

Exploring the Corporate Governance and Financial Performance: Nexus Through Green Investment in the Automobile Sector of Pakistan

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ABSTRACT

Based on the legitimacy theory, The main aim of this study intends to evaluate the impact of corporate governance (CG) on firm performance (FP) with the mediating role of green investment (GI) by deploying automobile sector listed on PSX from 2011 to 2021. Because automobile sector has a significant impact on Pakistan GDP and also the growing importance of sustainable practices. This study used balanced panel data with diagnostic tests, descriptive, correlation analysis, GLS model and mediation analysis via STATA. Preacher and Hayes (2013) model were used to check the mediating effect. The results found that there has a significant positive impact of managerial Ownership (MO) and audit committees (AC) on firm performance (FP), with board size (BS) showing a negative and statistically insignificant effect. The overall framework implies a significant and positive relationship between CG and FP, while GI did not show the mediating effect. This current study emphasizes that the companies should incorporate green investment strategy into CG frameworks to meet financial success and sustainable environment. This provides a remarkable insight for policymakers to improve governmental rules, stimulate stakeholder input, enforce transparent disclosure standards, and promotion of GI in order to establish a sustainable corporate environment. These actions are recognized as crucial tactics for creating a corporate structure that balances environmental responsibility with economic development.

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INTRODUCTION

Globally, environment has been significantly influenced by climate change and environmental due to the unfavorable effects of the commercial activities and rapid population growth related to consumption and production, in which one of the societal issues are pollution of the air and water in the modern industry. Today habits of consumption are highly influenced by commercial factors, ignoring the environmental constraints (Smith et al., 2020). Green investment, encompassing eco-innovation, waste discharge fees, pollution penalties, and green fees, is a business strategy aimed at mitigating the negative environmental effects of corporate activities. Consequently, adopting GI may strengthen a company's competitive edge, reputation, and overall worth, leading to increased profitability without harming the environment (Tanasya and Handayani, 2020).

Increasing the number of green investors could have a good effect on the company's social responsibility and environmental strategy (Chuang and Huang, 2018; Lai and Sohail, 2022). On the other hand, green investment is a part of green financial development techniques that work for any nation, including Pakistan, that wants to raise its GDP rate and enhance economic development globally. According to this research, "green investment" refers to the financial act of sponsoring environmental improvement projects (Eyraud et al., 2013). It is widely recognized that climate change and sustainability perform an essential role in the success of businesses, especially in the context of financial planning (Leyva-De la Hiz et al., 2022).

It is very important for all companies during this time to implement a green investment strategy to improve firm performance and boost economic growth. Financial scandals have significantly impacted the government, executives, and investors. These organizations experienced failure due to inadequate corporate governance, such as ENGRO Group of Companies, Mehran Bank, Adelpia Communications, Kmart, Chiquita Brands Int, Enron, World Com, One Tel, China Medical Technology, Kabul Bank, Crescent Bank Fraud, PTCL and Mehran Bank (Arif et al., 2023; Saeed & Faiz 2018; Ullah et al., 2019).

Recently, several researches have been conducted in order to investigate the direct relationship between CG and FP by numerous scholars in different contexts in research designs and processes in developed and developing countries both (in terms of a variety of CG measures such as board structure, compensation structure, audit committee, and ownership structure (individually or jointly) to assess their impact on FP (El-Chaarani et al., 2022; Farhan et al., 2022; Kyere & Ausloos, 2019; Kishore & Mathews, 2021; Nasrallah & Khoury, 2021; Shehadeh et al., 2022; Younas et al., 2021), found significant positive impact of CG on FP (Arora, 2022). Conversely, a few studies have been carried out to assess a negative or no link between CG and FP (Ali et al., 2021; Awan & Jamli, 2016).

However, research on the green investment and CG dynamics of sustainable performance can make an intriguing contribution to enhancing FP. Studies that consider GI have been investigated by (Weihong et al., 2022; Indriastuti & Chariri, 2021) found mixed results. Likewise, limited work conducted on GI mostly in China, Saudi Arabia, US and seven Asian countries (Japan, Taiwan, Hong Kong, Malaysia, Singapore, Indonesia, and India) cited by (Khalil and Nimmanunta, 2021; Khalil et al., 2022; Liu et al, 2022). In Pakistan, GI has been demonstrated in the energy sector (Ali et al., 2022).

