INNOVATION-DRIVEN SUSTAINABILITY: EXAMINING THE EFFECTS OF PRODUCT AND PROCESS INNOVATIONS ON SMES IN THE DIGITAL ERA IN FCT ABUJA

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Abstract
This study examines the relationships between innovation (process and product) and the sustainability of small and medium enterprises (SMEs) in the digital era within the Federal Capital Territory (FCT) Abuja, Nigeria. Drawing on existing literature, the research hypothesizes that both process innovation and product innovation have a positive and significant impact on the sustainability of SMEs. The study employs a quantitative approach, utilizing a survey-based data collection method. A sample of 384 SMEs operating in the FCT Abuja region was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The finding strongly shows that process innovation has a significant and positive effect on SME sustainability. In contrast, the study did not find a significant direct relationship between product innovation and SME sustainability. The study recommends that SME owners/managers, policymakers, and support institutions should prioritize investments and initiatives that foster process innovation capabilities within the SME sector.
Keywords: *Product innovation, Process innovation, Sustainability, Small and medium-sized enterprises*

INTRODUCTION

Small and medium-sized enterprises (SMEs) play a crucial role in the economic development of Nigeria, accounting for a significant portion of the country's Gross Domestic Product (GDP) and employment (Ajai, 2019). In the Federal Capital Territory (FCT) of Abuja, SMEs are particularly vital, contributing to the diversification of the local economy and providing opportunities for job creation and entrepreneurship development (Akinboade & Kinfack, 2012).

The digital transformation sweeping across various industries has had a profound impact on the way businesses operate, forcing SMEs to adapt and innovate to remain competitive and sustainable (Eggers et al., 2020). In the digital era, technology has become a critical enabler of business success, influencing every aspect of an organization, from product development to operational efficiency and customer engagement (Alaali & Houghton, 2019).

For SMEs in the FCT Abuja, the digital landscape presents both opportunities and challenges. On one hand, digital technologies can enable these enterprises to reach new markets, improve their operational efficiency, and enhance their customer experience (Ajayi, 2016). On the other hand, the rapid pace of technological change and the need for continuous innovation can stretch the limited resources and expertise of many SMEs, creating obstacles to their long-term sustainability (Eggers et al., 2020).

The ability of SMEs to innovate, both in terms of their products and their processes, has become a critical determinant of their survival and success (Ajai, 2019). Product innovation, which involves the development of new or improved products or services, can help SMEs differentiate themselves from competitors and better meet the evolving needs of their customers (Alaali & Houghton, 2019). Process innovation, on the other hand, focuses on improving the efficiency and effectiveness of an organization's internal operations, enabling SMEs to optimize their resource utilization and enhance their competitiveness (Ajayi, 2016).

The sustainability of SMEs in the digital era is a pressing concern, as these enterprises often lack the resources and expertise to effectively manage the technological and market-driven changes that characterize the modern business landscape (Ajai, 2019). Despite the growing recognition of the importance of innovation for SME sustainability, there is a dearth of research exploring the specific effects of product and process innovations on the long-term viability of SMEs in the digital era, particularly within the context of the FCT Abuja region (Eggers et al., 2020). This study aims to address this gap by investigating the impact

of these two types of innovation on the sustainability of SMEs operating in the digital landscape of the FCT Abuja.

Thus, the primary objectives of this study are:

1. To analyze the effect of product innovation on the sustainability of SMEs in the digital era in the FCT Abuja.
2. To investigate the effect of process innovation on the sustainability of SMEs in the digital era in the FCT Abuja.

LITERATURE REVIEW
Conceptual Review

Innovation has been widely recognized as a critical driver of organizational sustainability, particularly for small and medium-sized enterprises (SMEs) operating in dynamic and competitive environments (Eggers et al., 2020). Innovations can take various forms, including product innovation, process innovation, marketing innovation, and organizational innovation (Akinboade & Kinfack, 2012).

Product innovation refers to the development of new or significantly improved products or services that meet the evolving needs of customers (Alaali & Houghton, 2019). This type of innovation can help SMEs differentiate themselves from competitors, increase their market share, and enhance their overall competitiveness (Ajai, 2019). By continuously improving and introducing new products, SMEs can maintain their relevance in the market and ensure their long-term sustainability.

Process innovation, on the other hand, involves the implementation of new or significantly improved production or delivery methods, which can lead to increased efficiency, reduced costs, and improved quality (Ajayi, 2016). For SMEs, process innovations can be particularly crucial in the digital era, as they enable these enterprises to streamline their operations, optimize resource utilization, and enhance their responsiveness to market changes (Eggers et al., 2020).

The sustainability of SMEs is a multifaceted concept that encompasses their ability to maintain profitability, adapt to changing market conditions, and ensure their long-term viability (Akinboade & Kinfack, 2012). Innovation plays a crucial role in this regard, as it allows SMEs to stay ahead of the competition, respond to customer demands, and enhance their overall resilience (Alaali & Houghton, 2019).

