Green Management Practices and Corporate Social Responsibility in Manufacturing Firms in Delta State, Nigeria

By

ONYACHOM, F.E

festusjala@gmail.com

07031343099

&

Olowu Irikefe Peter

irikefepeterolowu@gmail.

com 08121088240.

Abstract

This study investigated the relationship between green management practices and Corporate Social Responsibility (CSR) among manufacturing firms in Delta State, Nigeria. Growing global concern for environmental sustainability has increased pressure on firms to adopt responsible operational practices that support long-term competitiveness and social accountability. In this context, green management practices have emerged as an important mechanism for improving both environmental and corporate performance. Specifically, the study examined the effects of green waste management practices and green energy efficiency practices on CSR performance. Two research questions and two corresponding hypotheses guided the study. A descriptive survey design was adopted. The study population comprised 98 registered manufacturing firms in Delta State, from which one managerial-level respondent with adequate knowledge of environmental and CSR matters was purposively selected from each firm, resulting in a sample size of 98 respondents. Data were collected using a structured questionnaire and analysed using multiple regression analysis. The findings revealed that green waste management practices had a significant positive effect on CSR performance ($\beta = 0.812$, $p < 0.05$), while green energy efficiency practices also exerted a significant positive effect on CSR performance ($\beta = 0.476$, $p < 0.05$). The adjusted R^2 value further indicated that a substantial proportion of the variation in CSR was explained by the predictor variables. The study concludes that effective adoption of green management practices enhances CSR outcomes in manufacturing firms. It therefore recommends that firms embed environmental sustainability into their core operational strategies in order to strengthen corporate responsibility, improve stakeholder trust, and enhance long-term competitiveness.

Keywords: Green management practices; corporate social responsibility; sustainability; manufacturing firms; environmental performance.

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

INTRODUCTION

The intensifying global concern for environmental sustainability has profoundly reshaped the way businesses operate, particularly within the manufacturing sector. Traditionally driven by profit maximisation and production efficiency, manufacturing firms are now increasingly required to align their operations with environmental and social expectations. This shift reflects a broader transition in the global economic landscape, where sustainability considerations are no longer peripheral but central to long-term organisational success. Manufacturing activities, by their very nature, are associated with substantial resource consumption, high energy demand, waste generation, and environmental degradation. Consequently, firms are facing mounting pressure from governments, host communities, investors, and other critical stakeholders to minimise their ecological footprint and operate in a more responsible and sustainable manner. In response to these expectations, many organisations are embracing green management practices as strategic mechanisms for balancing economic performance with environmental stewardship and long-term sustainability (Zhang et al., 2024; Li & Khan, 2024).

Green management, as conceptualised by Chen and Jin (2023), involves the systematic integration of environmentally responsible principles into organisational planning, production processes, resource utilisation, and managerial decision-making. It represents a deliberate shift from conventional production systems toward cleaner, more efficient, and environmentally conscious practices. At its core, green management emphasises waste reduction, energy conservation, emission control, and the adoption of sustainable technologies. Rather than treating environmental concerns as regulatory obligations alone, it positions sustainability as a strategic priority embedded within the firm's operational and corporate framework. Empirical evidence increasingly supports the argument that such practices yield tangible organisational benefits. For instance, studies have demonstrated that green management enhances environmental performance, improves resource efficiency, stimulates innovation, and contributes to overall organisational sustainability (Sharma et al., 2024). Beyond these operational gains, green practices also strengthen stakeholder relationships, enhance corporate image, and create avenues for competitive advantage in increasingly environmentally conscious markets (Xiao et al., 2024).

Closely intertwined with the adoption of green management practices is the growing prominence of Corporate Social Responsibility (CSR) as a critical indicator of organisational accountability and ethical conduct. In contemporary business discourse, CSR has evolved significantly from its earlier conception as philanthropic or charitable activity to a more comprehensive framework that encompasses social, environmental, and economic responsibilities.

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

As noted by Yu et al. (2024), CSR now serves as a key measure of how organisations respond to stakeholder expectations and societal challenges. Rahman et al. (2024) further describe CSR as the extent to which firms integrate social, ethical, and environmental considerations into their strategic decisions and daily operations. This broader perspective highlights the importance of responsible environmental behaviour, employee welfare, consumer protection, ethical governance, and community engagement as essential components of corporate performance.

