

Effect of Corporate Governance on Environmental Performance: Empirical Evidence from Zimbabwe

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Abstract

The increasing pressure on environmental responsibility from shareholders, government regulators and the public led to the need for companies to pay more attention to the environmental impact of their operations. This study has been carried out to investigate the effect of corporate governance on environmental performance in Zimbabwe. Board size, board independence, gender diversity, managerial ownership and institutional ownership were used to proxy corporate governance while Global Initiative Reporting Index (GRI) was used to proxy environmental performance and firm age was introduced as a control variable. Exposit research design was adopted, data were collected from the annual reports of listed 27 manufacturing companies on the Zimbabwe Stock Exchange using census sampling techniques and panel regression analysis was used to analyze the data collected. The findings showed that board size, gender diversity and managerial ownership have a positive and significant effect on environmental performance while board independence and institutional ownership have positive and insignificant effects on environmental performance. It was concluded that corporate governance variables are important considerations in achieving a good environmental performance and recommended that good number of board size and women should be encouraged for objective and gender-balanced decision making as regards environmental issues.

Keywords

Corporate Governance, Environmental Performance, Stakeholders Theory, Zimbabwe

1. Introduction

Companies are paying closer attention to the environmental impact of their op-

erations in response to increasing pressure from shareholders, government regulators, and the general public to be more environmentally responsible. Companies' negative effects on the environment, such as greenhouse gas emissions, vehicle emissions, and waste, are a serious concern for stakeholders, who hope that businesses will begin to act more responsibly in this regard and begin to address issues of environmental and sustainable development (Braam et al., 2016). This is very imperative, even at this time when environmental issues had caused a lot of life threatening issues to both human and animals. Human life span had reduced drastically, unexplained sickness and diseases are the other of the day with a lot of issues with animals and plants. Corporate governance has an important role to play in environmental issues because it is the responsibility of the director to take the decision on every aspect of the business. The characteristic of the board and ownership structure could be of importance to their decision-making as regards environmental disclosure. For the purpose of this study we used board size, board independence, gender diversity, managerial ownership and institutional ownership.

Also, manufacturing sector has grown to become not only one of the world's most significant industries, but also a major contributor to national economies everywhere. However, there are growing environmental concerns due to the global environmental crisis, and a major contributor to this is the impact that manufacturing companies' activities can have on the environment. Hence, there is a need to investigate the effect of corporate governance on environmental performance.

Although, some prior studies have been carried out in this area, to the best knowledge of the researcher attention has been given to Zimbabwe. For example Masud, Nurunnabi & Bae (2018) studied the effect of corporate governance on environmental reporting, empirical evidence from south Asian countries. Olayinka & Owolabi (2021) carried out their study on corporate governance and environmental sustainability reporting in Nigeria while Ofoegbu et al. (2018) investigated the influence of corporate governance on environmental disclosure of listed non-financial firms in Nigeria. Therefore, it is worthy to know that this study is poised empirically to investigate the effect of corporate governance on environmental performance, an evidence from Zimbabwe manufacturing listed companies. Hence, there is need to bridge this gap in knowledge.

The main objective of the study is to investigate corporate governance and environmental performance while the specific objectives are to examine the effect of board size, board independence, gender diversity, managerial ownership structure and institutional ownership structure.

The study will cover a period of 10 years (2011-2020) for listed manufacturing companies in Zimbabwe.

The study is structured into five major parts, the introduction, literature review (conceptual, theoretical and empirical), methodology, data analysis and discussion of findings, conclusion and recommendations.

2. Literature Review

2.1. Corporate Governance

According to the Forum for Williams (2003), “corporate governance” means the overall structure of the company. Strong corporate governance is essential in creating a business climate that is welcoming to both domestic and international investors. Strong corporate governance facilitates the direction, administration, management, and control of organizations. According to a report published by the World Bank in 2006, corporate governance consists of “the frameworks and practices for the management and direction of businesses,” which includes the relationships among the board of directors, the management team, the minority shareholders, the controlling shareholders, and other stakeholders. According to Ioana and Gherghina (2007), the Organization for Economic Cooperation and Development (OECD) defined “corporate governance” as “the system by which corporations are managed and controlled”. Policies and procedures for making decisions that affect all parties involved and the environment are laid out in the governance structure, as are the rights and responsibilities of the company’s various stakeholders.

