

Green Management Practices and Environmental Performance in Listed Nigerian Manufacturing Firms

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Abstract: *This paper explores how green management practices impact the environmental performance of listed manufacturing companies in Nigeria with particular emphasis on green procurement, green innovation and green human resource management. The quantitative research design was used and based on cross-sectional survey design. A total of 172 senior and middlelevel management personnel were sampled out of the chosen listed manufacturing companies and a structured questionnaire was developed on a five-point Likert scale in order to collect data. Multiple regression analysis was employed to analyze the data. The regression output suggests that there is a positive significant relationship between green management practices and environmental performance ($R = 0.721$) and the model accounts to about 52.0 per cent of the variation in environmental performance ($R^2 = 0.520$). There was a significant overall model ($F = 60.68$, $p < 0.05$) which proved the combination effect of the independent variables. On their own, green innovation was the most effective predictor of environmental performance (0.354 , $p < 0.05$), then green procurement (0.312 , $p < 0.05$) and green human resource management (0.241 , $p < 0.05$). These results suggest that companies that invest in environmentally friendly technologies, pursue environmentally responsible sourcing and implement environmental factors into human resource policies have better environmental performance. The paper offers empirical data demonstrating that integrated green management practice can greatly improve the environment performance of the manufacturing industry in Nigeria. It adds value to the existing literature by showing the concomitant effects of green procurement, green innovation, and green human resource management in a developing economy setting. According to the findings, the research suggests that manufacturing companies should enhance green procurement systems, invest more on green innovation, and make green human resource management practices institutional. Enabling regulatory frameworks and incentives are also recommended to enable sustainable manufacturing practices by policymakers. The paper concludes that green management practices are key strategic instruments to enhance environmental performance and sustainable industrial development in Nigeria.*

Keywords: green management practices, green procurement, green innovation, green human resource management, environmental performance, manufacturing firms, Nigeria.

INTRODUCTION

The development of environmental degradation and depletion of resources have aggravated the situation worldwide, endangering the stability of ecosystems and sustainable development (United Nations

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Environment Programme [UNEP], 2021). The manufacturing sector which consumes a lot of energy, produces wastes, and emits greenhouse gases has been largely identified as one of the biggest contributors to environmental pollution (Ajayi & Oladipo, 2022). This fact has increased the significance of green management practices (GMPs) as companies strive to reduce their environmental impact and conform to international standards of sustainability. Green management can be defined as organizational attempts to incorporate eco-innovation, reduction of waste, green procurement and energy conservation in operations to realize better environmental performance (Zhao, Wang, and Chen, 2023). The initiatives are in line with the United Nations Sustainable Development Goals particularly SDG 12 on responsible consumption and SDG 13 on climate action (UN, 2020).

In Nigeria, manufacturing is an important source of industrialization, employment, and national output, making it a key driver of economic growth in the country (National Bureau of Statistics [NBS], 2022). Nevertheless, its activities have also led to increased environmental issues, including industrial pollution, inadequate waste disposal, and the lack of resource management (Ogunyemi & Adebayo, 2023). Consequently, there is a growing pressure on listed manufacturing companies by regulators, investors, and the community to implement sustainable practices that enhance their environmental performance (Okafor et al., 2021). These companies are especially significant to examine as they are regulated by tougher disclosure rules and corporate governance criteria, and their sustainability practices are more open and verifiable (Securities and Exchange Commission [SEC], 2021; Nwosu and Adeola, 2020).

Even with such regulatory requirements, the environmental performance of listed manufacturing companies in Nigeria is not optimal, as the enforcement tools are weak, investment in clean technologies is low, and employees of these companies are not engaged in sustainability initiatives (Adebisi and Bello, 2023). This scenario poses essential questions in terms of the understanding, adoption, and operationalization of the concept of green management in the Nigerian manufacturing companies. Although most companies say that they follow sustainability practices, the realities of its operations reveal that there is a high level of pollution and poor management of available resources (Onwuka et al., 2022). Existing empirical researches are inclined to general sustainability concerns rather than to a specific mechanism - green procurement, green innovation and green human resource.