Importantly, there is a growing body of evidence suggesting that the integration of green management practices within CSR frameworks produces mutually reinforcing outcomes. Organisations that embed environmental sustainability into their CSR strategies tend to achieve improved sustainability performance, stronger stakeholder trust, and enhanced corporate reputation. Such firms are also better positioned to respond to regulatory demands and shifting market expectations, thereby strengthening their long-term competitiveness (Yu et al., 2024; Rahman et al., 2024). In this regard, green management practices can be seen not merely as operational tools, but as strategic drivers of corporate responsibility and value creation.

Within the Nigerian context, the relevance of green management and CSR has become increasingly pronounced, particularly in the manufacturing sector. Nigeria's industrial landscape is characterised by rapid growth, expanding urbanisation, and increasing environmental challenges. Manufacturing firms, especially those operating in resource-intensive industries, contribute significantly to environmental pollution, waste generation, and energy consumption. As a result, there is heightened scrutiny from regulatory bodies, host communities, and civil society organisations regarding the environmental and social impacts of industrial activities. Studies by Okoro et al. (2023) and Adewale and Musa (2024) indicate that stakeholders are now more vocal in demanding that firms adopt sustainable production practices and demonstrate genuine commitment to social responsibility.

Despite these growing expectations, the implementation of green management practices among Nigerian manufacturing firms remains inconsistent and, in many cases, inadequate. Several structural and institutional challenges continue to hinder effective adoption. These include weak enforcement of environmental regulations, limited access to sustainable technologies, financial constraints, inadequate infrastructure, and insufficient managerial commitment to sustainability initiatives. As noted by Wang et al. (2024), such constraints often result in superficial or fragmented adoption of green practices, where environmental considerations are treated as secondary rather than integral to business strategy. Consequently, many firms continue to struggle with inefficient waste management systems, excessive energy consumption, and limited

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

integration of environmental sustainability into their CSR frameworks.

This disconnect is particularly evident in the tendency of some organisations to approach CSR primarily as a philanthropic exercise, focusing on community donations and social projects while neglecting the environmental implications of their core operations. While such initiatives are valuable, they do not fully address the broader sustainability challenges associated with industrial production. Increasingly, scholars and practitioners argue that meaningful CSR must extend beyond philanthropy to include responsible environmental management and sustainable operational practices. In this regard, green waste management and energy efficiency practices represent critical dimensions through which firms can align their operational activities with CSR objectives.

Despite the growing importance of this issue, empirical research examining the relationship between green management practices and CSR within the Nigerian manufacturing sector, particularly at the subnational level, remains limited. Most existing studies have focused on developed economies or have adopted broad national perspectives, thereby overlooking the unique contextual dynamics of specific regions such as Delta State. Given the industrial significance of Delta State and its environmental sensitivity, there is a clear need for context-specific evidence that can inform both managerial practice and policy development.

Against this backdrop, the present study examines the relationship between green management practices and Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria. Specifically, the study focuses on two key dimensions of green management, green waste management practices and green energy efficiency practices and their influence on CSR performance. By providing empirical insights into how these practices shape corporate responsibility outcomes, the study aims to contribute to the growing body of literature on sustainability and CSR, while also offering practical recommendations for enhancing sustainable industrial development in the region.

Statement of the Problem

Manufacturing firms in Delta State, Nigeria, operate within a production environment that is typically characterised by intensive resource use, substantial waste generation, high energy consumption, and environmental emissions. These operational realities have heightened public concern and increased stakeholder expectations for greater environmental responsibility and sustainable business conduct. Consequently, firms are increasingly expected not only to remain profitable, but also to demonstrate measurable commitment to environmental protection and social responsibility.

Despite these expectations, many manufacturing firms still exhibit weak integration of

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

green management practices into their strategic and operational systems. Environmental concerns are often treated as secondary compliance issues rather than core managerial priorities. This has contributed to persistent problems such as poor waste disposal systems, inefficient energy utilisation, avoidable pollution, and limited adherence to sustainability standards. Although many firms engage in Corporate Social Responsibility activities, such efforts are frequently concentrated on philanthropic donations and community support programmes, with limited connection to environmental management practices. As a result, CSR initiatives often fail to address the environmental consequences of industrial operations or reflect a comprehensive sustainability agenda. This disconnect creates a gap between corporate responsibility claims and actual environmental performance.

