conform to the prevailing mimetic (Song et al., 2023). Therefore, basing on the institutional theory, it is valid to presume that corporate governance has a positive effect on corporate social responsibility because it is through these governance structures that a company can maneuver through the institutional environment that defines such a socially responsible corporate conduct.

#### **Corporate governance has a significant positive impact on corporate social responsibility.**

The relationship between green finance (GF) and corporate social responsibility (CSR) has been subjected to the most severe criticism in the recent field discussion with references to the approach of the institutional theory. GF as a constellation of a set of financial products and services, whose purpose is to facilitate environmentally sustainable projects, is both an economic instrument and a strategic response to pressures of institutions of which value is based on sustainability. Compulsory actions of governmental and regulatory institutions, when companies are forced to and expected to engage in green funding practices to receive capital or avoid punishment, apply to encourage the companies to practice CSR activities as a broader sustainability strategy (Gerged et al., 2022). At the same time, stakeholder and industry associations group normative pressure on organizations to implement the green financial practice in relation to socially responsible behaviour in order to be in line with the societal expectations (Li et al., 2023). Companies receiving green finance tend to have a responsible environmental behaviour which is mostly expected and thus, creates a direct channel through which CSR is not only implemented but also extended. The empirical research also points to the effectiveness of green finance in promoting the performance of CSR as the companies invest these funds in sustainability initiatives and social welfare projects (Yousaf et al., 2023; Song et al., 2023). It is common to find firms simply copy the GF, CSR, used by market leaders, as a measure of organizational legitimacy and such occurrences are similar to mimetic pressures in the institutional theory. Accordingly, GF both logically

and empirically proves to magnify the involvement in CSR.

**Green finance has a significant positive impact on corporate social responsibility.**

The green innovation (GI) and the corporate governance (CG) nexus have increasingly attracted increasing sustainability scholarship in the recent past. A strong CG does not just act as a compliance device, but goes to the extent of shaping up the corporate strategy, more so when it comes to matters of environmental innovation. It has been found that board typologies of robust governance promote investment in green techs and greener processes, since such undertakings enhance the long-term prospects of stakeholders, concurrently reducing environmental hazard (Li et al., 2023). In terms of the institutional theory, companies operate in institutional environments that put pressure to meet the norms of sustainability (DiMaggio & Powell, 1983). Regulatory agencies, investors, and industry networks are increasingly pressuring the companies to adopt GI as a part and parcel of the corporate responsibility and therefore amounts to coercive and normative pressure to the firms. Institutional forces, namely routes to funding GI, such as mechanisms of corporate governance like independent directors and sustainability-oriented committees are essential guiding mechanisms that funnel resources to GI by way of these institutional requirements (Gerged et al., 2022). Empirical evidence has revealed that organizations that have appropriate governance structures have better degrees of green product and process innovation (Hunjra et al., 2023). The literature also suggests that companies do not come up with GI strategy on their own, but in emulation of industry leaders, as it is consistent with mimetic forces described by the institutional theory (Song et al., 2023).

**Corporate governance has a significant positive impact on green innovation.**

In the modern sensitive competitive and sustainability market environment the strategic designation of monetary capital is a determinant tenet in the environmental activity of firms. Green finance (GF) as a special capital targeting at environmentally-friendly initiatives to get

environmentally-friendly innovations (GI) works as the cataclysmic device of green innovation promotion by means of allowing businesses to construct eco-friendly technologies and sustainable goods. Lack of strong finances is a detriment to numerous organizations to be willing to implement progressive solutions to their environmental problems (Li et al., 2023). Institutional argument argues that the changing financial environment influences the firms, where the green finance as a strategic priority is being discussed by responsible organizations and investors (DiMaggio & Powell, 1983). The rules and regulations of green finance and sustainability disclosure push firms to seek innovation as a key step in gaining green financial products (Gerged et al., 2022). At the same time, the normative pressures emanating out of the stakeholders construe the enterprises to spend the green funds wisely by investing in innovation that causes magnification of the environmental impacts. According to empirical research, access to green finance significantly increases the likelihood of implementing GI into practice since this process is enabled by the establishment of additional capital that can be used to install sophisticated sustainable technologies (Zhang et al., 2023; Yousaf et al., 2023). Moreover, organizations commonly imitate other organizations process of green investment under mimetic pressures to maintain the competitiveness and legitimacy.