Management with the help of which environmental performance may be improved (Chukwu & Danjuma, 2021). This highlights a gaps in research in explaining the distinct and joint impact of these particular and combined dimensions of green management in the setting of developing nations, especially Nigeria (Aliyu and Abdullahi, 2023).

Since it has been established that successful implementation of green management practices can affect the way resources are used, the degree of technological development, and the environmental behaviour of employees, the failure to implement the practices still poses a threat to the achievement of sustainable performance in manufacturing companies (Zhao et al., 2023). The lack of empirical research on the

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interaction of these practices to affect the environmental performance also adds to the challenge of implementing specific policies and corporate interventions (Eze & Nwachukwu, 2022). As such, this paper aims to fill this research gap by offering empirical evidence on how much green procurement, green innovation and green human resource management can lead to better environmental performance of listed manufacturing companies in Nigeria. The research is expected to offer practical insights that can inform the managerial decision-making process and policy changes aimed at promoting sustainable manufacturing in Nigeria (Dada & Salihu, 2024).

It is on this basis that the primary aim of the study is to investigate the effects of green management practices on the environmental performance of the listed manufacturing companies in Nigeria. The targeted goals are tri-fold: (1) to identify the impact of green procurement practices on environmental performance; (2) to identify the impact of green innovation on environmental performance; and (3) to identify the impact of green human resource management on environmental performance. In line with this, the following research questions can be used to guide the study: How do green procurement practices impact environmental performance? How does green innovation affect the environmental performance? and what is the effect of green human resource management on environmental performance of listed manufacturing firms in Nigeria? This research is likely to deepen empirical knowledge about sustainable industrial practice and provide useful information to governments and regulators interested in encouraging environmental friendliness in the production process within the industrial environment in Nigeria.

LITERATURE REVIEW

The rising ecological alarm has obligated manufacturing companies to incorporate the aspect of sustainability in their operational management framework, which has seen a rise in the use of green management practices that can minimize the environmental degradation and enhance environmental performance (Singh and Kumar, 2021). Green management can include environmentally-friendly sourcing, environmental protection, energy efficiency, and participation of employees in environmental projects, and it is currently seen as a strategic requirement due to the increasing regulatory pressure, stakeholder expectations and global environmental consciousness (Zhao et al., 2023; Adebisi and Bello, 2023). The key result of such initiatives is environmental performance, which is the capacity of an organization to reduce emissions, maximize the use of resources, waste management, and adherence to environmental regulations, which leads to competitiveness, and resilience over the long term (Eze and Nwachukwu, 2022; Chen and Lin, 2022; Aliyu and Abdullahi, 2023).

Green procurement is also one of the elements of green management that improves the sustainability of the organization by encouraging the use of recyclable, low-carbon, and environmentally-compliant materials, yet companies in the developing economies tend to find it difficult to afford and implement (Oluwole and Ibrahim, 2021; Akomolafe and Yusuf, 2023; Ogunyemi and The importance of green innovation is also hard to overstate, since investment in clean technologies, eco-design, and emission-

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reducing processes results in a substantial positive impact on the environment, however, Nigerian companies are limited due to a lack of funding and poor institutional support (Chen and Lin, 2022; Zhao et al., 2023; Aliyu and Abdullahi, 2023). The green human resource management also promotes sustainability by training and appraising employees on environmental behavior and rewarding it, yet most companies do not have systematic mechanisms to institutionalize these (Olayemi and Nnaji, 2023; Chukwu and Danjuma, 2021; Nwosu and Adeola, 2020). Even though the previous literature has analyzed sustainability on a large scale, not many have examined these dimensions at the same time, resulting in the lack of knowledge regarding how these dimensions interact to affect the environmental performance among the Nigerian listed manufacturing companies (Eze & Nwachukwu, 2022; Dada and Salihu, 2024).