In addition, empirical evidence on how specific green management dimensions, particularly green waste management and green energy efficiency practices influence CSR performance among manufacturing firms in Delta State is scarce. Most previous studies have focused on developed countries or broader national samples, making it difficult to generalise their findings to the local industrial context. The absence of context-specific evidence may hinder policy formulation and managerial decision-making regarding sustainable business strategies. It is against this background that this study investigates the relationship between green management practices and Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria.

Research Questions

The following research questions guided this study:

1. What is the effect of green waste management practices on Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria?
2. How do green energy efficiency practices influence Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria?

Objectives of the Study

The main objective of this study is to examine the nexus between Green Management practices and organizational competitiveness among synthetic production firms in Delta State, Nigeria. Specifically, the objectives are to:

1. Determine the effect of green waste management practices on Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria.
2. Assess the influence of green energy efficiency practices on Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria.

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

Hypotheses of the Study

The following null hypotheses were formulated and tested at 0.05 level of significance:

H_{01}: Green waste management practices have **no significant effect** on Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria.

H_{02}: Green energy efficiency practices have no significant effect on Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria

REVIEW OF RELATED LITERATURE

Conceptual Framework

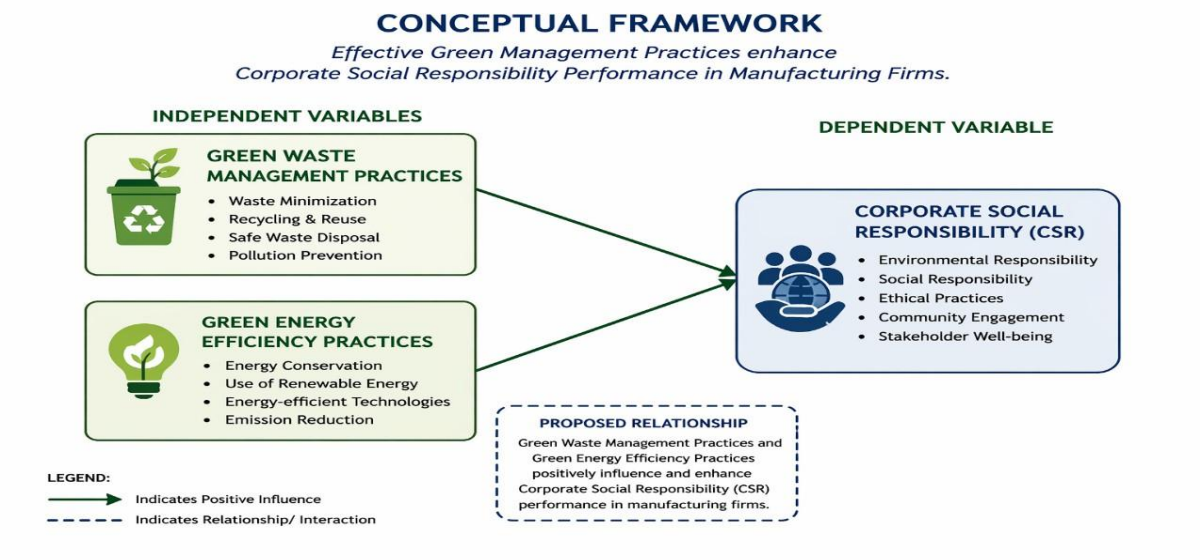

Fig. 1 Conceptualization of the relationships between green management practices and CSR performance in manufacturing firms. (Sources: Researcher, 2024)

The conceptual framework illustrates the relationship between green management practices and Corporate Social Responsibility (CSR) in manufacturing firms. The independent variables cover green waste management practices and green energy efficiency practices. According to Ruiz-López et al. (2024) and Dzage et al. (2024), Green waste management consists of waste minimization, recycling, reuse, safe disposal, and pollution prevention. This generally reflect environmental responsible production processes. Green energy efficiency consists of energy conservation, renewable energy use, adoption of energy-efficient technologies, and emission

Journal of Technical and Vocational Education and Training 2026 Vol. 1 (4) DOI: 10.61955/AYZLZU

reduction strategies. This is aimed at improving environmental performance (Xiao et al., 2024; Khoshnaw et al., 2024).