The conceptual framework illustrates the hypothesized relationships between the two types of innovation (product innovation and process innovation) and the sustainability of SMEs in the digital era within the FCT Abuja region. The framework suggests that both product and process innovations can have a positive and significant impact on the sustainability of SMEs, enabling these enterprises to adapt to the changing market conditions, enhance their competitiveness, and ensure their long-term viability in the digital landscape.

Product Innovation and Sustainability of SMEs

Numerous studies have investigated the relationship between product innovation and the sustainability of SMEs. Ajai (2019) found that SMEs that engage in product innovation are more likely to achieve superior financial performance and maintain their market share in the long run. This is because product innovations can help SMEs differentiate their offerings, attract new customers, and establish a stronger brand identity (Ajayi, 2016).

In the digital era, product innovation has become even more critical for SME sustainability, as customers' expectations and preferences are rapidly evolving (Eggers et al., 2020). SMEs that can quickly develop and introduce new or improved products that cater to these changing needs are more likely to remain competitive and sustainable in the market (Alaali & Houghton, 2019).

Process Innovation and Sustainability of SMEs

Similarly, process innovation has been identified as a key factor in the sustainability of SMEs. Akinboade and Kinfack (2012) found that SMEs that invest in process innovations, such as the adoption of new technologies or the streamlining of their operational procedures, are better equipped to enhance their efficiency, reduce costs, and improve their overall competitiveness.

In the digital era, process innovations can be particularly impactful for SME sustainability, as they enable these enterprises to leverage digital technologies to optimize their internal operations, improve their responsiveness to market changes, and enhance their overall productivity (Ajayi, 2016). By implementing process innovations, SMEs can strengthen their competitive position and ensure their long-term viability in the digital landscape (Eggers et al., 2020).

Theoretical Framework

The theoretical underpinnings of this study are grounded in the resource-based view (RBV).

Resource-Based View (RBV)

The resource-based view (RBV) provides a theoretical foundation for understanding how innovation, as a critical organizational resource, can contribute to the sustainability of SMEs in the digital era (Barney, 1991). According to the RBV, a firm's sustained competitive advantage is derived from its ability to acquire and deploy valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). In the context of SMEs, innovation can be considered a VRIN resource that enables these enterprises to differentiate themselves, enhance their efficiency, and adapt to the changing market conditions in the digital landscape (Alaali & Houghton, 2019).

The RBV suggests that SMEs that effectively leverage their innovative capabilities, particularly in the form of product and process innovations, are more likely to achieve superior performance and ensure their long-term sustainability (Ajayi, 2016). By continuously investing in and developing new products and improving their internal processes, SMEs can create unique and difficult-to-replicate competitive advantages, which are essential for their survival and growth in the digital era (Ajai, 2019).

Integrating the RBV theory, this study proposes that the successful implementation of product and process innovations can enable SMEs in the FCT Abuja region to develop unique, valuable, and difficult-to-imitate resources and capabilities, which, in turn, can contribute to their overall sustainability in the digital era.

METHODOLOGY

This study employs a quantitative research design using a causal approach. The survey method is well-suited for this study as it allows for the collection of data from a larger sample of SMEs in the FCT Abuja region, enabling the researchers to investigate the relationships between the variables of interest (product innovation, process innovation, and sustainability) (Creswell & Creswell, 2017).

The target population for this study comprises Small and Medium Enterprises (SMEs) operating in the Federal Capital Territory (FCT) of Abuja, Nigeria. According to the National Bureau of Statistics, there are approximately 20,000 registered SMEs in the FCT Abuja region as of 2022 (NBS, 2022).

To ensure a representative sample, the researchers use a of purposive and random sampling techniques. A purposive sampling approach was employed to identify SMEs that meet the following criteria: (1) have been in operation for at least 3 years, (2) operate in the digital/technology-enabled sectors, and (3) have a minimum of 10 employees (Akinboade & Kinfack, 2012). This purposive selection help ensure that the sample consists of SMEs with the necessary experience and exposure to the digital environment.

The sample size was determined using the G*Power software, with a minimum of 384 SMEs targeted to achieve a statistical power of 0.80, a medium effect size ($f^2 = 0.15$), and a significance level of 0.05 (Faul et al., 2007).

The data for this study was collected through a structured questionnaire survey. The questionnaire was designed to capture information on the SMEs' level of product and process innovations, and their perceived sustainability in the digital era. The survey instrument was pre-tested with a small sample of SME owners/managers to ensure the clarity and validity of the questions.

The researcher employED both online and offline data collection methods to reach a broader range of SMEs in the FCT Abuja region. The online survey was distributed through various SME-related online platforms and professional networks, while the offline survey was conducted through face-to-face interactions with SME owners/managers in FCT Abuja.

The data collected from the survey was analyzed using the partial least squares structural equation modeling (PLS-SEM) technique. PLS-SEM is a robust and versatile multivariate analysis method that allows for the simultaneous examination of the relationships between multiple independent and dependent variables (Hair et al., 2017). This analytical approach is particularly well-suited for this study, as it can handle complex models with latent variables, such as the relationships between product innovation, process innovation, and sustainability.