**Green finance has a significant positive impact on green innovation.**

One of the major mechanisms through which corporate governance (CG) contributes to the sustainable performance of firms is the need to be more socially responsible (CSR). With powerful governance systems, these factors can be created where the corporate shapes have accountability, ethical behavior, and long-lasting corporate-level strategic priorities beyond financial returns (Li et al., 2023). The role of governance structures in determining the achievement of sustainability is operationalized, through CSR initiatives that operationalize policy into reality in the form of social responsibility initiatives (Gerged et al., 2022). Institutional theory goes further to assert that companies are exposed to various institutional

pressures which determine how they strategize to respond to them such as coercive, normative and mimetic Institutional pressures (DiMaggio & Powell, 1983). Companies that have a strong governance arrangement are in a better position to respond to these pressures through active involvement in CSR to comply with the legal demands, decipher stakeholders' subjectivity, and sustain legitimacy in their business (Arayssi et al., 2020). Indeed, using empirical data, it is established that better-governed companies undertake more detailed CSR practices that, in turn, affect sustainable performance positively through better environmental practices, an improved welfare of society, and increased stakeholder confidence (Yousaf et al., 2023; Hunjra et al., 2023). Besides, CSR is a channel through which the governance structures have easily been responsive to the demands of institutions, hence augmenting the commitments of a firm towards long term sustainability objectives.

#### **Corporate social responsibility mediates the relationship between corporate governance and sustainable performance.**

Green financial capital availability of itself is not a sufficient condition to improve the sustainable performance of the firm rather strategic allocation and operationalization of such capital is of prominent importance. The capital is provided by green finance, but the channel that translates the financial inputs into actual contribution to sustainability is regulated by the initiatives of corporate social responsibility (CSR). The participants in the environment and society often believe that the firms that borrow having access to green financial opportunities will be participating in creating environmental and social value (Zhang et al., 2023). Institutional theory presupposes that companies are under a coercive contact with financial institutions and governments which promote rational utilization of green funds (DiMaggio & Powell, 1983). To meet such expectations, more often than not, it requires firms to invest in CSR programs that are consistent with institutional standards and the demands of stakeholders. CSR can be characterized as a mediator of fundamental importance transforming green finance as a financial tool to perceivable, socially

valuable activities contributing to an increase in sustainable performance (Li et al., 2023). Many empirical evidence shows that green financing advances superior sustainability performance when mobilized tactically under CSR-based activities like the environment, social, and green labor (Gerged et al., 2022; Yousaf et al., 2023). Without such a dimension of CSR, the prospects of the green finance of bringing genuine sustainability change can continue to be limited.

#### **Corporate social responsibility mediates the relationship between green finance and sustainable performance.**

The characteristics of the empirical literature support the indication that green innovation is an instrumental mediator within the governance-sustainability nexus. In particular, it was demonstrated that companies with well-developed governance systems are more likely to engage in green innovation, which subsequently promotes their sustainability and environmental performance (Hunjra et al., 2023; Li et al., 2023). According to Gerged et al. (2022), green technologies and eco-efficient processes are prominently enabled by features of governance, including independence among the board, sustainability-oriented committees, and open reporting. Under highly regulated regimes, such enterprises are most likely to report a higher resource efficiency, reduced levels of carbon emissions, and increased trust among their stakeholders which are essential pillars of sustainable performances (Yousaf et al., 2023). This pattern of evidence is clear in the sense that the corporate governance will have its effect in an indirect manner through creating favorable circumstances to green innovation.

An explanatory approach is provided with institutional theory. It argues that companies face institutional pressures and these are the regulatory coercive pressures, stakeholder normative pressures and the industry-mimetic pressures which shape sustainability behavior (DiMaggio & Powell, 1983). Well-managed corporations are more likely to respond to these markets by engaging resources to participate in advocating the policies and practices that embrace green innovation as one of the strategies to achieve institutional legitimacy and

competitive advantage (Arayssi et al., 2020). Regulatory coercion gives firms the motive to find technological and managerial way of addressing the impacts of more stringent environmental mandates and the stakeholder normative expectations induces them to use green technologies that reduce the ecological footprint. The existence of mimetic process further strengthens such behaviour where managers monitor and imitate the green innovation efforts of major players in the industry so as to maintain legitimacy and equality (Song et al., 2023). In turn, green innovation works as the main channel through which corporate governance defines sustainable performance not directly based on governance but as an indirect, innovation-based response to institutional pressures.