CSR, which is the independent variable, is reflected through environmental responsibility, ethical practices, social responsibility, community engagement, and stakeholder well-being (Mughal et al., 2023; Rahman et al., 2024). Sharma et al. (2024) and Okoro et al. (2023) suggest that green management practices positively influence CSR outcomes by improving environmental accountability and stakeholder relations. Overall, the framework proposes that effective adoption of green waste management and energy efficiency practices enhances CSR performance in manufacturing firms, thereby promoting sustainability, ethical responsibility, and stronger stakeholder engagement.

Green Management Practices

Green management practices refer to organisational strategies and operational activities designed to minimise negative environmental impacts while improving efficiency and sustainability. These practices include waste reduction, recycling, pollution control, energy conservation, sustainable procurement, and the use of environmentally friendly technologies. Green management represents a shift from conventional profit-centred management toward a more balanced approach that recognises environmental stewardship as an essential component of long-term business success. In manufacturing firms, green management has become particularly important because production processes often involve heavy energy use, raw material consumption, and waste generation. Firms that adopt green practices are better positioned to reduce costs, comply with regulations, and improve stakeholder confidence. Studies have also shown that green management enhances innovation capability and organisational resilience in increasingly competitive markets.

Green Waste Management Practices

Green waste management practices involve systematic efforts to reduce, reuse, recycle, and safely dispose of industrial waste in environmentally responsible ways. These practices are intended to minimise pollution, conserve resources, and improve workplace and community health outcomes. Common approaches include waste segregation, material recovery, cleaner production techniques, and employee participation in waste reduction initiatives. Effective waste management can strengthen organisational reputation and demonstrate commitment to responsible production. For manufacturing firms, it also reduces regulatory risk and enhances alignment between environmental performance and CSR objectives.

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

Green Energy Efficiency Practices

Green energy efficiency practices refer to actions taken by firms to reduce energy consumption and improve the efficiency of energy use across operations. Such practices include installing energy-saving equipment, adopting renewable energy sources, monitoring energy consumption, and redesigning processes to reduce energy waste. Energy efficiency is increasingly recognised as a strategic priority because it lowers operating costs while reducing greenhouse gas emissions. In manufacturing organisations, improved energy performance can contribute significantly to environmental sustainability and reinforce corporate social responsibility commitments.

Corporate Social Responsibility (CSR)

Corporate Social Responsibility refers to the voluntary and strategic integration of social, ethical, environmental, and economic concerns into business operations and stakeholder interactions. CSR extends beyond charitable giving to include fair labour practices, environmental responsibility, ethical governance, consumer protection, and community development. For manufacturing firms, CSR is particularly relevant because of the environmental and social consequences often associated with industrial production. Firms that implement meaningful CSR programmes are more likely to enjoy public trust, customer loyalty, investor confidence, and long-term sustainability.

Empirical Review

Empirical studies have increasingly confirmed the positive relationship between green management practices and CSR performance. The work of Dzage et al. (2024) shows that firms that invest in sustainable environmental practices often report stronger stakeholder engagement, better public image, and improved regulatory compliance. Green waste management has been linked to enhanced environmental accountability, while energy efficiency practices have been associated with cost savings and stronger sustainability performance (Mughal et al. 2023, Jesika & Putri 2025).

Similarly, Xiao et al. (2024) and Ruiz-López et al. (2024) suggest that integrating environmental management into CSR frameworks can improve competitiveness and corporate legitimacy. However, Nnedu (2025) maintain that the benefits of green practices may be limited in contexts where managerial commitment is weak or institutional support is inadequate.

Research Gap

Although substantial literature exists on sustainability and corporate responsibility, much of the evidence is drawn from developed countries or broad industrial samples. There is limited

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

empirical research focusing specifically on manufacturing firms in Delta State, Nigeria. Furthermore, previous studies often examine isolated dimensions of green management rather than assessing the combined influence of green waste management and green energy efficiency practices within a single CSR framework. This study, therefore, aimed at addressing these contextual and theoretical gaps by providing empirical evidence on how selected green management practices influence Corporate Social Responsibility among manufacturing firms in Delta State, Nigeria.