Similarly, in some studies; the impact of CG on GI as a direct effect is investigated (Lai & Sohail, 2022 and Karim et al., 2021). GI used as an independent variable to calculate the impact of CG and sustainable development of SME's, particularly on the food and beverage companies (Jayathilake, 2019; Le & Ferasso, 2022). In some of studies, green investment has been determined with firm performance as a direct and mediating effect leading toward sustainability development (Tanasya & Handayani, 2020; Chen & Ma, 202; Khalid et al., 2022; Indriastuti & Chariri, 2021; Khalil & Nimmanunta, 2022; Yin et al., 2022). GI has been examined as a mediator among firm characteristics, trade enrichment, and CSR (Weihong et al., 2022). But still, there is a lack of pertaining to investigate the mediating effect of GI between CG and FP as per prior study knowledge. In a business context,

past studies have primarily examined environmental disclosure and environmental performance (Liu et al., 2021). The studies often overlook the factors that influence GI from the viewpoints of CG and FP and neglect to comprehensively investigating them in both developed and developing economies, including Pakistan. Additionally, many studies do not adequately consider the comprehensive and up-to-date aspects of CG as stated in the SECP (2019) codes.

However, Pakistan is facing challenges like resource scarcity, population growth, and the effects of climate change caused by CO₂ emissions. Air pollution from transportation and industrial impurities exacerbates environmental issues. Inadequate waste management practices pose a threat to both human and aquatic life (Baswara et al., 2022; Ullah et al., 2021). The automobile manufacturing sector in Pakistan is experiencing substantial growth, strengthening its position as one of the fastest-growing sectors in the country. Pakistan is positioned at 35th in automobile production. The automobile industry in Pakistan in 2021 is considered a crucial component of any industrialized nation (Dweiri et al., 2016). The automobile sector is growing in developed and developing economies due to the continuous production process and rapid increase in revenue to contribute to GDP (Kushwaha & Sharma, 2016). On the other side, these industries are pressing from two sides; firstly, the automobile sector wants to deploy environmental norms to maintain sustainable development in the economy, and secondly to promote firm performance for the long run. Meanwhile, reducing carbon emissions is the biggest challenge for automobile producers because of the high cost and restrictions imposed by government regulations. In a developing country like Pakistan is also facing this kind of challenge (Hussain et al., 2022). In this scenario, governance practices need to be implemented towards sustainable development by adopting eco- friendly practices like green change management, green financing, and green investment strategies. In which green investment is one of the aspects of CSR (Chen and Ma, 2021) in order to invest in R&D (Shehzad & Cheema, 2024). This study seeks to find out how the GI mediates the connection between CG and FP in automobile firms listed on the Pakistan Stock Exchange (PSX) from 2011 to 2021.

LITERATURE REVIEW

Corporate Governance and Firm Performance – Direct Effect Perspective

CG is primarily focused on balancing the interests of all stakeholders (financial institutions, governments, directors, employees, clients, suppliers, shareholders, lenders, and communities). This is a newly developed interdisciplinary field that encompasses several academic areas such as micro economics, administrative economy, theory of organization, theory of information, legislation, finance, management, accounting, sociology, psychology, and politics. (Farooq et al., 2022). The introduction of corporate governance (CG) as a separate discipline received momentum due to public discussions and legal modifications driven by influential corporate crises such as Enron, Tyco, and WorldCom. This led to reports of influential findings such as the Cadbury Report (1992), the Sarbanes-Oxley Act (2002), and the Higgs Report (2003). This also involves the collaboration among the stockholders, board of directors, and corporate management to influence the performance and

direction of the corporation (Amahalu & Okudo, 2023). As per legitimacy theory, which highlights that a company's legitimacy is strengthened by effective CG that prioritizes ethics and openness. Aligning with society standards enhances stakeholder perceptions of the firm's performance, leading to an ongoing process that reinforces legitimacy and improves stakeholder perception (Karim et al., 2020; Rasheed et al., 2024).