Figure 1: Structural Model
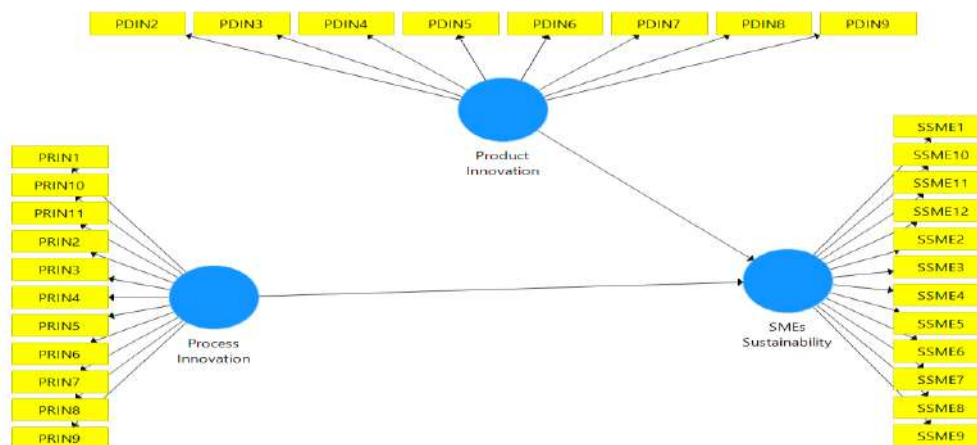
Source: SmartPLS, 2024

The PLS-SEM analysis was conducted using the SmartPLS software. The analysis involve the following steps:

1. Measurement model evaluation: Assessing the reliability and validity of the constructs (product innovation, process innovation, and sustainability) through measures such as composite reliability, convergent validity, and discriminant validity.
2. Structural model evaluation: Examining the hypothesized relationships between the constructs, including the direct effects of product innovation and process innovation on the sustainability of SMEs in the digital era.
3. Significance testing: Determining the statistical significance of the path coefficients using bootstrapping procedures to assess the hypothesized relationships.

The justification for using PLS-SEM in this study is that it is well-suited for this research, particularly as the researcher was dealing with complex models and latent variables, as is the case in this investigation of the effects of product and process innovations on the sustainability of SMEs in the digital era (Hair et al., 2017). Additionally, PLS-SEM is robust to non-normal data distributions and can handle small to medium sample sizes, making it an appropriate choice for this study.

RESULTS AND DISCUSSIONS
Demographic Characteristics of SME Owners/Managers
Gender Distribution

The total respondents for this study consisted of 384 small and medium-sized enterprises (SMEs) operating in the Federal Capital Territory (FCT) Abuja, Nigeria. An examination of the gender distribution of the respondents reveals that most of the SME owners/managers were male, representing 80.8% of the total sample. In contrast, female SME owners/managers accounted for 19.2% of the respondents.

Table 1: Gender Distribution

Gender	Counts	% of Total	Cumulative %
Female	67	19.2 %	19.2 %
Male	282	80.8 %	100.0 %

Source: Researcher Computation 2024

The analysis presented on the above table indicates that the study is predominance of male respondents as the value for male is 284 respondents while the female is 67 from the entire population 384.

Marital Status of Respondents

The analysis of the marital status of the SME owners/managers in the sample reveals that the majority (86.5%) are married individuals. The second-largest group consists of single respondents, accounting for 9.2% of the total sample.

Table 2: Marital Status

Marital Status	Counts	% of Total	Cumulative %
Divorced	7	2.0 %	2.0 %
Married	302	86.5 %	88.5 %
Prefer not to say	3	0.9 %	89.4 %
Separated	5	1.4 %	90.8 %
Single	32	9.2 %	100.0 %

Source: Researcher Computation 2024

The table on marital status shows that the majority of respondents, **86.5%** (302 people), are married, while **9.2%** (32 people) are single. A smaller proportion, **2.0%** (7 people), are divorced, and **1.4%** (5 people) are separated. Only **0.9%** (3 people) preferred not to disclose their marital status. The cumulative percentages show that 88.5% of respondents are either married or divorced, 89.4% include those who prefer not to say, 90.8% cover those who are separated, and 100% is reached with the inclusion of single respondents.

Age Distribution

The analysis of the age distribution of the SME owners/managers in the sample reveals that the majority (52.4%) are above the age of 40 years. The second-largest age group is the 31-40 years old category, which accounts for 45.6% of the respondents. Only a small proportion (2.0%) of the sample is within the 21-30 years age range.

Table 3: Age Distribution

Age	Counts	% of Total	Cumulative %
21 – 30	7	2.0 %	2.0 %
31 – 40	159	45.6 %	47.6 %

Table 3: Age Distribution

Age	Counts	% of Total	Cumulative %
Above 40	183	52.4 %	100.0 %

Source: Researcher Computation 2024

The table 3 on age distribution reveals that **52.4%** (183 people) of the respondents are above 40 years old, while **45.6%** (159 people) fall within the 31–40 age range. A small proportion, **2.0%** (7 people), are aged between 21 and 30. The cumulative percentage shows that by including those aged 31–40, **47.6%** of the respondents are accounted for, and with those above 40, the total reaches **100%**.