As a result, the organizational framework that determines how businesses are led to achieve their goals is referred to as having “corporate governance.”

2.2. Concept of Environment Performance

The private sector, and multinational corporations in particular, will be increasingly important in the future for preventing global environmental problems (Salo, 2008). Corporate ethos and management practices have broadened to include social and ecological concerns. The reason for this is that Elkington’s ideas are spreading through the ranks of corporate management. According to Elkington (1997), only businesses measuring their success in terms of profit, environmental quality, and social justice—a so-called “triple bottom line” approach—will be able to keep up with the ever-changing demands of the global marketplace in the twenty-first century.

The extent to which a company satisfies the environmental expectations of its stakeholders is one common definition of environmental performance. That’s why it’s so important for metrics used to evaluate environmental performance to show whether or not stakeholders feel their needs have been met.

Measures of a company’s environmental performance provide insight into how well the organization manages its impact on the natural world. What matters is how well the company does at creating a pleasant working atmosphere (Suratno et al., 2007). The company takes environmental factors into account as part of its commitment to social responsibility and environmental stewardship. According to Fitriani (2013), an organization’s environmental performance can be defined as how well it contributes to creating a healthy and sustainable natural environment.

2.3. Corporate Governance and Environmental Performance

Directors play a crucial role in all organizational decision-making, which is why corporate governance is of paramount importance in the context of protecting the environment from unsavory corporate practices. Corporate boards, of which directors are a part, have authority over the company's daily operations and long-term strategies. The corporate board would be responsible for all strategic and operational decisions, as well as any decisions pertaining to the company's impact on the environment (Aguilera & Jackson, 2003). For this reason, corporate boards, as the primary decision-making body, are accountable for the company's environmental strategies, which must be implemented proactively (Ortiz-de-Mandojana et al., 2016). The high number of regulations has led many businesses to establish dedicated environmental committees (Dixon-Fowler et al., 2017). They are also known as "corporate social responsibility" committees. Organizations benefit from having a board that is representative of the community it serves and is diverse (whether that diversity be in terms of independent directors, foreign directors, or some other factor) (De Villiers et al., 2011). When it comes to tackling ecological issues, the board of directors' input is crucial. According to De Villiers et al. (2011), a company's environmental performance suffers when its board of directors isn't sufficiently diverse, large, and independent. A large, independent board's ability to monitor operations and process information is diminished by the bureaucratic red tape they must wade through; a small, diverse board, on the other hand, faces fewer of these challenges.

Furthermore, Tauringana and Chithambo (2015) argued that the dissemination of environmental information in firms was significantly impacted by board size because of the correlation between board size and the knowledge of individual board members. The effectiveness of a company's environmental strategies and policies is directly proportional to the amount of time and attention given to these matters in the boardroom.

There has previously been some research linking corporate governance and environmental performance, but it did not use the GRI. Only recently have the opportunities and risks of studying the intersection of corporate governance and environmental performance been investigated (Benn et al., 2014).

One of the previous major bodies of research that directly examined the relationship between corporate governance and environmental performance focused on the effects of corporate board structure and firm ownership on specific and limited indicators of corporate environmental performance. In that body of literature, there were contradictory findings regarding how board structure affected environmental performance. Halme and Huse (1997) discovered that board of directors factors were positively related to differences in corporate environmental reporting.

Goodstein, Gautam, and Boeker (1994) discovered, on the other hand, that companies with large and diverse boards were less likely to initiate strategic

changes than those with smaller homogeneous boards, implying that diverse boards would be limited in their effectiveness during periods of environmental turbulence. This study confirmed previous research (Gautschi & Jones, 1987; Kesner et al., 1986) that boards with a higher proportion of outside directors did not improve environmental performance as measured by fewer environmental law violations. According to two additional studies, environmental performance indicators were positively correlated with ownership structure factors (Halme & Huse, 1997; Mahoney & Roberts, 2019).