#### **Green innovation mediates the relationship between corporate governance and sustainable performance.**

Green innovation has become the critical topic in sustainability-related research, which is recognised as a useful tool by which companies can manufacture environmentally-friendly goods, procedures, and technologies that can solve the rampant issues regarding climate change and resource shortages (Xie et al., 2023). Companies which invest into green innovation will be able to reduce their environmental impact, efficiency of energy usage, and provide stable propositions that meet regulatory requirements and market demands (Li et al., 2023). Besides improving a company to adapt to the environmental changes, such efforts also increase its competitiveness, providing the specific benefit of succeeding in more sustainability-oriented markets (Hunjra et al., 2023).

Green innovation is one of the key factors that determines sustainable performance of a firm, which has an environmental, social, and economic aspect. Based on empirical studies, it is revealed that green innovations result in the increase of organizational sustainability, with emissions being minimized, the management of waste being improved, and the level of social contributions being augmented (Gerged et al., 2022). In addition, long-term sustainability is supported by green innovation that integrates sustainable environment practices into the organization, and promotes sustainable growth and

the establishment of better stakeholder relations (Yousaf et al., 2023). Modern empirical research points repeatedly at green innovation as a driver of sustainable performance and, therefore, to a significant operation mechanism along the sustainability pathways. In this environment, the role of green finance becomes dominant. The intermediary role of green innovation is associated with the impact of green finance because financial funds per se are not sufficient to generate a positive sustainable performance; instead, because of their strategic deployment toward sustainable innovation-inspired projects, financial resources can be converted into reliable sustainability returns (Zhang et al., 2023). The institutional theory also highlights the trend and assumes that the companies experience coercive activities by the regulators, normative pressures by the interest groups, as well as mimetic pressures of other industry frontrunners to exhibit evidence of sustainability behaviors (DiMaggio & Powell, 1983). Green financing is not a sufficient objective; thus, institutions need firms to be innovative, consequently fulfilling the expectations of legitimacy. Green innovation is the pipeline along which green finance can be achieved as an embodiment of substance of sustainability. Without innovation, the benefits of green finance can be thin, but with the innovative-focused applications they can bring to considerable improvement in the sustainable performance of a firm.

#### **Green innovation mediates the relationship between green finance and sustainable performance Methodology**

The research design implemented in this study is a quantitative and cross-sectional study that can be considered reasonable when the aim is to examine the correlation of corporate governance, green finance, corporate social responsibility (CSR), green innovation, and sustainable performance at one, real-time point of reference. The quantitative lens is selected to perform measurements and tests of the hypothesized relationships, whereas the cross-sectional configuration allows recording data in the specified window of time (Creswell & Creswell, 2018). Sustainability and management inquiry often use cross-sectional designs to explain the

organizational structure (Hair et al., 2021). The sampling frame is made up of the textile manufacturing companies of Pakistan which is one of the leading sectors in the country and plays a significant role in providing national GDP as well as jobs. At the same time, it is one of the most polluting industries in Pakistan, as well as it is under increasing pressure on the part of foreign buyers, control agencies, and environmental services to start sustainable operations (Khan et al., 2022). This is due to the fact that such exposure of institutionalized pressures bands makes the industry a perfect population through which to explore the impact of corporate governance and green finance to sustainability trajectories.

Pakistan textile industries are now more active in CSR reporting and at the same time, they are introducing green financial instruments to address the increasing sustainability standards in the world (State Bank of Pakistan, 2022) Such a rating gives this study a higher contextual relevance and its ability to generalize to policies and managers. Through the purposive sampling, respondents will be chosen, and they will include sustainability managers, financial officers, or top managers who directly have power and skills in governance or financial decision making, or the in-house sustainability projects. The selection of purposive sampling is suitable since it seeks to recruit

professionals who have the necessary knowledge that can add facts on the study constructs (Etikan et al., 2016).

Minimum sample-to-path ratio recommendation provided by Hair et al. (2021) in Partial Least Squares Structural Equation Modeling (PLS-SEM) will be used as the guide to the data analysis. The research will aim to enrol a sample size of at least 300400 which is enough to provide the study with enough statistical power and allow the generation of strong estimates of the model. Using SmartPLS 4.0, statistical analysis will be carried out thus, having the opportunity to assess both measurement relationship and the structural relationship at the same time. The study is also ideally suited to SmartPLS because the latter is best applied when the mediation pathways are numerous and because it does not require a strongly distributional assumption of data, a trait that increases its applicability to the study (Hair et al., 2021).