Educational Qualifications

The analysis of the educational qualifications of the SME owners/managers in the sample reveals a relatively high level of formal education among the respondents. The majority (62.8%) hold postgraduate degrees, such as master's or doctoral qualifications. The second-largest group consists of graduates with bachelor's degrees, accounting for 34.7% of the total sample. Only a small proportion (2.6%) of the respondents have diplomas or National Certificate of Education (NCE) qualifications.

Table 4: Qualifications

Qualifications	Counts	% of Total	Cumulative %
Diploma/NCE	9	2.6 %	2.6 %
Graduate	121	34.7 %	37.2 %
Postgraduate	219	62.8 %	100.0 %

Source: Researcher Computation 2024

The table on qualifications indicates that the majority of respondents, **62.8%** (219 people), hold postgraduate degrees, while **34.7%** (121 people) are graduates. A smaller percentage, **2.6%** (9 people), possess a Diploma or NCE. The cumulative percentages show that after accounting for those with a Diploma/NCE, **2.6%** of respondents are included, rising to **37.2%** when graduates are added. Finally, the cumulative percentage reaches **100%** with the inclusion of those holding postgraduate qualifications.

Assessment of Measurement Model
Factor Loadings

The factor loadings presented in Table 5 provide information on the reliability of the measurement scales used in this study to assess product innovation, process innovation, and the sustainability of small and medium-sized enterprises (SMEs) in the Federal Capital Territory (FCT) Abuja, Nigeria.

Table 5: Factor Loadings

Variables	Loadings	Variables	Loadings
PDIN2	0.717	PRIN7	0.894
PDIN3	0.845	PRIN8	0.801
PDIN4	0.736	PRIN9	0.861
PDIN5	0.811	SSME1	0.809
PDIN6	0.817	SSME10	0.841
PDIN7	0.754	SSME11	0.804
PDIN8	0.804	SSME12	0.863
PDIN9	0.798	SSME2	0.755
PRIN1	0.847	SSME3	0.781
PRIN10	0.755	SSME4	0.773

PRIN11	0.755	SSME5	0.772
PRIN2	0.888	SSME6	0.875
PRIN3	0.799	SSME7	0.779
PRIN4	0.839	SSME8	0.832
PRIN5	0.829	SSME9	0.832
PRIN6	0.852		

Source: Output from SmartPLS

The factor loadings for all indicators range from 0.717 to 0.894, all of which exceed the recommended threshold of 0.70 (Hair et al., 2017). This indicates that the items used to measure all construct are reliable.

Construct Reliability and Convergent

The assessment of construct reliability and convergent, as presented in Table 6, provides further evidence of the psychometric properties of the measurement scales used in this study. The Cronbach's alpha value for the process innovation construct is 0.955, the rho_A value is 0.957, and the composite reliability is 0.961. All these values exceed the recommended threshold of 0.70, indicating excellent internal consistency reliability (Hair et al., 2017). Furthermore, the average variance extracted (AVE) for the process innovation construct is 0.689, which is above the recommended minimum of 0.50, demonstrating good convergent validity.

Table 6: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Process Innovation	**0.955**	**0.957**	**0.961**	**0.689**
Product Innovation	**0.911**	**0.913**	**0.928**	**0.618**
SMEs Sustainability	**0.952**	**0.954**	**0.958**	**0.657**

Source: Output from SmartPLS

Table 6 on Construct Reliability and Validity shows strong reliability and validity for the constructs of Process Innovation, Product Innovation, and SMEs Sustainability. All Cronbach's Alpha values are above 0.9, indicating high internal consistency, with Process Innovation at 0.955, SMEs Sustainability at 0.952, and Product Innovation at 0.911. The rho_A values, which confirm construct reliability, are similarly high, with Process Innovation at 0.957, SMEs Sustainability at 0.954, and Product Innovation at 0.913. Composite Reliability scores are also strong, exceeding 0.9 across the board, with Process Innovation at 0.961, followed by SMEs Sustainability at 0.958 and Product Innovation at 0.928, indicating high overall reliability. Furthermore, the Average Variance Extracted (AVE) values demonstrate acceptable convergent validity, with Process Innovation at 0.689, Product Innovation at 0.618, and SMEs Sustainability at 0.657, all above the recommended 0.5 threshold.

Discriminant validity

Discriminant validity refers to the extent to which a construct is truly distinct from other constructs, indicating that it measures a unique concept (Hair et al., 2017). It is an important aspect of construct validity, as it ensures that the measures of different constructs are not overly correlated with each other. The Fornell-Larcker criterion suggests that the square root of the average variance extracted (AVE) for each construct should be greater than the construct's highest correlation with any other construct in the model.

The square root of the AVE for the process innovation construct is 0.830, which is greater than its correlation with product innovation (0.745) and SME sustainability (0.830). This indicates that the process innovation construct is distinct from the other two constructs in the model, demonstrating adequate discriminant validity.