Independent Variable

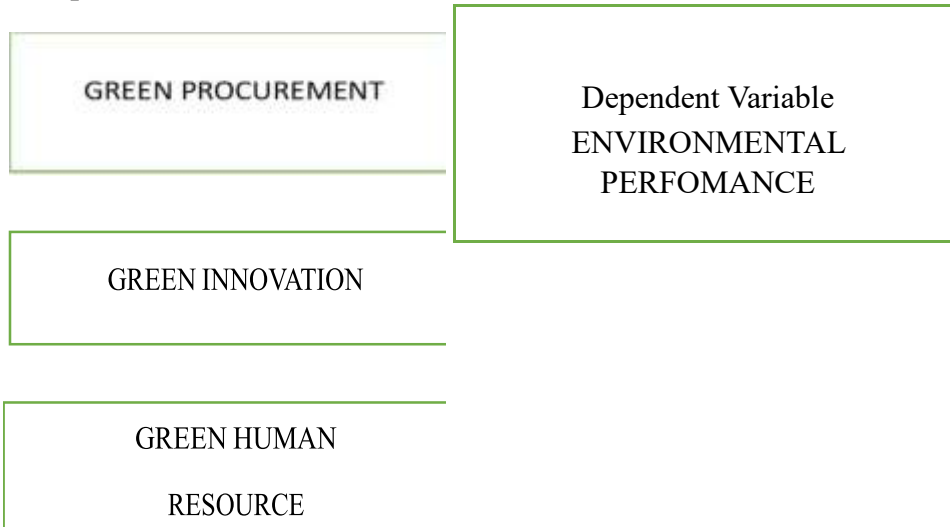


Figure 2. 1 Conceptual Framework

Source: Authors Compila on (2025)

Theoretical Review

This paper is informed by four significant theoretical lenses which explain the reasons why firms are green management and how this practice can affect the environmental outcomes. They are Natural Resource-Based View (NRBV), Institutional Theory, Stakeholder Theory, and Legitimacy Theory, which present an addition to each other in terms of understanding decisions related to sustainability in manufacturing organizations (Hart, 1995; DiMaggio and Powell, 1983; Freeman, 1984; Suchman, 1995).

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The NRBV indicates that the firms can achieve a competitive advantage by building the capabilities to use resources sustainably, prevent pollution, and eco-innovate, implying that green procurement, green innovation, and green HRM practices can enhance environmental performance (Hart, 1995; Singh and Kumar, 2021). This theory locates environmental efforts as strategic tools that help firms increase their efficiency and performance in the long run (Zhao et al., 2023).

Environmental practices are described by the Institutional Theory as reactions to coercive, normative, and mimetic pressures by regulators, industry standards, professional bodies, and competitive forces (DiMaggio & Powell, 1983; Adebisi & Bello, 2023). In Nigeria, the agencies like NESREA and the global market demand of being green through ESG require listed companies to embrace a more sustainable practice to ensure their legitimacy and escape sanctions (Ogunyemi and Adebayo, 2023). The Stakeholder Theory emphasizes that companies have to address the expectations of employees, customers, communities, and investors, who society expects responsible environmental behavior (Freeman, 1984; Olayemi and Nnaji, 2023).

Lastly, the Legitimacy Theory posits that companies implement sustainability to be in line with the social standards and safeguard corporate identity (Suchman, 1995; Onwuka et al., 2022). Combined, these theories support the premise that green procurement, green innovation, and green HRM have a positive impact on environmental performance due to the ability to build strategic capabilities, adhere to regulations, fulfill stakeholder expectations, and gain societal legitimacy (Aliyu and Abdullahi, 2023; Dada and Salihu, 2024).

This paper will be based on the Natural Resource-Based View (NRBV), which offers the best theoretical foundation to explore the impacts of green management practices on the environmental performance of manufacturing companies. The NRBV, presented by Hart (1995), builds on the classical Resource-Based View by suggesting that the competitive advantage of a firm is more and more related to capabilities that enable environmental sustainability. The theory states that organizations are able to deliver high performance when they develop internal competencies in their pollution prevention, sustainable use of resources and eco-innovation (Hart, 1995; Singh and Kumar, 2021).