**Measurement of Variables**

All questionnaire items will be adapted from well-established, validated instruments from previous studies to ensure reliability and validity. Each item will be measured using a seven-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree.

**Table 1: Measurements**

Construct	Items	Sources
Corporate Governance (CG)	6 items (e.g., board independence, sustainability oversight, governance transparency)	Gerged et al. (2022); Hunjra et al. (2023)
Green Finance (GF)	4 items (e.g., access to green loans, use of green bonds, preference for environmentally linked financing)	Li et al. (2023); Zhang et al. (2023)
Corporate Social Responsibility (CSR)	6 items (e.g., environmental initiatives, community engagement, ethical labor practices)	Yousaf et al. (2023); Gerged et al. (2022)
Green Innovation (GI)	4 items (e.g., adoption of eco-friendly technologies, green product development, process innovation)	Xie et al. (2023); Song et al. (2023)
Sustainable Performance (SP)	4 items (e.g., environmental performance, social performance, long-term profitability)	Li et al. (2023); Gerged et al. (2022)

**Data analysis**

**Measurement Model:**

In Partial Least Squares Structural Equation Modeling (PLS-SEM) the measurement model is an important element which examines the connections between latent constructs as well as the indices that they are measured on. It mainly checks that the items used to operationalize each construct should have reliability as well as validity (Hair et al., 2021). There are two interconnected dimensions at the forefront of this appraisal which include indicator reliability and construct validity. The second one includes convergent validity and discriminant validity. The basic steps in SmartPLS are as follows: in SmartPLS the evaluation process will start by looking at indicator loadings, which measure the degree to which each observed value is related to the fundamental construct. General rule of thumb is that when loadings are more than 0.70 it can be said that the items measure their corresponding construct adequately (Hair et al., 2021). In the next step composite reliability (CR) and average variance extracted (AVE) were analyzed to determine reliability and convergent validity. Figures of CR greater than 0.70 imply that the items of the instrument measure a desired construct reliably, and the figures of AVE greater than 0.50 refer to the fact

that over 50 % of the variance of observed variables is explained by the respective latent construct (Hair et al., 2021). These standards ensure the statistical strength of the model as well as the adequacy of representation of each construct by its indicators. Measurement model takes special relevance in the context of SmartPLS, because PLS-SEM is both variance and prediction model. It would be appropriate in complicated models, small sample groups, and data, which do not meet the criteria of multivariate normality (Hair et al., 2021). Unlike covariance-based SEM, PLS-SEM attempts to maximize variance capture in the dependent variables and as a result it is particularly suitable to management, sustainability, and social science studies in which predictive power is valued more than goodness of fit metrics (Sarstedt et al., 2022). The SmartPLS also allows assessment of both reflective and formative constructs. In our current research, we have constructs that are all reflective in nature; which means that we would expect the latent variable to bring about changes in the indicators. The ability of SmartPLS to conjoin and disconnect the measurement and structural analyses also provides the researcher with a keen idea about the quality measurement before determining relations among constructs.

**Table 2: Factor Loadings**

		CG	CSR	GF	GI	SP
<b>Corporate Governance (CG)</b>	CG1	0.857				
	CG2	0.899				
	CG3	0.860				
	CG4	0.909				
	CG5	0.845				
	CG6	0.838				
<b>Corporate Social Responsibility (CSR)</b>	CSR1		0.823			
	CSR2		0.819			
	CSR3		0.817			
	CSR4		0.879			
	CSR5		0.862			
	CSR6		0.790			
<b>Green Finance (GF)</b>	GF1			0.835		
	GF2			0.907		
	GF3			0.891		

	GF4	0.862	
Green Innovation (GI)	GI1		0.744
	GI2		0.856
	GI3		0.766
	GI4		0.750
Sustainable Performance (SP)	SP1		0.837
	SP2		0.862
	SP3		0.879
	SP4		0.883

The measurement model also generated enough evidence of reliable statistics among all constructs, with item loadings ranging between 0.744 and 0.909 which exceeded the minimum threshold of 0.70 as proposed by Hair et al. (2021). Corporate Governance (CG) maintained a high loading which was also true with the thus variables showing Corporate Social Responsibility (CSR), Green

Finance (GF) and Sustainable Performance (SP). Green Innovation (GI) items were also found to be acceptable but a bit lower and they were lying in the acceptable range. Summed up, these outcomes suffice to confirm the research method of data collection, and imply that the measurement model may be considered reliably and validly substantial to conduct a further structural analysis with the help of SmartPLS.