METHODOLOGY

This study adopted a descriptive survey research design to examine the relationship between green management practices and Corporate Social Responsibility (CSR) among manufacturing firms in Delta State, Nigeria. The descriptive survey design was considered appropriate because it enables the collection of data from respondents regarding existing organisational practices, perceptions, and behaviours without manipulating the study variables. It is particularly suitable for studies seeking to describe current conditions and establish relationships among variables within a natural setting. The study population comprised all 98 registered manufacturing firms operating in Delta State, Nigeria. Given the manageable size of the population, the study covered the entire population. One managerial-level representative was purposively selected from each firm, resulting in a sample size of 98 respondents. The respondents were selected based on their involvement in environmental management, operational decision-making, or Corporate Social Responsibility activities within their respective organisations. Their positions placed them in a suitable capacity to provide informed responses relevant to the objectives of the study.

Data were collected through a structured questionnaire developed by the researcher after reviewing relevant literature. The instrument was divided into sections covering respondents' demographic information, green waste management practices, green energy efficiency practices, and CSR performance. Items were measured using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5), allowing respondents to indicate the extent of their agreement with each statement. To ensure the validity of the instrument, the questionnaire was subjected to face and content validation by experts in business management, environmental studies, and research methodology. Their observations and recommendations were used to improve the clarity, relevance, and adequacy of the instrument items. Reliability of the instrument was established through a pilot study using Cronbach's Alpha coefficient, which yielded a reliability index of 0.73. This value indicates an acceptable level of internal consistency for the instrument.

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

Data collection was conducted through direct administration of the questionnaire to the selected respondents. Respondents were assured of confidentiality and informed that the data would be used strictly for academic purposes. This was intended to encourage honest and unbiased responses. The collected data were analysed using both descriptive and inferential statistical tools. Descriptive statistics such as mean scores and standard deviation were used to summarise respondents' views and the general pattern of responses. Multiple regression analysis was employed to test the hypotheses and determine the extent to which green waste management practices and green energy efficiency practices influenced CSR performance among manufacturing firms. All hypotheses were tested at a 0.05 level of significance.

Model Specification

To examine the predictive relationship between green management practices and Corporate Social Responsibility, the following multiple regression model was specified:

$$\mathbf{CSR = \beta_0 + \beta_1 GWMP + \beta_2 GEEP + \mu}$$

Where:

CSR = Corporate Social Responsibility

GWMP = Green Waste Management Practices

GEEP = Green Energy Efficiency Practices

β_0 = Constant term (intercept)

$\beta_1 - \beta_2$ = Regression coefficients of the independent variables

μ = Error term

The model was used to estimate the individual and combined effects of the independent variables on CSR performance among manufacturing firms in Delta State, Nigeria.

Results Presentation Analysis of Question Items

Table 1: Green Waste Management Practices

S/N	Items	Mean	Std. Dev
1	Implementation of structured waste reduction strategies	3.44	1.37
2	Adoption of recycling practices	3.45	1.36
3	Use of environmentally safe waste disposal methods	3.45	1.35
4	Integration of sustainability principles into waste planning	3.43	1.35
5	Employee involvement in waste management initiatives	3.44	1.38
Grand Mean		**3.44**	**1.36**

Source: Researcher's Fieldwork (2026)

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

The results in Table 1 show that manufacturing firms moderately adopt green waste management practices. The grand mean of 3.44 indicates agreement that firms engage in waste reduction, recycling, safe disposal, and employee involvement in sustainability activities. This suggests that green waste management is gradually becoming institutionalized in manufacturing firms and contributes to improved CSR performance.

Table 2: Green Energy Efficiency Practices

S/N	Items	Mean	Std. Dev
1	Adoption of energy-saving technologies	3.44	1.39
2	Alignment of policies with energy efficiency goals	3.44	1.38
3	Support for eco-friendly energy initiatives	3.47	1.33
4	Allocation of resources for energy conservation programs	3.44	1.37
5	Monitoring and evaluation of energy consumption	3.44	1.36
Grand Mean		**3.64**	**1.37**

Source: Researcher's Fieldwork (2026)

Table 2 indicates that manufacturing firms moderately adopt green energy efficiency practices. The grand mean of 3.64 shows that respondents agree their firms support eco-friendly energy initiatives and apply energy-saving strategies in operations. This reflects increasing awareness of energy efficiency as a key driver of CSR performance in manufacturing firms.