Table 7: Fornell-Larcker Criterion

	Process Innovation	Product Innovation	SMEs Sustainability
Process Innovation	0.830		
Product Innovation	0.745	0.786	
SMEs Sustainability	0.830	0.652	0.811

Source: Output from SmartPLS

Assessment of Measurement Model
Coefficient of Determination
The R-square (R^2) value, as presented in Table 8, represents the coefficient of determination, which is a measure of the proportion of the variance in the dependent variable (SME sustainability) that is explained by the independent variables (product innovation and process innovation) in the model. The R-square value for the SME sustainability construct is 0.692, which indicates that the product innovation and process innovation variables explain 69.2% of the variance in SME sustainability. The adjusted R-square value of 0.690 considers the number of independent variables in the model and provides a more conservative estimate of the explained variance.

Table 8: R square

	R Square	R Square Adjusted
SMEs Sustainability	0.692	0.690

Source: Output from SmartPLS
These R-square values suggest that the model has a substantial explanatory power, as the independent variables (product innovation and process innovation) account for a significant portion of the variation in the dependent variable (SME sustainability). According to the guidelines provided by Hair et al. (2017), R-square values of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak, respectively. The R-square value of 0.692 for SME sustainability falls within the substantial range, indicating a high level of predictive accuracy. This suggests that the focus on innovation, both in terms of new products and improved processes, is crucial for the long-term viability and sustainability of small and medium-sized enterprises operating in the digital era.

Effect Size
The F-square (f^2) value, as presented in Table 9, is a measure of the effect size of the independent variables on the dependent variable. It provides an indication of the relative impact of each independent variable on the dependent variable, in this case, SME sustainability.
Table 9: F square

	SMEs Sustainability
Process Innovation	0.862
Product Innovation	0.008

Source: Output from SmartPLS
The F-square value for the process innovation construct is 0.862, which suggests a large effect size according to the guidelines provided by Cohen (1988). Cohen's thresholds for interpreting the F-square effect sizes are as follows:
- $f^2 \geq 0.35$: Large effect size
- $f^2 \geq 0.15$: Medium effect size
- $f^2 \geq 0.02$: Small effect size

The F-square value of 0.862 for process innovation indicates that this construct has a large and substantial effect on SME sustainability. This means that process innovation, as an independent variable, has a strong and meaningful impact on the dependent variable, SME sustainability, within the context of the study.

The large effect size of process innovation suggests that improvements in process-related innovations, such as the implementation of new or significantly improved production methods, delivery mechanisms, or supporting activities, can significantly contribute to the sustainability of small and medium-sized enterprises

in the Federal Capital Territory (FCT) Abuja, Nigeria. Investing in and enhancing process innovation capabilities appears to be a crucial factor in driving the long-term viability of SMEs in the digital era.

Multicollinearity

The inner VIF (Variance Inflation Factor) values, as presented in Table 10, are used to assess the level of collinearity among the independent variables in the structural model. The VIF values for both process innovation and product innovation are 2.250. According to the guidelines provided by Hair et al. (2017), VIF values less than 5 indicate that collinearity is not a concern in the model. The VIF values below the threshold of 5 suggest that the independent variables (process innovation and product innovation) are not highly correlated with each other. This means that the independent variables are measuring distinct and unique aspects of the phenomenon, and their effects on the dependent variable (SME sustainability) can be reliably estimated without the influence of multicollinearity.

Table 10: Inner VIF

	SMEs Sustainability
Process Innovation	2.250
Product Innovation	2.250

Source: Output from SmartPLS

Table 10: Inner VIF presents the Variance Inflation Factor (VIF) values for Process Innovation and Product Innovation in relation to SMEs Sustainability. Both Process Innovation and Product Innovation have VIF values of 2.250, indicating that there is no significant multicollinearity between the variables, as the VIF values are well below the commonly accepted threshold of 5. This suggests that the predictors are not highly correlated with each other, and the model is stable with respect to multicollinearity.

Model Fit Indices

The model fit indices presented in Table 11 provide an assessment of how well the proposed model fits the data collected in this study. The Standardized Root Mean Square Residual (SRMR) value for both the saturated and estimated models is 0.061. The SRMR is a measure of the average difference between the observed and the predicted correlations. A value less than 0.08 is generally considered a good fit, indicating that the model has adequately captured the relationships among the variables (Hu & Bentler, 1999). The SRMR value of 0.061 suggests that the model has a good fit to the data.

Table 11: Fit Summary

	Saturated Model	Estimated Model
SRMR	0.061	0.061
d_ULS	1.821	1.821
d_G	1.421	1.421
Chi-Square	2424.246	2424.246
NFI	0.775	0.775

Source: Output from SmartPLS

The d_ULS (the squared Euclidean distance) and d_G (the geodesic distance) are two additional fit indices that are sensitive to model misspecification. The values for both the saturated and estimated models are 1.821 and 1.421, respectively. These values are below the 95th percentile of the bootstrap quantiles, indicating a good model fit (Dijkstra & Henseler, 2015).