Furthermore, from the review of empirical reviews, it was found that there is an inconsistent result among the links between CG and FP. Some studies revealed a positive relation (Nahar et al., 2022) conducted in Malaysia by selecting of 70 sample of non-financial firms from 2016 to 2020. Detthamrong et al. (2017) noted that board size insignificantly and negatively influenced the FP in Thailand, some of the studies indicating a negative effect. Moreover, research conducted by Alqatamin (2018) and Athar et al. (2023) has demonstrated that the presence of an audit committee in the context of Jordan and Pakistan has a positive impact on the return on assets (ROA) of firms, particularly in developing economies like Pakistan. Herdjiono and Sari (2017) and Aslam and Haron (2021) found that the impact of AC on bank FP, as reported in the OIC, was not significant. On the other hand, the impact of managerial ownership on financial performance in both developed and developing countries has yielded inconclusive results among financial and non-financial companies, as conducted by Al-Ahdal et al. (2023), Almudehki and Zeitun (2012), and Fauzi and Musallam (2015). Based on the empirical studies the following hypothesis is proposed:

H1: There is a significant impact of corporate governance on firm performance

Corporate Governance and Firm Performance – An Indirect Effect Perspective

Corporate social responsibility (CSR) serves as the foundation for innovative studies on ecological issues within the structure of enterprise operations. GI has been classified as a specific driver of CSR due to the need for CSR expenditures to harmonize the interests of shareholders/investors with the interests of society and the environment (Han et al., 2020; Liu et al., 2022). GI is defined from two perspectives based on prior research: the first perspective is the investment goal, to lower the carbon and greenhouse gas emissions and enhance the economic system ecology (Chen and Ma, 2021; Eyraud et al., 2013; Martin and Moser, 2016); and the second perspective is the investment flow, including green infrastructure and technology (Mielke and Steudle, 2018; Rehman et al., 2023).

Green investment is defined by the International Monetary Fund (IMF) as an investment required to reduce greenhouse emissions and air pollution in the absence of commercial operations of non-energy enterprises (Tanasya & Handayani, 2020). Investing in green initiatives like eco-innovation, environmental technology, and waste discharge fees can enhance competitive advantage, reputation, and firm value, leading to increased revenues while maintaining environmental sustainability. (Hussain, et al., 2023).

Multiple studies have examined as a moderating and mediating variable in the link between CG and FP influence of working capital management (Shahid et al., 2020; Nawaz et al., 2021; Khan et al., 2021; Kamran et al., 2022). CSR used in few studies as a mediating variable (Tiep Le & Nguyen, 2022) and moderating role (Saleh et al., 2021 and Mubeen et al., 2021), board size, board characteristics financial slack, intellectual capital and cost of debt and capital as mediator (Haldorai et al., 2022; Javaid et al., 2021; Rashid, 2020; Raudhatul & Sa'adah, 2022; Shahid et al., 2020; Tabassam and Khan, 2021) corporate diversification (Tanui et al., 2021), market orientation (Karim et al., 2020), firm size and board independence used as a moderating variable (Mubeen et al., 2021) but still a study is lacking pertinent to find out the impact of CG on FP with mediating role of GI suggested by (Shahid et al., 2020) to fill the gap of this study.

A study by Lai and Sohail in 2022 revealed a significant positive relationship between CG and GI in China from 1998 to 2020. Additionally, Kasseeah (2020) pointed out that the organization is crucial in deciding whether to invest in environmental projects. Investment in these projects is better suited to businesses with greater inclusivity, diversity, and openness to accountability to their stakeholders and the general public. Companies with a responsible board of directors are more likely to take actions that do not affect the environment because they care about the outside world and its problems (Shahzad et al., 2020). Last but not least, the nature and sorts of items being produced also have a significant impact. Products that directly link to shifting climatic circumstances will define the best course of action to take in order to effectively address the possibility of a declining yield (Hu et al., 2019). Similarly, few researchers have examined a positive association between GI and FP (Mubeen et al., 2021). GI and sustainable performance have a favorable link, according to Saxena and Khandelwal (2012), because investors and management of the company share a desire for a green environment (Indriastuti & Chariri, 2021; Khalid et al., 2022; Rasheed et al., 2024).

Conversely, green investment has been used as a mediator in the relationship between trade enhancement, firm characteristics, and CSR (Weihong et al., 2022) conducted in China by deploying manufacturing firms via questionnaire. Other relevant research is proposed by (Shahid et al., 2020) that green investment can strengthen the relationship between CG and FP. The existing gap in this study is based on past literature to investigate the mediating role of green investment between corporate governance and firm performance of non-financial firms listed on PSX firms, particularly in Pakistan. According to legitimacy theory, which suggests that firms seek to establish and maintain their legitimacy by ensuring that their values, policies, and plans are in line with those of the community, green investment can be viewed as a company's approach to establishing and maintaining legitimacy (Chariri et al., 2018). This study is based on both actual studies and theoretical contributions.