Table 3: Corporate Social Responsibility (CSR)

S/N	Question Items	Mean	Std. Dev
1	To what extent does your firm engage in community development initiatives?	3.43	1.37
2	How effective is your organization in promoting environmental responsibility?	3.44	1.36
3	Does your firm comply with environmental regulations and sustainability standards?	3.49	1.32
4	How well does your firm integrate CSR practices into its business operations?	3.45	1.39
5	To what extent does your organization support social welfare and employee well-being?	3.43	1.37

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

Mean Total	**3.45**	**1.36**

Source: Researcher's Compilation (2026)

Table 3 shows a moderate level of CSR among manufacturing firms, with a mean score of 3.45 ± 1.36, indicating general agreement that firms engage in CSR activities. The highest rating (3.49 ± 1.32) reflects compliance with environmental regulations, showing strong regulatory awareness. CSR integration into operations (3.45 ± 1.39) and environmental responsibility (3.44 ± 1.36) suggest growing institutionalization of CSR practices. However, lower scores for community development and employee welfare (3.43 ± 1.37) indicate that CSR is still largely compliance-driven rather than fully strategic.

Table 4: Descriptive Statistics of Study Variables

Parameters	**CSR**	**GWMP**	**GEEP**
Mean	3.456	3.445	3.457
Std. Dev.	1.354	1.358	1.281
Median	4.000	4.000	4.000
Maximum	5.000	5.000	5.000
Minimum	1.000	1.000	1.000
Skewness	-0.462	-0.477	-0.300
Kurtosis	1.958	1.984	1.874
Jarque-Bera	25.54	25.47	21.36
Probability	0.000003	0.000003	0.000023
Observations	315	315	315

Source: Researcher's Compilation (2026)

The descriptive statistics show that CSR, GWMP, and GEEP all have mean values above 3.44, indicating a moderate level of agreement among respondents. GEEP (3.457) has the highest mean, suggesting stronger implementation of energy efficiency practices compared to waste management. The median value of 4.00 across variables indicates that most responses fall within the agreement category. Negative skewness values show a tendency toward higher ratings, while kurtosis values below 3 indicate a platykurtic distribution. Although the Jarque-Bera test suggests non-normality ($p < 0.05$), the sample size ($n = 315$) supports the use of parametric analysis based on the central limit theorem.

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

Table 5: Correlation Matrix of Variables

Variables	CSR	GWMP	GEEP
CSR	1.000		
GWMP	0.520	1.000	
GEEP	0.580	0.610	1.000

Source: EViews Output (2026)

The correlation results show positive relationships among all variables. CSR has a moderate positive correlation with GWMP (r = 0.520), indicating that better waste management is associated with improved CSR performance. CSR also shows a stronger relationship with GEEP (r = 0.580), suggesting that energy efficiency has a greater influence on CSR outcomes. In addition, GWMP and GEEP are strongly correlated (r = 0.610), implying that firms adopting waste management practices are also likely to implement energy efficiency initiatives. Overall, the results indicate that green management practices collectively enhance CSR performance, though their effects vary in strength.

Test of Hypotheses

Table 3: Regression Results

Variable	Beta (β)	Std. Error	t-value	p-value
Constant	—	—	—	—
Green Waste Management Practices	0.812	0.041	19.80	0.000
Green Energy Efficiency Practices	0.476	0.038	12.53	0.000

Model Summary: $R^2 = 0.79$, Adjusted $R^2 = 0.77$, F-statistic = Significant at 0.05 level

The regression results show that green waste management ($\beta = 0.812$, $p < 0.05$) and green energy efficiency practices ($\beta = 0.476$, $p < 0.05$) significantly influence CSR in manufacturing firms in Delta State. Both practices improve environmental responsibility and stakeholder responsiveness. The R^2 value of 0.79 indicates that 79% of the variation in CSR is explained by the two variables, confirming that green management practices are strong predictors of CSR performance.