The Chi-square value for both the saturated and estimated models is 2424.246. The Chi-square test is used to assess the overall model fit, with a non-significant p-value ($p > 0.05$) indicating a good fit. However, the Chi-square test is sensitive to sample size, and in large samples, it is common to obtain significant p-values, even when the model fits the data well.

The Normed Fit Index (NFI) value for both the saturated and estimated models is 0.775. The NFI compares the proposed model to the null model and ranges from 0 to 1, with values greater than 0.90 generally considered a good fit (Bentler & Bonett, 1980). The NFI value of 0.775 suggests a moderate fit of the model

to the data.The combination of these fit indices provides confidence in the validity and reliability of the study's findings, supporting the interpretation and discussion of the relationships between the key constructs.

Test of Hypotheses
The path coefficients and associated statistics presented in Table 12 provide the basis for evaluating the hypotheses in this study.
Table 12: Path Coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Process Innovation -> SMEs Sustainability	0.774	0.776	0.041	18.813	**0.000**
Product Innovation -> SMEs Sustainability	0.076	0.076	0.046	1.640	**0.102**

Source: Output from SmartPLS

Hypothesis 1: Process Innovation -> SME Sustainability
The path coefficient for the relationship between process innovation and SME sustainability is 0.774, with a t-statistic of 18.813 and a p-value of 0.000. The p-value is less than the commonly used significance level of 0.05, indicating that the relationship is statistically significant. This result rejects Hypothesis 1, and supports that which proposed a positive and significant relationship between process innovation and the sustainability of small and medium-sized enterprises (SMEs) in the Federal Capital Territory (FCT) Abuja, Nigeria. The large path coefficient of 0.774 suggests that process innovation has a strong and positive effect on SME sustainability.

The results strongly support the hypothesis that process innovation has a significant and positive impact on the sustainability of SMEs. This finding is consistent with the existing literature on the importance of process innovation for organizational performance and competitiveness (Gunday et al., 2011; Jiménez-Jiménez & Sanz-Valle, 2011).

The dominance of process innovation over product innovation in driving SME sustainability aligns with the arguments made by Ajai (2019) and Agwu and Emeti (2014), who emphasized the critical role of process-related innovations in the Nigerian SME landscape. In the digital era, SMEs that can implement new or significantly improved production methods, delivery mechanisms, and supporting activities are better equipped to enhance their operational efficiency, reduce costs, and improve customer responsiveness – all of which are crucial for long-term sustainability (Gunday et al., 2011; Jiménez-Jiménez & Sanz-Valle, 2011).

Hypothesis 2: Product Innovation -> SME Sustainability
The path coefficient for the relationship between product innovation and SME sustainability is 0.076, with a t-statistic of 1.640 and a p-value of 0.102. The p-value is greater than the commonly used significance level of 0.05, indicating that the relationship is not statistically significant. This result support Hypothesis 2, which proposed that there is no significant effect of product innovation on the sustainability of SMEs in the FCT Abuja region. The relatively small path coefficient of 0.076 and the insignificant p-value suggest that product innovation does not have a significant direct effect on SME sustainability in the context of this study.

The findings do not support the hypothesis that product innovation has a significant effect on the sustainability of SMEs in the FCT Abuja region. This contrasts existing literatures that emphasize the importance of product innovation for organizational performance and competitiveness (Gunday et al., 2011; Jiménez-Jiménez & Sanz-Valle, 2011).

One possible explanation for this unexpected finding could be the inherent challenges that SMEs in the FCT Abuja region face in developing and commercializing innovative products. As noted by Ajai (2019) and Agwu and Emeti (2014), SMEs in Nigeria often struggle with limited access to resources, technological capabilities, and market knowledge, which can hinder their ability to effectively engage in product innovation.

CONCLUSION AND RECOMMENDATIONS

The findings from the hypothesis testing provide a nuanced understanding of the impact of process innovation and product innovation on the sustainability of small and medium-sized enterprises (SMEs) in the Federal Capital Territory (FCT) Abuja, Nigeria.

The analysis reveals a strong positive relationship between process innovation and SME sustainability, with a path coefficient of 0.774, a t-statistic of 18.813, and a highly significant p-value of 0.000. This indicates that process innovation significantly enhances the sustainability of SMEs, supporting the hypothesis that it has a positive and substantial impact. The results are consistent with existing literature that emphasizes the critical role of process-related innovations in enhancing operational efficiency and competitiveness.

In contrast, the relationship between product innovation and SME sustainability was found to be statistically insignificant, with a path coefficient of 0.076 and a p-value of 0.102. This suggests that product innovation does not have a direct effect on the sustainability of SMEs in the FCT Abuja region. This finding contrasts with prior studies that highlight the importance of product innovation for organizational performance, indicating that the context of SMEs in Nigeria may present unique challenges that hinder the effectiveness of product innovation.

This study recommends that SMEs in the FCT Abuja prioritize and invest in process innovation initiatives to enhance their sustainability and competitive advantage. This could involve the adoption of new production methods, improved delivery mechanisms, and the optimization of operational processes.