Table 3: Reliability Analysis

Variables	Cronbach's alpha	(rho_a)	(rho_c)	(AVE)
Corporate Governance (CG)	0.935	0.938	0.948	0.754
Corporate Social Responsibility (CSR)	0.911	0.912	0.931	0.693
Green Finance (GF)	0.897	0.902	0.928	0.764
Green Innovation (GI)	0.785	0.787	0.861	0.609
Sustainable Performance (SP)	0.888	0.891	0.923	0.749

The co-efficients of reliability and validity that the current study revealed indicates that the proposed model of measurement meets the minimum standards of internal consistency and convergent validity. The Cronbach alpha value of all the constructs was above 0.70, which indicated great internal reliability (Hair et al. 2021). Precisely, Corporate Governance (alpha = 0.935), Corporate Social Responsibility (alpha = 0.911), Green Finance (alpha = 0.897), Green Innovation (alpha = 0.785), Sustainable Performance (alpha = 0.888) well show that the items that occupy any one of these dimensions are deemed to measure a solitary, underlying construct. The CR (rho\_c) values were within the 0.861-0.948 range as predicted in all measures, and higher than the most minimum

recommended reference value of 0.70 as proposed by Hair et al. (2021). Besides, the average variance (AVE) of each construct was more than the recommended criteria of 0.50 that showed high convergent validity of each construct (Fornell & Larcker 1981). The convergent validity of the research was confirmed since each construct contributed to over half of the variance of items composing it as demonstrated by the AVE coefficients Corporate Governance (0.754), CSR (0.693), Green Finance (0.764), Green Innovation (0.609), and Sustainable Performance (0.749). All these findings support the validity and reliability of the measurement model, as grouped, therefore forming a critical foundation to evaluate the structural model (Sarstedt et al. 2022).

Table 4: Validity Statistics (HTMT)

Variables	CG	CSR	GF	GI	SP
Corporate Governance (CG)					
Corporate Social Responsibility (CSR)	0.611				
Green Finance (GF)	0.859	0.617			
Green Innovation (GI)	0.154	0.279	0.296		
Sustainable Performance (SP)	0.512	0.666	0.623	0.357	

Heterotrait-Monotrait (HTMT) ratio is a reliable variable that is measured to assess discriminant validity in structural equation modeling whereby the constructs in the study are kept at a rational distance. As per the recommendations available, the HTMT benchmark is traditionally subjected to a 0.85-0.90 range, with the more complex models being allowed up to 0.90 (Hair et al., 2021). Most of the HTMT values in the current study lie with these acceptable limits implying that constructs are not very conceptually close. shamefully, both ratio of HTMT between Corporate Governance (CG) and Corporate Social Responsibility (CSR) (0.611), and between CG and Sustainable Performance (SP) (0.512) fall below the threshold of 0.85 tenable to the

discriminant validity. Similarly, CSR association with Green Innovation (GI) (0.279) and SP (0.666) also depict statistically acceptable deviation. The only one that spots above is the HTMT between CG and Green Finance (GF) (0.859), which treads at the upper boundary. Though this level of significance is not as high as it should be, it serves as an indication of a solid relationship between governance practices and green financial course of action, meaning that there is a possibility of the respondents identifying the two phenomena as highly connected. All these HTMT scores support the discriminant validity of the model, which evidence existing recommendations (Henseler et al., 2015; Hair et al., 2021).