Within the framework of this paper, green procurement, green innovation, and green human resource management can be viewed as strategic environmental competencies, which allow companies to minimize waste, increase their energy efficiency, resource conservation, and decrease environmental risks. The NRBV implies that companies with such capabilities not only comply with environmental not only the expectations but also enhance their operational effectiveness and competitiveness in the long term (Zhao et al., 2023).

Therefore, NRBV can be a robust explanatory framework of comprehending why listed manufacturing companies pursue green management practices and the ways in which they can be transformed into better

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environmental performance. It helps to assume that environmental practices are not only ethical issues but also strategic resources that help to make organizations successful (Aliyu & Abdullahi, 2023).

Empirical Review

According to (Eze & Nwachukwu, 2022), the elements of green management practices have emerged as core predictors of the performance of the manufacturing firms in terms of their environmental status as organizations are faced with the pressure to minimize pollution, conserve resources, and adhere to sustainability regulations. Indeed, (Singh & Kumar, 2021) remind that green-oriented managerial practices have a direct impact on the reduction of waste, reduction of emissions, and ecological efficiency of firms, and consequently, they reinforce the environmental performance. (Zhao, Wang, and Chen, 2023) also add that companies that include green management practices are more likely to have more stable environmental gains than companies that remain dependent on traditional production systems.

(Oluwole & Ibrahim, 2021) discover that green procurement is a major factor in the development of environmental results in that companies that emphasize on recyclable materials, environmentally friendly suppliers, and environmentally friendly sourcing practices record low rates of waste production, and toxic emissions. This is supported by (Babalola, Ogunleye, and Edet, 2021) who cite evidence to the effect that the environmentally based sourcing strategies allow firms to control pollution and not to react to it. Conversely, (Akomolafe & Yusuf, 2023) indicate that the companies of the developing world have a tendency to have difficulties with green procurement because of the expensive prices, lack of suppliers, and ineffective environmental laws. (Ogunyemi & Adebayo, 2023) further note that cost-cutting often takes precedence over sustainability in manufacturing companies in Nigeria, hence constraining the effects of procurement on environmental sustainability.

As (Chen & Lin, 2022) demonstrate, green innovation is another key factor that defines environmental performance since companies that implement clean technologies and eco-friendly production systems tend to emit much less and use fewer resources. As is illustrated in (Zhao et al., 2023), innovation-driven companies are more in a position to transition between reactive environmental compliance, and proactive sustainability leadership. According to (Singh & Kumar, 2021), the empirical relationship between green innovation and waste, energy consumption, and environmental risk reduction is strong. Nevertheless, (Aliyu & Abdullahi, 2023) note that lack of funding, technical capacity and reliance on foreign technology are among the challenges that Nigerian manufacturers encounter to adopt green innovations. The same study (Ajayi and Oladipo, 2022) confirms that despite the Nigerian companies recognizing the value of green innovation, the investment in sustainable technologies is minimal because of the financial limitations and lack of confidence in the returns.

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According to (Olayemi & Nnaji, 2023), green human resource management (GHRM) affects the environmental performance through determination of the awareness, motivation, and commitment of employees towards sustainability. It is disclosed in (Chukwu & Danjuma, 2021) that the level of employee engagement in green behaviour is heightened in those firms who have put in place environmental training, green performance evaluation and rewards based on sustainability. According to (Eze & Nwachukwu, 2022), companies that consider employees in their environmental programs are better adhering to environmental laws and show higher waste and energy consumption. Nevertheless, (Nwosu & Adeola, 2020) indicate that GHRM in most Nigerian companies is poorly developed because of poor HR systems, low training investment, and commitment by the management. Although employees are willing to contribute to environmental efforts, (Olayemi & Nnaji, 2023) contend that insufficient incentives and programs prevent the efficiency of GHRM practices.