Higher levels of stock ownership by corporate officers and directors were significantly and positively correlated with an increase in serious illegal environmental violations, according to McKendall research published in 1999. This could imply that officers and directors with a financial stake are more likely to engage in illegal activities in order to maximize profit. McKendall's research also discovered that the presence of social responsibility or ethics committees had no effect on a company's environmental violations.

Environmental performance is more than merely reporting financial information. It covers the responsibilities of the firms to the environment (Gray et al., 1987) and involves ensuring effective corporate governance practices that incorporate transparency in environmental best practice. Many developing countries care less about environmental happenings or activities of companies as regards pollution. The poverty level is so high that many are mainly interested in the daily survival of feeding self and family. Ensuring effective and sound corporate governance practices that would enhance sustainability and lead to the country's economic growth and development is also a major challenge for companies.

Disclosure on environmental performance helps firms to gain stakeholders' confidence, isolate probable dangers and mitigate the impact of polluting firms' activities on the environment. The effect of companies' operations on neighbours, environment, employees, host communities and consumers cannot be over-emphasized. The long time survival of companies would be enhanced when outcomes or possible outcomes are made known to all the relevant stakeholders including regulators, the media and shareholders (Adams & Zutshi, 2004).

The inclusion of women on boards is one aspect of board diversity. Diversity on corporate boards has emerged as a critical issue for today's businesses. According to some, male and female perspectives on social responsibility are fundamentally different (Post et al., 2011). According to previous research, businesses with female directors/gender-diverse boards were more likely to pursue environmentally responsible practices/strategies (Ciocirlan & Pettersson, 2011; Bear et al., 2010; Pucheta-Martínez & Bel-Oms, 2018; Firer & Williams, 2003). Glass et al. (2015) and Ciocirlan and Pettersson (2011) discovered that US companies with a high proportion of female directors on boards outperformed male-dominated boards in terms of environmental performance. Jia and Zhang (2019) made a similar case, claiming that women in Chinese boardrooms can influence corporate decisions and strategies, particularly those affecting the envi-

ronment. Given the foregoing, we hypothesized that more female directors and greater gender diversity on corporate boards of directors would benefit their environmental strategies. Having directors who own stock in the company can help reduce agency costs because they will act more like business owners and work to increase shareholder value. Directors with stockholdings may be more likely to make CSR-friendly decisions in order to attract stakeholders' attention and demonstrate that they are making a positive impact on the world (Khan et al. 2012). Previous research, however, discovered a negative relationship between managerial ownership and disclosure policies (Khan et al. 2012). Directors in developed countries are more likely to make short-term decisions to increase their own benefits and compensation (Oh et al., 2011; Faller & ZuKnyphausen-Aufseß, 2016), making it difficult for developing-country stakeholders to exert influence. Board members wield more power than other interested parties due to a lack of disclosure and responsibility.

Previous research has found that directors who own a larger number of shares are less concerned with maximizing shareholder wealth and more concerned with their own financial gain and interests. This is also an important aspect of running a business. Experts in corporate governance agree that a company's ownership structure, whether concentrated or decentralized, is critical (De Andres et al., 2005). The proportion of a company's stock owned by institutional investors such as banks, pension funds, endowment funds, mutual funds, and insurance companies is referred to as its "institutional ownership" (Dey, 2008). It is widely assumed that the presence of institutional investors reduces the efficiency and effectiveness of a board. Jensen and Meckling (1976) argued that when companies' ownership and management were separated, customers demanded greater transparency from those businesses. As a result, it is reasonable to assume that institutional shareholders reduce the likelihood of better corporate environmental reporting.

When shareholders with a larger stake in the company limit the board's ability to make important business decisions, the board's independence and activism suffer (Jensen & Meckling, 1976; Lakhali, 2005).

2.4. Empirical Literature

Several authors had examined the effect of corporate governance and environmental performance.