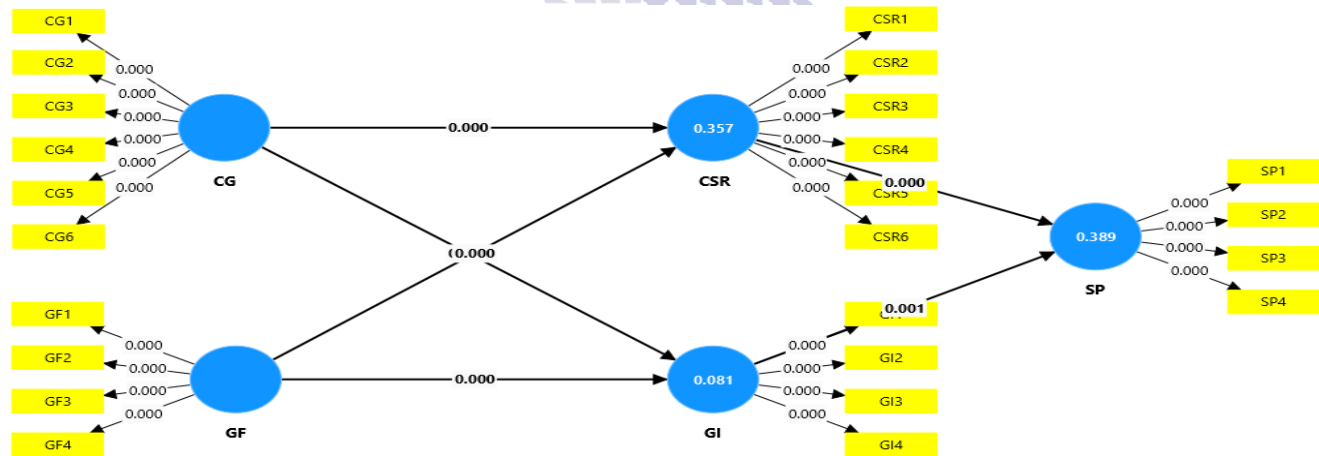


Figure 2: Structural Equation Modelling

Table 5: Hypotheses Results

Hypotheses	Original sample	(M)	(STDEV)	T statistics	P values
CG -> CSR	0.333	0.334	0.082	4.055	0.000
GF -> CSR	0.300	0.302	0.083	3.608	0.000
CG -> GI	-0.200	-0.202	0.088	2.271	0.023
GF -> GI	0.413	0.421	0.086	4.807	0.000
CG -> CSR -> SP	0.187	0.187	0.048	3.904	0.000
GF -> CSR -> SP	0.169	0.170	0.052	3.231	0.001
CG -> GI -> SP	-0.034	-0.035	0.017	1.958	0.050

GF -> GI -> SP	0.070	0.074	0.027	2.557	0.011
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A structural model showed empirical support on a number of hypothesized associations with path coefficients and p-values being obtained using SmartPLS analysis. Following Hair et al. (2021), a statistical significance confirms the results concerning p-value that should be less than 0.05 and t-statistic that should be greater than 1.96. The values of R-square show that 35.7 % of the variation in Corporate Social Responsibility (CSR) and 8.1 % of the variation of Green Innovation (GI) can be explained by the prediction variables detected by the model. Besides, there is an overall moderate explanatory power (38.9 % R<sup>2</sup>) of the model on Sustainable Performance (SP) (Hair et al., 2021).

Corporate Governance (CG) has a great influence on CSR and this is represented by a path coefficient of 0.333 ( $t = 4.055$ ,  $p = 0.000$ ). The results support the existing data showing that sufficient governance frameworks promote the socially irresponsible behavior of firms (Gerged et al., 2022; Hunjra et al., 2023). There is also a similar positive correlation between CG and GI (beta = 0.300,  $t = 3.608$ ,  $p = 0.000$ ) which supports the argument stating that green financial resources act as incentives to engage in CSR activities by firms (Li et al., 2023). On the other hand, the correlation, between CG and GI, is unfavorable, but significant (beta = -0.200,  $t = 2.271$ ,  $p = 0.023$ ), and indicates that governance mechanisms are a limiting factor of innovation activities, probably by promoting risk aversion or dynamic compliance processes (Song et al., 2023). In contrast, Green Finance positively influences Green Innovation ( $\beta = 0.413$ ,  $t = 4.807$ ,  $p = 0.000$ ), indicating that financial support targeted at green projects directly fosters innovation, consistent with the findings of Zhang et al. (2023). The mediation results further reveal that CSR significantly mediates the relationships between both CG and Sustainable Performance (SP) ( $\beta = 0.187$ ,  $t = 3.904$ ,  $p = 0.000$ ), and GF and SP ( $\beta = 0.169$ ,  $t = 3.231$ ,  $p = 0.001$ ). These findings suggest that CSR is a crucial pathway through which both governance and green finance improve sustainable outcomes, supporting earlier empirical evidence (Yousaf et al., 2023; Gerged et al., 2022). For green innovation mediation, the indirect effect of CG on SP through GI is negative but

significant ( $\beta = -0.034$ ,  $t = 1.958$ ,  $p = 0.050$ ), implying that the governance-driven innovation processes may not effectively translate into sustainability gains, possibly due to inefficient or risk-averse innovation strategies. On the other hand, the mediation of GF on SP through GI is positive and significant ( $\beta = 0.070$ ,  $t = 2.557$ ,  $p = 0.011$ ), indicating that green finance effectively stimulates innovation that enhances sustainable performance (Li et al., 2023).