As (Aliyu & Abdullahi, 2023) show, a company pursuing a combination of various green management strategies will be more effective than the ones implementing individual sustainability measures, and procurement, innovation, and HRM are complementary. Empirical data presented in (Babalola et al., 2021) indicates that a combination of both practices can result in more significant pollution decreases and resource optimization. It is also reported that multi-dimensional green management programs enhance regulatory adherence and operational effectiveness of Nigerian manufacturing companies (Adebisi and Bello, 2023). On the other hand, (Onwuka, Chijioke, and Hassan, 2022) observe that fragmented or the implementation of the sustainability practices inconsistently does not lead to any meaningful environmental improvements because there are gaps between sustainability policy and real implementation.

The relevance of structured sustainability practices is validated by (Eze and Nwachukwu, 2022) that the environmental performance can be enhanced with the use of environmental management systems in Sub-Saharan Africa. This is supported by (Aliyu & Abdullahi, 2023) who demonstrate that when green innovation is employed in Nigerian firms, there is a quantitative decline in emissions and increased energy efficiency. According to (Ajayi & Oladipo, 2022), sustainable production practices in Nigeria lead to improvement of the overall environmental compliance but they observe that its practice is diverse among firms. As (Onwuka et al., 2022) warns, in the absence of more vigilant supervision and active dedication of managers, sustainability practices tend to be symbolic rather than transformational.

According to (Dada & Salihu, 2024), the biggest gap in the empirical literature is the lack of research that would investigate the joint impact of green procurement, green innovation, and GHRM on environmental performance at the same time. The necessity to include multidimensional analysis to identify which green practices have the most significant impact on environmental performance among manufacturing companies is also emphasized in (Eze & Nwachukwu, 2022). Further empirical research on the application of the integrated sustainability models that are specific to the Nigerian context is recommended by (Aliyu

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& Abdullahi, 2023) because the constraints and environmental issues affecting the local industries are different.

The general patterns of the empirical evidence in both global and Nigerian settings are that green procurement, green innovation, and green HRM have a positive effect on the environmental performance, albeit with varying strengths, depending on the organizational capacity, regulatory environment, and availability of resources (Singh and Kumar, 2021; Zhao et al., 2023; Olayemi and Nnaji, 202). Thus, the empirical body is in favor of the necessity of integrated consideration of the three main dimensions, in particular, among listed manufacturing companies in Nigeria where the sustainability practices are still developing and not implemented evenly (Dada and Salihu, 2024).

Gaps in Literature

Although there is an increasing body of literature on green management practices, the available literature indicates that there are a number of gaps that are yet to be filled, especially in the Nigerian manufacturing setting. Even though the impact of green procurement, green innovation, and green HRM has been studied previously, the majority of studies have focused on each of these practices separately, which restricts the knowledge of how these practices can be combined to achieve a complex understanding of sustainability outcomes (Eze and Nwachukwu, 2022; Singh and Kumar, 2021). Moreover, numerous researches provide a general overview of the concept of corporate sustainability without addressing particular dimensions of green management, leaving a gap in defining which practices have the most powerful effect on the environment (Zhao et al., 2023; Ajayi and Oladipo, 2022). Empirical studies also reveal that there are large gaps in policy and practice because Nigerian companies tend to implement sustainability practices more as symbolic than strategic, but the impact of internal capabilities on environmental results is seldom examined (Onwuka et al., 2022; Aliyu and Abdullahi, 2023). Besides this, green HRM is still under-researched despite its pivotal position in influencing employee behaviour and environmental performance (Olayemi and Nnaji, 2023). In general, there are no integrated and country-specific empirical studies that simultaneously test green procurement, green innovation, and green HRM as joint predictors of environmental performance in listed manufacturing companies in Nigeria (Dada & Salihu, 2024).

METHODOLOGY

Survey research design was employed. In a bid to investigate empirically the relationship between the green management practice and the environmental performance of the listed manufacturing companies in Nigeria, the study employs multiple regression model, which has been extensively applied in past sustainability and management studies (Aliyu and Abdullahi, 2023; Dada and Salihu, 2024).

The functional expression is given as:

$$EP=f(GP,GI,GHRM)$$

Where: EP = Environmental Performance, GP = Green Procurement, GI = Green Innovation, GHRM = Green Human Resource Management.