Given the lack of significant impact of product innovation on sustainability, SMEs should reassess their strategies regarding product development. It is essential for SMEs to seek collaborative partnerships and engage in networks that can enhance their capabilities for developing and commercializing innovative products. Such collaborations may help address challenges related to resource limitations and market knowledge that often hinder effective product innovation.

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EFFECT OF GREEN REWARD AND GREEN PERFORMANCE APPRAISAL ON ORGANIZATIONAL PERFORMANCE OF SELECTED MANUFACTURING FIRMS IN ABUJA, NIGERIA

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Abstract
The study examines the effect of green reward and green performance appraisal on organizational performance of selected manufacturing firms in Abuja, Nigeria. The study was anchored on resource-based theory. This study employed the survey research design, The population of this study comprises eight hundred and thirty-seven (837) employees of the selected registered manufacturing firms in Abuja, Nigeria, Taro Yamane was used to determine the sample size of two hundred and ninety-eight (298) used for the study, while simple random sampling technique was used to selected the respondents. Primary data was used and it was collected through the use of five-point likert scale questionnaire, Partial least squares Structural equation model was used to test the hypotheses, the study reveals that both Green Reward and Green Performance Appraisal significantly enhance organizational performance, with Green Performance Appraisal having a more substantial impact. The findings indicate that incorporating environmentally sustainable practices into performance evaluations and reward systems can improve overall organizational outcomes. Based on these results, it is recommended that manufacturing firms prioritize the implementation of comprehensive Green Performance Appraisal systems and develop robust Green Reward programs. These initiatives will not only promote a culture of sustainability but also drive continuous improvement in organizational performance, offering a competitive advantage in the market.
Keywords: *Green reward, green performance appraisal, Manufacturing firms, Performance, Abuja*

INTRODUCTION

The global push towards environmental sustainability has led organizations to adopt green practices in various aspects of their operations, including human resource management. In Nigeria, the manufacturing sector plays a crucial role in the economy but faces challenges related to environmental impact and sustainability (Anyanwu, 2019). Green human resource management (GHRM) practices, particularly green reward systems and green performance appraisals, have emerged as potential tools to enhance both environmental and organizational performance. These practices aim to motivate employees to engage in environmentally friendly behaviors and align their performance with the organization's sustainability goals (Ahmad, 2023).

Green reward system and compensation is the process of rewarding employees through financial and non-financial measures for good environmental practices such as energy and water conservation, sustainable transportation, water reduction and recycling, and sustainable agriculture. These financial incentives could be bonuses, cash prices, honors awards or special recognition. (Audu et al. 2023). Shrivastava and Nandkeolyar (2022) stated that manufacturing firms are increasingly adopting performance-based incentives to motivate employees to contribute to environmental sustainability. These incentives may include bonuses, profit-sharing, or other rewards tied to individual or team performance in achieving green targets. This trend reflects the growing recognition of the importance of sustainability in overall organizational success. By aligning rewards and compensation with green objectives, manufacturing firms can enhance employee motivation, attract top talent, drive innovation, and improve overall performance.

Green performance appraisal refers to conducting the appraisal process in a manner that does not harm the environmental and promotes sustainability, such as paperless appraisal process, virtual meetings, digital documentation and energy-efficient technology (Pham et al., 2019). Manufacturing firms are increasingly integrating sustainability metrics into their performance appraisal systems. This involves defining specific Key Performance Indicators (KPIs) related to environmental performance, such as energy efficiency, waste

reduction, or carbon footprint. By incorporating these metrics, organizations can objectively assess and reward employees for their environmental contributions (Fathia et al. 2021).

Organizational performance refers to the extent to which an organization achieves its strategic objectives and fulfills its mission, taking into account multiple dimensions of performance, including financial, operational, and stakeholder perspectives (Hamza, & El Baradie, 2021). Meanwhile, David and David (2020) viewed it as the ability of an organization to achieve and sustain a competitive advantage over its rivals, resulting in superior financial and non-financial outcomes. According to Gunasekaran et al. (2022) Performance in the context of manufacturing firms encompasses various dimensions, including operational efficiency, financial outcomes, and environmental performance. Effective implementation of green reward systems and green performance appraisals can potentially lead to improved environmental performance through reduced waste, energy consumption, and emissions. Better compliance with environmental regulations and standards.

In Nigeria, the manufacturing sector faces unique challenges such as infrastructural deficits, regulatory inconsistencies, and resource constraints (Enyoghasi, & Badurdeen, 2021). However, there is also a growing recognition of the importance of sustainability, driven by global trends and local environmental issues. The integration of green reward systems and green performance appraisals in Nigerian manufacturing firms could be instrumental in driving the sector towards more sustainable practices. Therefore, it is imperative to investigate how the implementation of green reward systems and green performance appraisals influences the overall performance of manufacturing firms in Abuja, Nigeria.