Acar et al. (2021) investigated ownership type and its impact on environmental disclosure. They examined a sample of 27,847 firm-year observations from 72 nations and economic regions from 2002 to 2017. The relationship between various ownership structures and environmental disclosure was investigated using panel regression analysis to see if it was affected by the level of development in the various countries. According to the study, firms with more institutional ownership had a negative impact on environmental disclosures, whereas firms with more state ownership had a positive impact. The study also found that firms in developed countries with a higher level of state ownership disclosed

more about the environment than firms in developing countries. This study was carried out in developed economy while ours was carried out in developing economy which bridged regional gap compared to the study of [Acar et al. \(2021\)](#). Although, our result showed a positive result.

[Martnez-Ferrero and Lozano \(2021\)](#) investigated how the degree of institutional ownership affected environmental, social, and governance (ESG) performance in emerging nations by jointly examining a nonlinear relationship. Their findings revealed that the ESG performance of firms in emerging markets was dependent on the level of influential institutional ownership and exhibited a U-shaped relationship, particularly for environmental disclosure. They looked at an international sample of 17,318 firm-year observations from 16 emerging countries from 2012 to 2018. Low-ownership institutional investors were less likely to encourage improved ESG performance in developing countries, though this effect was mitigated once institutional ownership reached a significant percentage. The study was carried out using developed economy which made it different from this study and the period covered was 2012 to 2018 in which this study also covered 2011 to 2022. Our study bridged both the regional and periodic gap.

[Shakil et al. \(2020\)](#) investigated how board gender and environmental, social, and governance performance of US banks affected how controversies involving those issues were handled over a five-year period (2013-2017). They used static and dynamic panel regression models with random, fixed, and dynamic generalized method of moments (GMM) effects to test the hypotheses. They used FMM to reduce endogeneity and measurement error and eliminated variable bias and bank-specific heterogeneity. They discovered a strong link between board gender diversity and American banks' environmental, social, and governance performance. [Shakil et al. \(2020\)](#) study used GMM for their analysis.

[Rubino and Napoli \(2020\)](#) conducted an empirical study of listed Italian companies to investigate the impact of corporate governance on environmental performance. Over a five-year period, they examined the governance and ownership characteristics of 83 Italian listed companies (2013-2017). They analyzed their data using hierarchical regression analysis and discovered that board independence, board size, and family firm status all had a positive impact on corporate environmental performance, while director interlocks had a positive but minor impact. This result was carried out in a developed economy.

[Gallego-Sosa et al. \(2020\)](#) investigated the impact of gender diversity on the environmental performance of banks listed in Europe and the United States over a five-year period. Using a fixed effect panel regression model, they discovered that gender balance boards have a positive and significant impact on bank performance for sustainability. Furthermore, there was a positive correlation between board size, the CRS committee, and ESG performance, but a negative correlation between board independence and ESG performance. They adopted panel regression analysis while we adopted least square dummy variable which bridged the methodological gap that was created in prior research.

Similarly, [Ofoegbu et al. \(2018\)](#) investigated the impact of corporate governance on the environmental disclosure of Nigerian listed non-financial firms. They based their research on the trinity theory (Agency, stakeholder and legitimacy theories). They used 86 Nigerian Stock Exchange-listed companies. Their data was analyzed using content analysis and ordinary least square regression techniques, and the results revealed that board independence, board meetings, and the environmental committee were statistically significant, whereas audit committee independence and board size were insignificant with regard to environmental disclosure.

[Masud et al. \(2018\)](#) investigated the effect of corporate governance on the performance of environmental sustainability reporting in South Asian countries using empirical evidence (Bangladesh, Indian & Pakistan). The data from the Global Reporting Initiative (GRI) was used to analyze 88 listed organizations' sustainability reports over an eight-year period (2009-2016). As independent variables, they use ownership structure (foreign, institutional, director, and family) and board characteristics (independence, size, diversity, and committees). They tested the hypotheses using ordinary least square regression analysis and discovered that foreign ownership, institutional ownership, board independence, and board size had a positive and significant effect on environmental performance, whereas director ownership had a negative and significant effect. The impact of board diversity and other environmental committees on environmental performance was negative and insignificant. They recommended that effective and efficient corporate governance elements be encouraged because they can help management monitor, control, and promote environmental sustainability reporting.