#### Discussion:

The findings support this hypothesis, demonstrating that corporate governance (CG) significantly drives corporate social responsibility (CSR) within organizations. The study confirms results reported earlier on good governance practices board independence, transparency and sustainability oversight, where good arrangements will result in the existence of favorable conditions within organizations, predisposing organizations to socially responsible behaviour. More particular to this relationship is the institutional theory, which postulates that companies which incorporate effective governance systems are more sensitive to coercive forces that embody regulatory requirements and normative demands by interested parties promoting corporate responsibility in the social and environmental issue (DiMaggio & Powell, 1983). Additionally, the empirical findings support the argument that effective governance can guide the firms to prioritize CSR as a tool of legitimacy and competitive advantage (Arayssi et al., 2020). The given results coincide with the response offered by Gerged et al. (2022), whereby the authors marked that the main motivations in implementing CSR in corporate strategy are governance transparency and stakeholder-specific practices. To this extent, it can be said that the hypothesis that the aspects of good governance instill proactive CSR culture, which can meet the requirements of both regulatory frameworks and society expectations stay valid.

The results also prove that green finance (GF) has a significant positive effect on CSR engagement, which can be explained by the fact that it has already been proven in the literature that green financial

instruments like green loans and green bonds prompt a company to invest in sustainability-related projects (Zhang et al., 2023). The granting of the capital on the condition of implementing CSR practices causes an increase in coercive institutional pressures by GF (Gerged et al., 2022). At the same time, normative pressures on the part of investors and consumers who were becoming progressively conscious of the environmental responsibility were demonstrated to encourage the routing of green financial power into the CSR programs (Li et al., 2023). In their research, Song et al. (2023) highlight that green finance is a financial stimulus promoting socially conscientious actions, as such enabling compatibility between the corporate financial goal and societal sustainability objectives. Therefore, the supposition that, converging financial and societal sustainability imperatives can be considered a driver of CSR engagement by means of GF is also confirmed.

The given research established a not so, but significant, negative relationship between corporate governance and green innovation (GI). This finding does not agree with previous research, most of which tend to show a positive impact (Hunjra et al., 2023; Li et al., 2023). A reasonable hypothesis can be associated with the governance focus on risk prevention and regulatory observance noted in some contexts, especially when speaking about developing countries, e.g., Pakistan, when bureaucratic process and risk-averse decision-making can hamper innovative projects (Song et al., 2023). Based on Gerged et al. (2022), highly fixed governance structure often inhibits new capacities, an issue that is enhanced when the board focuses on short-term regulatory compliance instead of long-term innovation approach. Moreover, the poor technology infrastructure and support system typifying new economies reduces the capability of governance structures in aiding GI (Khan et al., 2022). As a result, even though the current body of literature has broadly implied that the relationship is, in fact, positive, the hypothesis fails to hold in the current context, which implies that the practices of governance have to change to include more innovation-compatible frames in order to inspire green initiatives.

This view is backed by empirical findings that indicate that, green finance has a strong urge to promote GI. This observation aligns with the point underlying that exposure to green financial instruments empowers companies with the funding they need to adopt green technological progress (Li et al., 2023). Green finance curbs the economic obstacles that the green innovation normally receives especially in resource constrained environments (Zhang et al., 2023). The institutional theory explains such an aspect as an answer to coercive forces given by the financial institutions, which compel the firms to direct green financial funds towards green innovations (DiMaggio & Powell, 1983). At the same time, the stakeholders, under the normative pressure, promote the prudent disbursement of the green finance focused on green innovation in order to gain environmental and social legitimacy (Gerged et al., 2022). Green finance therefore strongly favors GI and thereby confirming the hypothesis.