H₂: Green investment significantly mediates the relationship between corporate governance and firm performance.

Theoretical Underpinning

Drawing upon the legitimacy theory which is stated by Dowling & Pfeffer in (1975) that how firms engage in environmental and social efforts to protect their credibility and achieve social values. On the basis of this theory, GI can help organizations and also demonstrate their commitment towards sustainable practices and ethical business functions and improve firm performance. This helps organizations build credibility and confidence with stakeholders, potentially leading to increased financial performance (Farrukh et al., 2022). Legitimacy involves supporting individuals or businesses that value environmental concerns. The company's commitment to community environmental standards is connected with its business and operational endeavors. The company's operations are influenced by community legitimacy, which plays a crucial role in the sustainability of its business activities (Shahid et al., 2020).

Conceptual Model

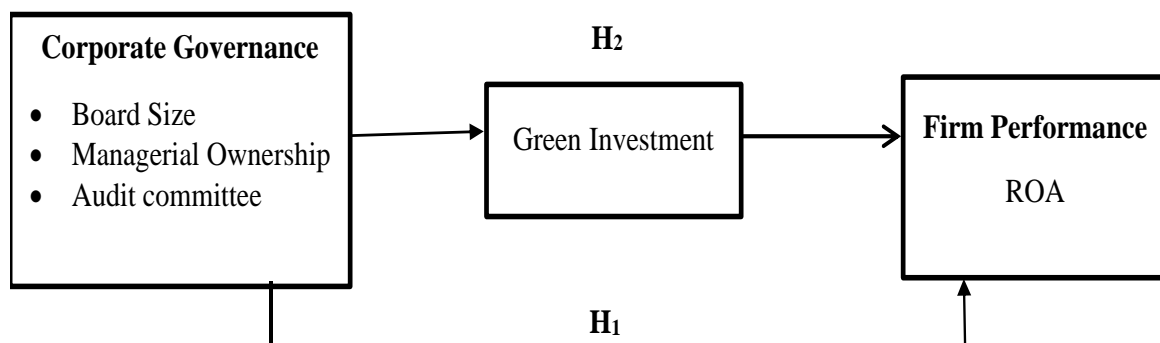


Figure 1. Conceptual Model

DATA AND METHODOLOGY

This present study examines the impact of CG on FP with the mediating role of GI based on a descriptive cum-correlational study. The positivism concept was used based on past literature and theories, so a quantitative and deductive approach has been applied in the light of research philosophy in order to quantify the results statistically with minimal interference. Hence, the population for the current study is all manufacturing sectors listed on PSX, in which all automobile sectors (Assembler, Parts, and Accessories) were deployed as a whole sample by applying the census sampling technique. The panel data from the period of 2011- 2021 was utilized. Annual reports of the given companies have been used via secondary source in order to gather the data.

STATA software was used to analyze the results by applying descriptive statistics, correlation, panel data regression analysis. Shapiro-Wilk test, VIF (variance inflation factor) test, BreuschPagan test, fixed, random effect model, Hausmann test, and GLS (generalized least squares method) in the context of the Preacher and Hayes (2013) model, which is used for mediation analysis.

Model Speciation:

$$FP_{i,t} = \beta_0 + \beta_1 CG_{i,t} + \beta_2 GI_{i,t} + \varepsilon_{i,t}$$

Where:

FP: Firm Performance

CG: Corporate Governance

GI: Green Investment

Table 1: Measurements of the Variables

Variables	Measurement	Source
Independent Variable		
Corporate Governance		
Board Size	Total number of directors on the board	Kyere & Ausloos (2021)
Managerial ownership	Number of shares owned by management/ Number of shares outstanding * 100	Hadnanb & Setiyawati (2021)
Audit committee	Number of Frequency of audit committee meetings	
Dependent Variable		
Firm Performance		
Return on Assets (ROA)	Net Income /Total assets *100	Kim & Lee (2020)
Mediating Variables		
Green Investment (GI)	(Green Investment/ (Total Assets/100) The data will be gathered by the help of Annual report	Liu et al. (2022) and Yannan et al (2021)

RESULT AND DISCUSSION**Results**

Panel data is commonly used in similar research studies (Bansal et al., 2021; Dakhli, 2021; Velte, 2019). In this current study, data was collected from 210 firms in the automobile manufacturing sector listed on PSX from 2011 to 2021 with 2100 observations. The data was strongly balanced with the help of STATA (Ademi & Klungseth, 2022).