Similarly, over a six-year period, [Haladu and Salim \(2016\)](#) examined board characteristics, sustainability reporting, and the moderating impact of environmental agencies (2009-2014). They analyzed their data using ordinary least squares and discovered that, while environmental experts, board size, and policy administration had positive and significant effects on environmental reporting, board composition and chief executive duality did not.

[Birindelli et al. \(2018\)](#) investigated the impact of board composition and activity on environmental, social, and governance performance in the banking industry. Gender diversity, board independence, board size, meeting frequency, and the corporate social responsibility committee were their independent variables. They used a fixed effect panel regression model on a sample of 108 listed banks from Europe and the United States over a six-year period (2011-2016) and discovered that gender diversity had no effect on ESG performance. There was a positive relationship between ESG performance, board size, and the CRs committee, but a negative relationship between independent directors. They advocated for corporate governance principles to play a key role in banks' environmental, social, and governance practices, with implications for both banks and supervisory authorities.

Walls et al. (2012) investigated the link between corporate governance and environmental performance. They analyzed their data using regression analysis and discovered that, while gender diversity had a negative and significant relationship with environmental performance, environmental committee, board size, and board independence did not.

Jaffar et al. (2018) investigated the role of corporate governance in environmental performance in the same way. Using the matched pairs design method, they developed stakeholder theory. The data was analyzed using the ordinary least square method. Their findings revealed that corporate governance mechanisms were positively associated with the environmental performance of Malaysian companies. They recommended that good governance be implemented in order to increase companies' compliance with environmental implementation, particularly in the area of environmental management, in order to meet regulatory standards and stakeholders' expect.

3. Theoretical Review

Stakeholder Theory

This theory was propounded by Edward Robert Freeman (1984), an American philosopher and professor of business at Darden School of the University of Virginia. When viewed as such, the conventional view that the success of the firm is dependent solely upon maximizing shareholders' wealth is not sufficient because the entity is perceived to be a nexus of explicit and implicit contracts (Jensen and Meckling, 1976) between the firm and its various stakeholders. Furthermore, in contrast with the institutional theory where norms are imposed to the firms, the stakeholder theory assumes that firms have the ability to influence not just society in general but its various stakeholders in particular. In developing stakeholder theory, Freeman and Reed (1983) incorporate the stakeholder concept into two categories: 1) a business planning and policy model; and 2) a CSR model of stakeholder management.

In the first model, the stakeholder analysis focus is on developing and evaluating the approval of corporate strategic decisions by groups whose support is required for the firm's continued existence. The stakeholders identified in this model include the owners, customers, public groups and suppliers. Although these groups are not adversarial in nature, their possibly conflicting behavior is considered a constraint on the strategy developed by management to best match the firm's resources with the environment. In the second model, the corporate planning and analysis extends to include external influences which may be adversarial to the firm. These adversarial groups may include the regulatory bodies, environmentalist and/or special interest groups concerned with social issues. The second model enables managers to consider a strategic plan that is adaptable to changes in the social demands of nontraditional stakeholder groups. As noted earlier, corporate environmental practices and reporting is one area in which much community awareness has developed. Likewise, the global community

promotes worldwide commitment to ecological sustainability by coming together to earth summits.

Stakeholder mapping is the process of identifying and naming the link between a company's actions and the consequences for its constituents. In the stakeholder theory, the stakeholders are the company's customers, suppliers, employees, and the general public. Given this collaboration, the company must rely on the support of its stakeholders if it is to succeed.

4. Methodology

Exposit-facto research design was adopted while the data were sourced using the secondary method of data collection. They were extracted from published annual reports of selected 27 manufacturing companies listed on the Zimbabwe Stock Exchange over the period of 10 years (2011-2020). The variables were board size (*BZ*), board independence (*BI*), gender diversity (*GD*), managerial ownership (*MO*) and institutional ownership (*IO*) were used to proxy corporate governance while the global reporting initiative index was used to proxy environmental performance.

Also firm age was introduced as a control variable. Both descriptive (mean, standard deviation etc) and inferential (panel regression) statistics were used to analyze the data collected. Other pre and post estimation test were also conducted.