It can be converted into a linear regression model in the following way:

$$EP=\beta_0+\beta_1(GP)+\beta_2(GI)+\beta_3(GHRM)+\varepsilon$$

The type of analysis used in this research is multiple regression analysis since it allows the researcher to determine the effect of several independent variables on one dependent variable at the same time. This statistical method enables the researcher to identify the individual effect of green procurement, green innovation and green human resource management on environmental performance whilst other variables are held constant. Regression analysis also measures the strength and direction of these relationships, which of the predictors are most relevant to environmental outcomes, and the overall strength of the model. This renders it especially appropriate in research that has intricate organizational and environmental relationships.

RESULTS AND DISCUSSION

Among the 200 questionnaires given, 172 were properly completed and returned, which is 86 per cent response rate. The rest 28 questionnaires that constitute 14 per cent were not returned or were deemed to be unusable. The response rate is high, which means that it was well participated and has a sufficient sample to use in conducting proper statistical analysis.

The demographic test reveals that the study was most balanced and informed in terms of representative sample of management personnel in listed manufacturing firms in Nigeria. Among the 172 out of the respondents, 96 respondents (55.8 per cent) were male, and 76 respondents (44.2 per cent) were female, as there was a slightly higher number of males in managerial jobs in the manufacturing industry. With respect to age, 64 respondents (37.2 per cent) fell under the age group of 30-39 years, 52 respondents (30.2 per cent) fell under the age group 40-49 years, 28 respondents fell under the age group of 30 years and another 28 respondents were over the age group of 50 years. This represents that most respondents (67.4 per cent) were in the active working age group of 30-49 years. Concerning the educational background, 74 respondents (43.0 per cent) had HND or Bachelor degrees, 68 respondents (39.5 per cent) had postgraduate degrees, and 30 respondents (17.5 per cent) had PhD degrees which showed that most of the respondents were highly academically competent. The job titles of the respondents were well balanced with 48 respondents (27.9 per cent) operations managers, 44 respondents (25.6 per cent) environmental officers and 40 respondents (23.3 per cent) procurement and human resource managers respectively. Moreover, 66 respondents (38.4 per cent) had between five and ten years of working

Publication of the European Centre for Research Training and Development UK experience, and 44 respondents (25.6 per cent) had eleven-15 years of experience, which means that the majority of respondents had enough professional experience to offer credible data. All in all, the demographic picture indicates that the respondents were well qualified and experienced, to make the sample appropriate to analyze the association between green management practices and environmental performance of listed manufacturing firms in Nigeria.

Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	96	55.8
	Female	76	44.2
	Total	172	100.0
Age Group (Years)	Below 30	28	16.3
	30–39	64	37.2
	40–49	52	30.2
	50 and above	28	16.3
	Total	172	100.0
Educational Qualification	HND/BSc	74	43.0
	MSc/MBA	68	39.5
	PhD	30	17.5
	Total	172	100.0
Job Position	Operations Manager	48	27.9
	Environmental Officer	44	25.6
	Procurement Officer	40	23.3

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	Human Resource Manager	40	23.3
	Total	172	100.0
Years of Experience	Below 5 years	34	19.8
	5–10 years	66	38.4
	11–15 years	44	25.6
	Above 15 years	28	16.3
	Total	172	100.0

Source: Computed Data, 2026.

Hypotheses Testing

In this part of the paper, the hypotheses formed are analyzed according to the research objectives. All the hypotheses were made according to the research questions and were measured with the help of a fivepoint Likert scale where Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A), and Strongly Agree (SA) are the answers to the research questions. The relationship between green management practices and environmental performance of listed manufacturing firms in Nigeria was empirically analysed using multiple regression analysis.

Table 3: Model Summary

Model R	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.721	0.520	0.512	0.463

Source: SPSS Output, 2026

Table 3 shows the model summary of multiple regression analysis of the impact of green management practices on environmental performance of listed manufacturing firms in Nigeria. The correlation coefficient (R) of 0.721 means that there is a strong positive relationship among the independent variables (green procurement, green innovation, and green human resource management) and environmental performance. The value of R Square of 0.520 indicates that the collective influence of the independent variables accounts about 52.0 per cent of the variation in the environmental performance, and the rest 48.0 per cent is due to other variables not included in the model. The adjusted R square of 0.512 supports the strength of the model as well as the explanatory power of the model once the number of predictors has been adjusted.