Table 2: Descriptive Statistics

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Board size	210	8.4	2.271521	5	16
Managerial ownership	210	2.996579	7.218677	0	29.95
Audit committee	210	3.652381	.857346	2	5
ROA	210	6.450134	8.693936	-21.73	53.1
Green investment	210	.9320287	4.274522	0	47.31149

Table 3 shows the summary statistics of the given variables, in which the average board size is 8.4, with a moderate standard deviation of 2.27 having minimum range of 5 and maximum range of 16. Managerial ownership has an average of approximately 3, with a positive standard deviation of 7.22 and also 0 minimum value and a maximum value is of 29.95. The mean audit committee score is 3.65, with a small standard deviation of 0.86 with 2 to 5 minimum and maximum range. Return on assets (ROA) shows an average of 6.45 and a substantial standard deviation of 8.69, with values ranging from -21.73 to 53.1, indicating a wide variability in ROA. Green investment has a mean of 0.93, a standard deviation of 4.27, and a range from 0 (Murwaningsari & Riyanti, 2023) to 47.31 out of 210 observations.

Table 3: Correlation Matrix

	BS	MO	AC	ROA	GI
BS	1.000				
MO	-0.0797	1.000			
AC	0.3666	-0.0955	1.000		
ROA	-0.0468	0.1816	0.1848	1.000	
GI	-0.0379	-0.0861	-0.0932	0.4414	1.000

The correlation matrix between the variables BS, MO, AC, ROA, and GI reveals several significant relationships. Particularly, MO and BS have a weak negative correlation (-0.0797), indicating that MO may be marginally lower on larger boards. Conversely, a moderately significant correlation (0.3666) suggests that larger boards and stronger or more frequent AC are related. MO and ROA have been found to have a slightly significant correlation (0.1816), indicating a possible relationship between higher levels of MO and higher ROA. Additionally, a fairly significant connection (0.4414) between GI and ROA has been found, suggesting a positive correlation between increased ROA and increased GI.

Diagnostic Tests

Diagnostic tests were carried out to investigate the normality, and variance inflating factor (VIF) for finding out multicollinearity and heteroscedasticity of data, e.g., the Shapiro-Wilk test and the BreuschPagan tests found no heteroscedasticity in variables, but normality issues in variables were found due to a highly significant value, which indicates the assumptions of OLS are violated; similarly, Hausman's test, fixed effect model and random effect model were also carried out, indicating no appropriate results. That's why the GLS model was applied, as stated by (Aryan et al., 2022) to obtain reliable results to evaluate the aim and objectives of the variables.

Table 5: GLS Model

Estimated covariances	1	Number of obs	210
Estimated autocorrelations	0	Number of Groups	21
Estimated coefficients	4	Prb > chi2	0.000
Wald chi2(4)	19.75		
Log Likelihood	-738.9212		

ROA	Coef.	SE	Z	P> z	[95% Conf. Interval]	
BS	-.46072	.272502	-1.69	0.091	-.994814	.073374
MO	.235926	.0802083	2.94	0.003	.0787206	.3931313
AC	2.502142	.7226204	3.46	0.001	1.085832	3.918451
Con	.4561358	2.888884	0.16	0.875	-5.205973	6.118245

Table 5 shows that there is a positive relationship between CG and FP which demonstrates a significant impact as per the threshold value (Wald chi2 test, p-value = 0.000) and a reasonable fit to the data (log likelihood = -738.9212) based on 210 observations grouped into 21 entities. While the intercept term (Con_) is not statistically significant (p-value = 0.875), the coefficients for the predictor variables reveal notable patterns. Marginally non-significant, the variable BS shows a coefficient of -0.46072 (p-value = 0.091). In contrast, MO and AC exhibit significant positive associations with the response variable, with coefficients of 0.235926 (p-value = 0.003) and 2.502142 (p-value = 0.001), respectively.