Model Specification:

$$EP_{it} = \beta_1 BZ_{it} + \beta_2 BI_{it} + \beta_3 GD_{it} + \beta_4 MO_{it} + \beta_5 IO_{it} + \beta_6 FA_{it} + e_t$$

where:

EP_{it} = Environmental Performance for firm *i* in year *t*;

BZ_{it} = Board Size for firm *i* in year *t*;

BI_{it} = Board Independence for the firm *I* in year *t*;

GD_{it} = Gender Diversity for the firm *I* in year *t*;

MO_{it} = Managerial Ownership for the firm *I* in year *t*;

IO_{it} = Institutional Ownership for the firm *I* in year *t*;

FA_{it} = Firm Age for firm *I* in year *t*;

e_t = Stochastic term;

i = number of sampled cross-sectional firms (1, 2, ..., 27);

t = period of the sampled firms (2001-2020).

where: EP was the dependent variable, $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ were regression coefficients with unknown values which were estimated *BZ, BI, GD, MO* and *IO* as independent variables while FA was control variable.

A priori expectation of variables in the model which indicated the relationship between dependent and independent variables was thus signed. A priori was such that $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0$.

4.1. Operationalization of Variables

Table 1 shows the operationalization of dependent variable, independent va-

riables and control variable used in the study.

4.2. Data Analysis and Discussion of Findings

The descriptive analysis of the data set is displayed in **Table 2**. EP has a mean of

Table 1. Operationalization of variables.

Variables	Acronym	Measurement
<i>Dependent</i>		
Environment performance	EP	Measured as the number of scores by each company compared with the GRI dummy. Individual company score divided by the total as stated by GRI (Ghani & Rosdi, 2019).
<i>Independent Variables</i>		
<i>Corporate Governance</i>		
Board size	BZ	The total number of all the directors on the board of a firm as stated by the annual report date (Ofoegbu et al., 2018).
Board Independence	PI	Percentage of non-executive directors was measured as the total number of non-executive directors divided by the total number of directors on the firm's board of directors in the annual report (Ofoegbu et al., 2018).
Gender Diversity	BD	Measured as the percentage of the number of women on the board of directors (Ofoegbu et al., 2018).
Managerial Ownership	MO	Measured as the percentage of director's direct and indirect shares divided by outstanding shares. They were not available for companies that did not disclose directors' shares interest (Ionel-Alin et al., 2012).
Institutional Ownership	MO	Measured as the percentage of the share ownership concentration of all the block institutional shareholders with 5% and above controlling interest. They were not available for companies that do not disclose major shareholders in their annual reports (Ionel-Alin et al., 2012).
<i>Control variables</i>		
Firm age	FA	Firm age was measured in terms of the number of years the companies had been listed (Akram. et al., 2018).

Source: Author's compilation, 2022.

Table 2. Descriptive statistics.

Variables	Mean	Std. Dev.	Min	Max	Obs.
EP	0.15	0.26	0.00	0.86	270
BZ	8.59	2.11	4.00	14.00	270
BI	72.68	12.18	16.67	114.00	270
GD	10.43	11.87	0.00	60.00	270
MO	5.47	11.62	0.00	48.56	270
IO	71.10	14.24	0.00	91.00	270
FA	36.26	20.85	9.00	75.00	270

Source: Author's computation (2022) using STATA 14.0.

0.15, a standard deviation of 0.26, and a range of 0 to 0.88. This suggests that Zimbabwe's environmental performance is quite poor. The maximum value of the board size is 14.00, while the minimum value is 4.00, and the average board size is roughly 9.00. This suggests that the manufacturing enterprises in Zimbabwe have a good number of board sizes. The average board independence is 72.68%, suggesting that the board has a good composition and will make excellent decisions. The percentage of female board members is extremely low, 10.43% on average. The institutional ownership has a 71.10% share, which indicates that the bulk of the company's shares is owned by institutions, while the management ownership has an average of 5.47%, which is fair.

The correlation matrix that explains the connection between the dependent and independent variables is shown in **Table 3**. It demonstrated a positive correlation between environmental performance (dependent variable) and all independent variables board size (0.20), board independence (0.07), gender diversity (0.17), managerial ownership (0.08), and institutional ownership (0.03).