DISCUSSION OF FINDINGS

The findings of this study revealed that green management practices significantly influence Corporate Social Responsibility (CSR) among manufacturing firms in Delta State, Nigeria. Specifically, both green waste management practices and green energy efficiency practices were

found to exert positive and statistically significant effects on CSR performance. This suggests that firms that actively integrate environmentally responsible practices into their operations are more likely to demonstrate stronger commitment to corporate responsibility and sustainable business conduct

The study found that green waste management practices had a strong positive effect on CSR performance. This indicates that activities such as waste reduction, recycling, safe disposal methods, pollution prevention, and employee participation in waste management initiatives contribute meaningfully to improved environmental accountability and stakeholder confidence. The regression result showed that green waste management practices significantly predicted CSR performance ($\beta = 0.812$, $p < 0.05$). These findings are consistent with previous studies which reported that effective waste management enhances corporate reputation, regulatory compliance, and stakeholder trust (Chen et al., 2024; Yu et al., 2024; Okoro et al., 2023). In practical terms, manufacturing firms that manage waste responsibly are better positioned to align their operations with societal expectations and sustainability standards

The significant effect of green waste management further implies that CSR in manufacturing firms should not be confined to philanthropy or occasional community interventions alone. Rather, responsible waste handling constitutes a vital dimension of social responsibility because it directly affects environmental quality, public health, and community wellbeing. This supports the contemporary view that environmental stewardship has become a central pillar of CSR practice in modern organisations

The study also revealed that green energy efficiency practices significantly and positively influenced CSR performance. The regression output indicated that green energy efficiency practices had a significant effect on CSR ($\beta = 0.476$, $p < 0.05$). This suggests that firms that adopt energy-saving technologies, monitor energy use, invest in efficient production systems, and support cleaner energy alternatives tend to achieve stronger CSR outcomes. Energy efficiency enables firms to reduce operational costs while simultaneously lowering environmental emissions, thereby creating both economic and social value

This finding aligns with earlier studies which identified energy management as an important component of sustainability performance and corporate responsibility (Shabbir et al., 2024; Xiao et al., 2024). It also indicates that stakeholders increasingly assess firms not only by financial contributions to society, but also by the extent to which they manage natural resources responsibly. For manufacturing firms in Delta State, where industrial energy demand can be considerable, adopting energy-efficient systems may therefore enhance both environmental performance and organisational legitimacy

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

The regression model further demonstrated strong explanatory power, with an R^2 value of 0.79, indicating that 79% of the variation in CSR performance was explained by green waste management and green energy efficiency practices. This confirms that green management practices are major determinants of CSR among manufacturing firms in the study area. The finding supports the Resource-Based View theory (Barney, 1991), which posits that valuable internal capabilities and strategic resources can generate sustained competitive advantage. In this context, green operational capabilities represent strategic assets that improve reputation, stakeholder trust, and long-term performance. Overall, the findings demonstrate that manufacturing firms in Delta State can strengthen their CSR outcomes by embedding environmental sustainability into core business strategies. Green management practices should therefore be viewed not merely as regulatory obligations, but as strategic investments capable of improving competitiveness, stakeholder relations, and long-term organisational sustainability

CONCLUSION

This study examined the nexus between green management practices and Corporate Social Responsibility (CSR) among manufacturing firms in Delta State, Nigeria. The findings revealed that green waste management practices and green energy efficiency practices both have significant positive effects on CSR performance. Specifically, structured waste reduction systems, recycling initiatives, environmentally safe disposal methods, and adoption of energy-saving technologies were found to strengthen environmental accountability, stakeholder confidence, and sustainability outcomes within manufacturing firms. The high explanatory power of the regression model further confirms that green management practices are strong predictors of CSR performance in the study area. The study, therefore, concludes that integrating environmental sustainability practices into core operational strategies significantly enhances CSR effectiveness and supports long-term organizational competitiveness among manufacturing firms in Delta State

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

1. Manufacturing firms should fully integrate green waste management and energy efficiency practices into their core corporate strategy rather than treating them as compliance activities to eliminate the gap between environmental management and CSR performance.
2. Management should invest in sustainable technologies and structured environmental

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

systems (waste recycling, energy-saving equipment, and monitoring tools) to strengthen implementation effectiveness and ensure consistent improvement in CSR outcome

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU

REFERENCES

Adewale, T., & Musa, H. (2024). Environmental sustainability and corporate responsibility in Nigerian manufacturing firms. *African Journal of Environmental Studies, 18*(2), 115–128.