Table 4: Analysis of Variance (ANOVA)

Model	Sum of Squares	DF	Mean Square	F	Sig.
Regression	62.400	3	20.800	60.68	0.000
Residual	57.600	168	0.343		
Total	120.000	171			

Source: SPSS Output, 2026

Dependent Variable: Environmental Performance**Predictors:** Green Procurement, Green Innovation, Green Human Resource Management

In Table 4, the ANOVA outcomes of the regression model that analysed the impact of green management practices on the environmental performance of listed manufacturing firms in Nigeria are shown. The regression model is statistically significant at a 5 per cent significance level as the value of the F-statistic is 60.68 and the probability value is 0.000. This means that green procurement, green innovation and green human resource management have a collective impact on environmental performance. The model is therefore deemed suitable and proper to describe the differences in environmental performances among the listed manufacturing companies in Nigeria.

Table 5: Regression Coefficients

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t-value	Sig.
(Constant)	0.412	0.146	–	2.822	0.005
Green Procurement (GP)	0.286	0.064	0.312	4.469	0.000

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Green Innovation (GI)	0.341	0.071	0.354	4.803	0.000
Green Human Resource Management (GHRM)	0.198	0.058	0.241	3.414	0.001

Source: SPSS Output, 2026

Dependent Variable: Environmental Performance

Table 5 illustrates the regression coefficients of the individual effect of the green management practices on the environmental performance of listed manufacturing firms in Nigeria. Environmental performance is positively and statistically significantly impacted by green procurement (= 0.312, $p < 0.05$), which means that the environment-friendly sourcing practices can increase environmental performance. The positive and significant impact is also evident with green innovation (0.354, $p < 0.05$), which indicates that the investments in environmentally friendly technologies and cleaner production processes have the largest impact on the improved environmental performance. Likewise, the positive and significant impact of green human resource management on environmental performance is observed (= 0.241, $p < 0.05$) which emphasizes the role of employee involvement and environmental training. On the whole, the findings affirm that all the three green management practices have a considerable effect on environmental performance.

Table 6: Collinearity Diagnostics

Model	Variable	Tolerance	Variance Inflation Factor (VIF)
1	Green Procurement (GP)	0.742	1.348
	Green Innovation (GI)	0.698	1.432
	Green Human Resource Management	0.765	1.307

Source: SPSS Output, 2026

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Table 6 shows the collinearity statistics of the regression model that investigates the impact of green management practices on environment performance of listed manufacturing firms in Nigeria. All independent variables have a tolerance value bigger than the minimal value of 0.10, and the Variance Inflation Factor (VIF) values are much lower than the critical value of 10. This shows that there is no multicollinearity between the explanatory variables which ensures that the regression coefficients are consistent and the model estimates are valid.

Table 7: Residual Statistics

Statistic	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.11	4.68	3.72	0.54	172
Residual	-1.12	1.09	0.00	0.46	172
Std. Predicted Value	-1.87	1.79	0.00	1.00	172
Std. Residual	-2.41	2.36	0.00	0.98	172

Source: SPSS Output, 2026

Dependent Variable: Environmental Performance

The results of the residual statistics of the regression model will be provided in Table 7. The mean of the residuals is around zero, showing that there are no systematic errors in prediction. The standardized residuals lie within the acceptable value of ± 3 which is an indication that no outliers are significant in the model. These findings confirm that the assumptions of normality and homoscedasticity are fairly met and thus justify the use of the regression model to test the hypothesis.