5. Interpretation

The examination of corporate governance characteristics and environmental performance may be seen in the Hausman test results from **Table 4**. The Hausman test's null hypothesis, which asserts that "there is no fixed effect," is not supported by the significant result, which is shown with a p-value of 0.00, which is less than the specified significance level of 5 percent. For this reason, the fixed effect model is the appropriate model. Additionally, the Hausman test result was supported by the Breusch-Pagan Lagrangian Multiplier (LM) test result, which had a p-value of 0.000 and was below the 5% level. As a result, the study accepted the null hypothesis that all coefficients are jointly equal to zero in this case, necessitating fixed effects, and fixed effect model was regarded as the right estimation for the model's analysis.

The Breusch-Pagan/Cook-Weisberg Test was used to test for heteroskedasticity, and results showed that it was heteroskedastic, meaning that the residuals of the model changed with time. To determine whether there is a serial correlation

Table 3. Correlation matrix.

	EP	BZ	BI	GD	MO	IO	FA
EP	1.00						
BZ	0.20	1.00					
BI	0.07	0.24	1.00				
GD	0.17	0.14	0.05	1.00			
MO	0.08	-0.35	-0.25	-0.18	1.00		
IO	0.03	0.09	0.31	-0.07	-0.08	1.00	
FA	-0.08	0.13	0.14	-0.06	-0.10	0.23	1.00

Source: Author's Computation (2022) using STATA 14.0.

problem in the model, the Wooldridge test for serial correlation was used to test whether there are associations between the model's coefficients and its residuals. The results with p-values of 0.00 implied that the model has a serial correlation problem. To determine whether there is cross-sectional dependency in the model, a cross-sectional dependence test was carried out using Pesaran's test for correlation among all the units in the same cross-section. The results showed a p-value of 0.00, which suggests that the model has a cross-sectional dependence problem.

In order to address the issues of heteroscedasticity, serial correlation, and cross-sectional dependence in the model, the model is estimated using Panel Corrected Standard Error for Fixed Effect Model based on the findings of the Hausman tests, LM test, heteroskedasticity test, autocorrelation test, and cross-sectional dependence test. According to **Table 4**, the probability values, BZ ($p = 0.016$), GD ($p = 0.003$), MO ($p = 0.001$), and FA ($p = 0.001$) all significantly affect environmental performance (EP), but BI ($p = 0.190$) and IO ($p = 0.227$) have no significant impact on EP. According to the explanatory variables' coefficients, BZ (0.0184); BI (0.0014); GD (0.0039); MO (0.0038); IO (0.0012); and FA (-0.0034), EP was positively impacted by BZ, BI, GD, MO, IO, and FA, but FA had a negative impact on EP. Thus, an increase in the number of board size of the manufacturing firms in Nigeria will result in an approximately 1.84 percent increase in environmental performance. Likewise, an increase in the percentage of non-executive directors will cause EP to increase by less than 0.01 percent. Also, an increase in the number of women on the board of manufacturing firms would lead to 0.4 percent increase in EP. An increase in IO will also increase EP by 0.12 percent while an increase in MO will reduce the EP by 0.38 percent.

Although gender diversity, managerial ownership, and institutional ownership had a significant impact on environmental performance, both in terms of quantity and probability. According to the independent variables' explanatory capabilities, joint fluctuations in the independent variables only account for 7.4% of the EP variation, with additional factors outside the purview of this model responsible for the remaining 92.6%. The corporate governance variable in the

Table 4. Panel regression analysis.