Table 6: Mediation Analysis Results

	Coef.	St. Error	Z	P>z	[95%Conf. Interval]	
GI <- CG Index	-0.291	0.326	-0.890	0.373	-0.930	0.349
_cons	2.100	1.344	1.560	0.118	-0.534	4.733
ROA <- GI	0.903	0.126	7.170	0.000	0.657	1.150
CG Index	0.448	0.597	0.750	0.453	-0.722	1.619
cons	3.807	2.468	1.540	0.123	-1.030	8.644
Var (GI)	.116	1.768			14.96	21.935
Var (ROA)	60.409	5.895			49.892	73.142

LR test of model vs. saturated: chi2(0) = 0.00, Prob > chi2 = 0.000

Table 7: Direct effect

	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
GI <- CG Index	-.2906332	.3263985	-0.89	0.373	-.9303625	.3490961
ROA <- GI	.903486	.1260107	7.17	0.000	.6565097	1.150462
CGI Index	.448351	.59715	0.75	0.453	-.7220414	1.618743

Table 8: Indirect Effect

	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
GI <- CG Index	0	No path				
ROA <- GI	0	No path				
CGI Index	-.262583	.2971619	-0.88	0.377	-.8450096	.3198435

Table 9: Total Effect

	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
GI <- CG Index	.2906332	.3263985	-0.89	0.373	-.9303625	.3490961
ROA <- GI	.903486	.1260107	7.17	0.000	.6565097	1.150462
CGI Index	.185768	.6649893	0.28	0.780	-1.117587	1.489123

Mediation analysis evaluated the role of GI in mediating the relationship between CG and FP. These results, as shown in tables 6, 7, 8, and 9, indicated a minimal indirect impact of CG on FP through GI. The overall impact of CG on FP was shown to be insignificant. Additionally, the mediating role of green investment (GI) in the connection between CG and FP was also found to be insignificant. This indicates that there is no mediating impact between CG and FP.

Discussion

As depicted in **Table 5**, showed that there is a significant impact of CG on FP. From the statistical results, it was obtained that the p-value was 0.000 ($0.000 < 0.05$). Thus, it can be concluded that H_0 is rejected and H_1 is accepted. Similarly, these findings show that MO and AC play significant roles in order to FP, consistent with (Alzeban, 2020; Fariha et al., 2022; Shahzad et al., 2023) The audit committee should be comprised of highly skilled individuals who have extensive knowledge about finance and accounting. The committee is responsible for maintaining organizational transparency through a careful review of annual reports. Nevertheless, MO is seen as a valuable internal corporate governance tool that aligns the interests of management and shareholders. MO indicates that managers hold shares in the firm. With shares, management may monitor company operations more closely in an effort to optimize earnings. Whereas the impact of BS is insignificant, followed by (Detthamrong et al., 2017; Khan et al., 2023; Kushwaha & Sharma, 2016; Sheikh & Alom, 2021), indicating that a large number of boards are not sufficient to enhance the level of firm performance and governance while board size can be promoted through highly qualified and expert staff (Khan et al., 2019).

Likewise, from the above results, it was found in the light of **Tables 6, 7, 8 and 9** that there is no mediation of GI between CG and FP, showing that H_2 is rejected because of the zero path among the variables based on the threshold value ($P > 0.000$). From the statistical results, it was found that the automobile sector in Pakistan has been employing the same outdated technology and assembly techniques for the past three decades, resulting in air pollution and associated health issues, as highlighted by Siddiqui (2021). This technological stagnation contributes to environmental degradation, with emissions from both factories and vehicles being major sources of pollution, impacting global warming, and causing acid rain (Agyemang et al., 2019; Mukhtar et al., 2023; Kumar & Chandrakar, 2012).

In Pakistan, the automobile sector has a significant impact on the country's GDP (Ghisellini et al., 2018). Khan et al. (2018) conducted a study highlighting the importance of better coordination between the growth of the automobile industry in the country and its operational efficiency. The lack of alignment becomes particularly obvious when it comes to innovation in sustainability technological advancement, and organizational practices, and. The primary factors contributing to this divergence

are financial constraints and a shortage of resources. Hence, the minimal value of GI was 0 obtaining the results from descriptive statistics showing, still GI is not implemented and not focusing over this to reduce fossil fuels and carbon emissions because of the median range of GI in the automobile sector, which is 0.03, and median only 3% million is utilizing green investment.

The study's results suggest that while it may not directly impact mediation, it offers important contextual information on the interplay between corporate governance, firm performance, and green investment in the Pakistani automobile industry. This is particularly beneficial for scholars studying comparable circumstances or seeking to comprehend the intricacies of the relationship in diverse settings. Furthermore, the current data analysis techniques being used can still provide value by introducing novel methods and even inspiring the creation of new research paths in the field.