CONCLUSION AND RECOMMENDATIONS

The research finds out that the green management practices, which are green procurement, green innovation, and green human resource management, are significant in improving the environmental performance of the listed manufacturing companies in Nigeria. The multiple regression analysis shows that significant percentage of the change in environmental performance is attributed to the joint implementation of these practices, which proves their strategic applicability in the manufacturing industry. Green innovation was found to be the most powerful predictor of environmental performance, which implies that investments in cleaner technologies, environment-friendly production processes, and

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sustainable design of products are important in alleviating environmental footprints and enhancing resource efficiency. There was also a strong and positive impact by green procurement meaning that environmentally responsible sourcing choices are useful in reducing waste, emissions, and regulatory non-compliance throughout supply chains. Moreover, green human resource management made a valuable contribution to environmental performance, which highlights the importance of employee training, environmental awareness, and organizational culture in ensuring sustainability policies are translated into outcomes. The results of this study are in line with the predictions of the Natural Resource-Based View and the stakeholder theory, which holds the view that companies that manage both environmental resources and internal strengths, in a strategic manner, are in a better position to generate high environmental performance.

Based on such results, it is advised that manufacturing companies in Nigeria should be more organized and formal in green management practices as opposed to adopting individual sustainability programs. Green procurement should be institutionalized by the management, through the integration of environmental requirements in supplier selection, contract evaluation and purchasing policies, and ensuring that the sustainability goals are not limited to internal processes but also to the entire supply chain. Moreover, companies must focus on sustained investment in green technology, especially on sustainable energy consuming equipment, waste reduction technology, and production processes that are environmentally friendly. These investments are necessary not only to meet regulations but also to be efficient in the long term and competitive.

The research paper also suggests that companies should enhance green human resource management by integrating environmental goals in the recruitment, training and performance appraisal systems. This should be the ability to provide employees with the skills and awareness that they need environmental objectives, since a high degree of staff involvement is essential to the successful execution of sustainability strategies. Moreover, policy makers and regulatory bodies ought to offer facilitating structures, incentives and technical expertise in order to promote the broader application of green management activities in the manufacturing industry. They can be tax breaks, environmental performance awards, and more straightforward guidelines on sustainability reporting.

Lastly, the research highlights the importance of enhanced integration between corporate environmental strategies and national sustainability policies. This kind of alignment will mean that green management practices will translate into the long-term environmental performance improvements, which will be part of the overall environmental sustainability and industrial development goals of Nigeria.

Suggestions for Further Studies

Although the study has found a significant relationship between green management practices-that is, green procurement, green innovation, and green human resource management and environmental performance

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of listed manufacturing companies in Nigeria, it also demonstrates the possibility of expanding the scope of the research model currently used. Since these variables are found to explain a large amount of the difference in environmental performance, future researches ought to use more green management dimensions like green logistics, green marketing, and environmental accounting practices to be able to explain the unexplained variance. The incorporation of these variables can help give a more detailed perspective of the joint impact of organizational sustainability practices on environmental outcomes in the manufacturing industry.

In addition to the increased number of explanatory variables, it is suggested that future studies should investigate the contribution that contextual and institutional factors can create to precondition the success of green management practices. As an example, the relationship between green management practices and environmental performance can be moderated by regulatory enforcement strength, industry-specific environmental standards and access to green financing. A closer look at these moderating effects would provide more details as to why certain companies perform better in the environment than others although they may have similar sustainability practices.

This research methodologically recommends that future studies should go further than cross-sectional survey designs to consider qualitative or mixed-method designs. In-depth interviews with sustainability managers, operations executives and regulatory officials may disclose the organizational, cultural and managerial dynamics that can affect the execution of green practices but they cannot be easily assessed by structured questionnaires. It has also been suggested that longitudinal research designs can be used to evaluate the impact of green management practices on the environmental performance over time especially as firms adapt to changes in environmental regulations and market demands.

Additionally, cross-sector and cross-listed or non-listed manufacturing research can contribute to the establishment of structural variations in the sustainability implementation and performance results. These comparative studies could also be expanded to geopolitical regions to discover regional differences in the practices and adherence to regulations in the environmental practices. Lastly, future studies can consider adopting other theoretical frameworks like the Institutional Theory or the Dynamic Capabilities Theory to better explain the external forces and the ability to adapt to these forces which drive the sustained implementation of green management practices in the developing economies such as Nigeria.

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