Variables	Aprori Sign	Pooled Ordinary Least Square	Random Effect Model	Fixed Effect Model	Panel Corrected Standard Error
C		-0.2148 {1.105} (-1.63)	-0.2153 {0.189} (-1.31)	-0.6928 {0.000} (-3.94)	-0.2148 {0.001} (-3.25)
BZ	+	0.0184 {0.029} (2.20)	0.0030 {0.704} 0.38	0.0051 {0.514} (0.65)	0.0184 {0.016} (2.4)
BI	+	0.0014 {0.322} (0.99)	-0.0009 {0.517} (-0.65)	-0.0035 {0.017} (-2.41)	0.0184 {0.190} (1.31)
GD	+	0.0039 {0.004} (2.88)	0.0011 {0.482} (0.70)	-0.0006 {0.679} (-0.41)	0.0039 {0.00} (5.55)
MO	+	0.0038 {0.010} (2.60)	-0.0008 {0.772} (-0.29)	0.0018 {0.633} (-0.48)	0.0038 {0.001} (3.42)
IO	+	0.0012 {0.310} (1.02)	0.0032 {0.004} (2.91)	0.0029 {0.000} (2.62)	0.0012 {0.227} (1.210)
FA	+	-0.0012 {0.114} (-1.59)	0.0045 {0.018} (2.36)	0.0240 {0.000} (6.61)	0.0012 {0.001} (-3.37)
<i>Model Parameter:</i>					
R square		0.0738			0.0738
Adjusted R square		0.0524			
F. Stat./Wald Stat Prb.		3.45 0.0027	17.50 0.0076	10.10 0.000	66.10 0.000
Breusch and Pagan Lagrangian multiplier test for random effects:					
Chi2 Prob.					347.43 0.000
Hausman Test:					
Chi2 Prb.					0.000
Multicollonearity Test: VIF					
VIF (mean)					1.17
Heteroskedasticity Test:					
Breusch-Pagan/Cook-Weisberg Chi2 Prb.					14.76 0.0001

Continued

Cross-Sectional Dependence:	
Pesaran's Test	
F Stat.	5.627
Prb.	0.000
Autocorrelation: Wooldridge	
Test	
F Stat.	155.320
Prb.	0.000

Source: Author's compilation (2022) using STATA 14.0. {} p-value, () t/z stat., ***1%, **Sig @5%, *sig @10%.

study significantly influences the environmental performance of manufacturing enterprises in Zimbabwe, according to the likelihood of the F-test (p-values of 0.00). This result is also in line with the correlation matrix that was earlier discussed in **Table 4**.

Relating the above result to prior research, we discovered that the findings of **Rubino and Napoli (2020)** and **Masud et al. (2018)** were in line with our findings that stated that board size has a positive and significant effect on environmental performance while that of **Ofoegbu et al (2018)** was not in support of our findings. Also, we discovered a positive and insignificant of board independence on environmental performance, this result is supported by the findings of **Rubino and Napoli (2020)** while that of **Haladu and Salim (2016)** and **Birindelli et al. (2018)** were on the contrary.

Shakil et al. (2020) found a positive and significant effect of gender diversity on environmental performance which is in line with our result and **Haladu and Salim (2016)** and **Walls et al. (2012)** discovered a contrary result. Managerial ownership had a positive and significant effect on environmental performance and the finding of **Masud et al. (2018)** was in line while that of **Jaffar et al. (2018)** was against. Finally, we discovered that institutional ownership had a positive and insignificant effect on environmental performance in Zimbabwe and this result was supported by that of **Masud et al. (2018)** while that of **Acar et al. (2021)** was against our findings.

6. Conclusion and Recommendations

6.1. Conclusion

This study examined the effect of corporate governance on environmental performance in Zimbabwe, using 27 listed manufacturing companies for the period of 10 years (2011 to 2020). Corporate governance used were board size, board independence, gender diversity, managerial ownership and institutional ownership while firm age was used as a control variable. Global Initiative reporting Index was used to proxy environmental performance.

The finding showed that board size, gender diversity and managerial ownership have a positive and significant effect on environmental performance while board

independence and institutional ownership have a positive and insignificant effect on environmental performance. This shows that corporate governance variables under the study play an important role in achieving good environmental performance.

6.2. Recommendation

Based on the findings of the study we recommended that a great number of board sizes should be maintained to have a better decision on environmental performance. Board independence directors should be encouraged to achieve subjective decisions as regards environmental issues. More interested women should be given the opportunity to serve as directors so as to achieve gender-balanced decisions on environmental performance. Also, managerial should be encouraged at a proportion that can be of improvement to the environmental performance and institutional ownership should be encouraged while more consideration should be given to those institutions that have knowledge on company's environmental policies and strategies for better performance on environmental issues.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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