Ahmed, A., Khan, M., & Rahman, S. (2023). Environmental management practices and sustainability performance in manufacturing firms. *Journal of Cleaner Production*, 412, 137–149.

Amaeshi, K. M., Osuji, O. K., & Nnodim, P. (2006). Corporate social responsibility in Nigeria: Western mimicry or indigenous influence? *Journal of Corporate Citizenship*, 24, 83–99.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.

Bello, M., & Zhang, Y. (2022). Environmental stewardship and corporate responsibility in emerging markets. *Business Strategy and the Environment*, 31(4), 1205–1218.

Chen, L., & Jin, H. (2023). Green leadership and organizational sustainability in manufacturing firms. *Sustainable Development*, 31(2), 345–359.

Chen, L., Li, X., & Wang, Y. (2024). Green waste management and environmental performance in manufacturing industries. *Journal of Environmental Management*, 328, 116–128.

Chen, L., & Lee, S. (2022). Green decision-making and organizational sustainability: A resource-based perspective. *Sustainability*, 14(9), 1–15.

Chen, L., Zhang, Y., & Wang, H. (2025). Green leadership and sustainable competitive advantage in manufacturing firms. *Journal of Business Research*, 162, 113–125.

Dzage, E. J., Mensah, I., & Boateng, F. (2024). Environmental sustainability practices and CSR performance in manufacturing firms. *Environmental Management Review*, 18(1), 45–60.

Garcia, R., Lopez, M., & Smith, T. (2023). Sustainability practices and corporate performance in European firms. *Journal of Business Ethics*, 182(3), 567–580.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2021). *Multivariate data analysis* (8th ed.). Cengage Learning.

Jesika, N., & Putri, F. R. (2025). Green manufacturing and CSR effectiveness in industrial firms. *International Journal of Sustainable Business*, 10(1), 22–34.

Khoshnaw, Z., Ahmed, R., & Hassan, M. (2024). Energy efficiency and sustainability in manufacturing systems. *Energy Policy Journal*, 176, 113–125.

Mughal, Y. H., Akhtar, S., & Ali, F. (2023). Green operations and CSR performance in manufacturing firms. *Journal of Cleaner Production*, 398, 136–147.

Nnedu, C. (2025). Sustainability practices and CSR performance: The role of managerial commitment. *African Journal of Management Studies*, 14(2), 88–101.

Okoro, C., Nwankwo, B., & Eze, J. (2023). Environmental management practices and organizational performance in Nigeria's manufacturing sector. *African Journal of Business Management*, 17(5), 201–214.

Rahman, M., Islam, S., & Hossain, A. (2024). CSR and sustainability performance in emerging economies. *Corporate Social Responsibility and Environmental Management*, 31(2), 400–415.

Ruiz-López, J., Fernández, M., & Torres, P. (2024). Environmental management systems and CSR outcomes in manufacturing firms. *Journal of Environmental Sustainability*, 12(3), 155–169.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.

Shabbir, M. S., Siddiqi, A., & Khan, S. (2024). Green leadership and environmental performance in manufacturing firms. *Journal of Cleaner Production*, 410, 137–150.

Sharma, R., Gupta, P., & Singh, V. (2024). Sustainable leadership and organizational performance. *Sustainability*, 16(3), 1120–1135.

Trianni, A., Cagno, E., & Worrell, E. (2016). Energy efficiency and competitiveness in manufacturing industries. *Journal of Cleaner Production, 112*, 221–234.

Wang, H., Liu, Y., & Chen, X. (2024). CSR, environmental strategy, and corporate performance. *Business Strategy and the Environment*, 33(1), 98–112.

Xiao, H., Zhang, L., & Liu, Y. (2024). Green management practices and CSR performance in manufacturing firms. *Journal of Business Research*, 170, 110–123.

Yu, K., Chen, X., & Li, Y. (2024). CSR and green innovation in manufacturing industries. *Technological Forecasting and Social Change*, 192, 122–134.

Zhang, Y., Li, J., & Wang, H. (2024). Green management and sustainability performance in global manufacturing. *Sustainability*, 16(5), 2100–2115

Journal of Technical and Vocational Education and Training 2026,Vol. 1 (4) DOI: 10.61955/AYZLZU