CONCLUSION AND POLICY IMPLEMENTATION

Conclusion

The study examines the relationship between corporate governance (CG), green investment (GI), and firm performance (FP) in the context of the automobile sector listed on PSX from 2011 to 2021. The findings reveal a significant impact of corporate governance on firm performance, indicating that factors such as board size, managerial ownership, and audit committee play crucial roles in influencing the financial performance of firms in the automobile sector. Hence, the role of green investment as a mediator between CG and FP seems insignificant.

The study emphasizes the importance of focusing more on CG standards in the automobile industry to improve overall company performance. Although the positive effects of corporate governance on firm performance are widely recognized, the minimal impact of green investment indicates a need for more focused initiatives to encourage ecologically friendly practices in the business. The results show a discrepancy between the present condition of the automobile sector in Pakistan and the implementation of environmentally friendly measures, highlighting the necessity for more emphasis on technological progress, organizational strategies, and sustainability innovation. The absence of intervention through green investment indicates that, despite the potential benefits of eco-friendly methods, the existing amount of GI in the automobile sector is small. These issues concern the industry's role in environmental deterioration, especially due to obsolete technology and assembly methods that result in air pollution and related health problems.

This study emphasizes the importance of aligning corporate governance practices with sustainability initiatives, specifically in the context of the automobile sector in Pakistan. While corporate governance has a clear influence on firm performance, the incorporation of green investment as a mediator needs more attention and strategic implementation. This research provides valuable insights for policymakers, industry stakeholders, and corporate leaders to foster a balance between economic growth and environmental responsibility in the automobile sector.

Limitations and Future Direction

This study limited itself to CG on FP with the mediating role of GI by taking non- financial sectors (manufacturing) listed on PSX as a target population, in which the automobile sector employed as a sample. The data was conducted via secondary source by using websites and annual reports of the mentioned companies in light of the census sampling technique based on the available data from 2011-2021. Moreover, only three sub- dimensions of CG have been considered in this study, BS, MO and AC, while ROA is used as a proxy for measuring FP with the mediating role of GI. Future studies could employ other sectors of non-financial companies listed on PSX to get more valuable results.

Corporate governance could be determined on other dimensions. ROE, Tobin's Q, and EPS might be taken as a proxy for calculating FP. GI could be used as an independent, dependent, and moderating effect in future studies with the current scenario. Based on the findings, GI might be taken as an individual measure for future studies because now it is using as a proxy for sustainability which is appears on the annual reports of the firms. Green investment could be considered as a moderating variable in further studies with CG and FP. Also, future studies could involve a deeper exploration of specific barriers and challenges hindering the implementation of green investment in the automobile sector. Additionally, a longitudinal analysis may provide insights into the evolving dynamics between corporate governance, green investment, and firm performance over time.

Practical Implementations and Recommendation

This study provides a variety of practical implementations, including, first, that investors can have a significant impact by encouraging portfolio companies to incorporate ESG factors into their decision-making processes. Highlighting sustainable investments and utilizing ESG rating agencies can guide decisions towards companies that demonstrate strong environmental performance and commitment to green efforts. Secondly, businesses should be given priority to ESG practices at board level with the help of qualified and expert staff members, and also develop ESG policies and make green investment in order to bring innovative technology in the organization and make it a part of strategic planning as well.

Thirdly, stakeholders of the firms can meet the progress of the ESG practices by applying some particular reports for instance key performance indicators (KPI's) and reports of sustainability. Because it will decision-makers to strengthen environmental regulations in order to encourage green investments and discourage harmful practices. Furthermore, government should be promoted tax exemptions or subsidies that may motivate firms to implement green technologies as well as to encourage open forum for discussions and partnerships between companies, investors, and communities on sustainability issues by offering training initiatives and technical support. It can enhance expertise and tackle possible obstacles. However, businesses can address those difficulties which is harmful for the organizational success e.g. uncertain market situations, short term cost, knowledge gap by showing cost benefit evaluation reports, giving priority to employee training, and ensuring clear and fair communication with stakeholders to meet long term goals of the sustainability.

Firms can address difficulties like short-term costs, knowledge gaps, and market uncertainty by conducting comprehensive cost-benefit evaluations, prioritizing employee training, and ensuring clear communication with stakeholders to promote long-term sustainability objectives. Through the strategic integration of environmentally-friendly investments and efficient governance procedures, all stakeholders may work together to achieve mutual benefits, enhancing the profitability of the company and minimizing its impact on the environment for a more sustainable future.

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