The empirical study also supports the proposed mediation hypothesis: it proves the idea that corporate social responsibility (CSR) becomes the main mechanism with the help of which corporate governance can enhance sustainable performance (SP). This finding resonates with Yousaf et al. (2023), who make a case in support of the argument that CSR is the action channel through which governance processes are translated into sustainability charts. Developing strong governance, the institutional theory also argues that it responds to any regulatory, normative, and mimetic pressures in the most adequate way due to the necessity to integrate CSR with corporate environment (Arayssi et al., 2020). The findings testify to the observation that without CSR, the effects of governance on sustainable performance would be less direct or pronounced. This observation has a similarity with the results that Hunjra et al. (2023) confirm analytically that CSR links the systems of governance with the achievement of sustainability, and thus features the significant role played by CSR towards the enhancement of the environment practices, strengthening the social welfare, and reinforcement of corporate legitimacy. In its turn, this means that the mediation hypothesis becomes empirically supported.

The findings also indicate that CSR has a great mediating role in the association between green finance and sustainable performance. Green finance provides the capitals needed, but their potential will be achieved properly when they will be used in the strategic form of CSR efforts (Li et al., 2023). Gerged et al. (2022) reckon that green finance would work better when a company invests in CSR practices that convert monetary investment into real social and environmental investments. Institutional theory also holds that, the stakeholders require transparency records of CSR activities to demonstrate accountable green financial use (DiMaggio & Powell, 1983). Yousaf et al. (2023) emphasize that green financing, in its turn, does not contribute to sustainability without financing projects that contribute to the social welfare and environmental preservation. Therefore, green financial resources require CSR in order to be operationalized hence supporting the mediation hypothesis.

Experimental evidence provided by the current research supports the mediating effect of green innovation in the relationship between green finance and sustainable performance, but the third path is establishing a negative relationship, which reveals that the governance inert leads to a lack of green innovation conversion into green output. According to Gerged et al. (2022), extremely conservative systems of governance restrict the innovative nature of taking risks, which fails at optimal sustainability. Song et al. (2023) also indicate that compliance-based governance architectures restrain the success of green innovating strategies. Furthermore, Khan et al. (2022) argue that institutional pressures will not be resolved when the governance system focuses on addressing minimum regulatory standards rather than aggressive innovations. These findings, in sum, make it clear that governance modalities should be re-considered as a way of supporting innovation-driven sustainability processes.

The reported evidence also validates the argument that the green innovation also plays a significant mediating role in the connection between green finance and sustainable performance. In line with the findings of Zhang et al. (2023), the research findings show that the green finance is most effective when it allows firms to come up with green products and sustainable technologies. Institutional theory

(DiMaggio and Powell, 1983) further argues that the coercive and normative forces going with green finance will require firms to show that money has gone to serious innovation and not to superfluous green painting. Yousaf et al. (2023) underline that green innovation is the process that vents green finance into tangible developments on sustainability, according to which the financial resources are not enough, innovation turns these financial investments into effective sustainability practices. In turn, the mediating hypothesis is confirmed completely.

#### Limitations and Future Research Directions

Despite the fact that the present study makes significant contributions to the existing literature by clarifying the interrelationship between corporate governance, green finance, corporate social responsibility, green innovation, and sustainable performance, a number of limitations deserve to be discussed. One, the cross-sectional research design only registers data at a specific instance of time without allowing the researcher to determine the causality and restricting the capability of analyzing the dynamic trends of the practice in the area of sustainability. Longitudinal designs should be pursued in the future to follow the development of the relationship between corporate governance and green finance on the sustainability performance through several time horizons in order to make the causal claim more stringent. Second, the external validity of the scope of the study is limited despite geographical focus, as well as sectoral focus. The corporate reputation of textile manufacturing companies in Pakistan, as a distinctly noticeable company due to its high-profile environmental impact, may not be applicable to the other forms of industry, nor to the situations where the intended environmental impact is not as dramatic and institutionally accepted. In order to increase the external validity of their results, it would be useful to replicate the analysis in other areas, like energy, agriculture, or construction, and in a greater range of countries, including developed economies. Third, self-reported data used through questionnaires are the key approach to the research, which is prone to some sort of social desirability bias, according to which the respondents may exaggerate their sustainable practices compliance due to the current

societal ideals and trends. Following the inclusion of more data sources (archival records, sustainability reports and environmental performance audits) would alleviate this bias and enhance the validity of the measure of sustainability practices. Fourth, the analysis fails to reflect the possibilities of the external pressures that can influence the corporate sustainability strategies such as those created by international buyers, non-governmental organizations (NGOs) and the global supply-chain standards. In the further research, these external institutional forces need to be included because they can provide a more detailed image of what exactly drives the sustainable performance of the modern global economy.

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