Green Human Resource Management (GHRM) practices, specifically green reward systems and green performance appraisals, have emerged as potential strategies to enhance both environmental and organizational performance. These practices aim to incentivize employees to engage in sustainable behaviors and align their performance with the organization's environmental goals. The manufacturing sector in Abuja, Nigeria, plays a critical role in the region's economic development but faces significant challenges, including infrastructural deficits, regulatory inconsistencies, and resource constraints. These challenges are compounded by the sector's substantial environmental footprint, characterized by high levels of waste, energy consumption, and emissions. Despite the growing global and local emphasis on sustainability, there is limited adoption of environmentally friendly practices within these firms. Therefore, it is imperative to investigate how the implementation of green reward systems and green performance appraisals influences the overall performance of selected manufacturing firms in Abuja, Nigeria.

The following null hypotheses were formulated to guide this study.
Ho1: Green reward has no significant effect on the performance of selected manufacturing firms in Abuja, Nigeria.
Ho2: Green performance appraisal has no significant effect on the performance of selected manufacturing firms in Abuja, Nigeria.

LITERATURE REVIEW
Green Reward
According to Mandago (2019) green reward is the compensation package adapted to reward individual employees with a spectrum of green skills and environmental sustainability achievements. The green reward can take in form of monetary (green travel benefits, green tax) and non-monastery (green recognition) rewards (Chaudhary, 2019). The green monetary rewards can be in form of financial compensation such as salary increments, paid vacations, bonuses, special discounts on certain items purchased for engaging in green behaviours (Tang et al., 2018). The non-monetary rewards usually take the form of wide publicity, public praise, and appreciation of green efforts by top management as well as special recognition, awards and promotions for those employees encouraging and upholding green behaviour (Rawashdeh, 2018). The practice of rewarding green behaviour toward environmentally sustainable performance can encourage employees to be green-conscious even outside their workplace. It can condition the meta-cognitive of

employees to develop a habit of recycling, saving energy and using fewer polluting vehicles, energy, and appliances (Saeed et al., 2019).

Lepak and Snell (2019) viewed green reward as the strategies and practices used by organizations to align environmental goals with employee rewards. It involves the design and implementation of performance-based incentives, such as profit-sharing, stock options, and career advancement opportunities, to motivate employees to engage in sustainable behaviors. Additionally, Sarkis and Zhu (2018) opined that green reward comprises the mechanisms and practices employed by organizations to incentivize and compensate employees for their involvement in environmental management.

Green Performance Appraisal

Pavitra (2017) defined green performance appraisal is an assessment of employee performance on how well they are making progress towards a green environment. It also covers the rating of employees based on green skills acquired and pro-environmental behaviours that impact positively on the environment (Fawehinmi et al., 2020). The green behaviours usually evaluate and rewarded in the course of green performance appraisal are those direct to sustaining and conserving the environment through reusing, recycling, repurposing and reducing the use of raw materials as well as conservation of energy (Iqbal, et al.,2018).

According to Darnall (2010) green performance appraisal involves evaluating employees based on their contribution to environmental sustainability, integrating these criteria into existing appraisal systems, it is a systematic process of assessing and evaluating employee performance related to their environmental responsibilities and contributions (Asif & Huysman, 2020). Also, Klassen and McLaughlin (2016) further stated that green performance appraisal refers to the assessment of employees' contributions to environmental sustainability goals and objectives, including their efforts in reducing resource consumption, waste generation, and carbon emissions within the organization.

Organizational Performance

Organizational performance measures an organization's capacity to meet the needs of its stakeholders and stay afloat in the market (George et al., 2019). It is the result of the actions or activities carried out by members of an organization to determine how successfully the group has achieved its goals (Lee et al., 2022). Performance is the outcome of work because they provide the strongest linkage to the strategic goals of the organization, customer satisfaction, and economic contributions. Performance plays a major role to companies in order to succeed in the competitive business field nowadays and because of that constitutes an important of the studies' interests (Cheese, 2020). In addition, it is a term used to refer to how an enterprise is doing in terms of level of profit, market share and product quality in relation to other enterprises in the same industry, Consequently, organizational performance is a reflection of productivity of members of an enterprise measured in terms of revenue, profit, growth, development and expansion of an organization (Saasongu, 2015).

According to Abubakar et al. (2019) organizational performance alludes to the realization as well as accomplishment of organizational objectives or grails. The organization must have or set measurable objectives in order to measure its performance level. The ways of assessing organizational performance entails monetary benefits, profitability as well as successful implementation of organizational strategies advantage. Moujib et al. (2011) related performance to the level of firm's output, optimum use of resources in efficient and effective way. Organizational efficiency and effectiveness can be measured through both financial and non-financial criteria. Financial performance measures comprise; revenue, level of profit and costs. Non-financial performance measurement consists of learning and innovation, customer satisfaction, market share, goods or service quality, new service or product initiatives, flexibility, and products and services delivery (Hanaysha & Mehmood, 2022).

Empirical Review
Green Reward and Organizational Performance
In Pakistan, Malka et al. (2024) examined the effect of green reward system on environmental performance of banking sector employees. The banking sector employees in Pakistan were selected to collect responses. For sampling, a random sampling technique was used and a sample of 360 bank employees was collected. For this study, the questionnaire survey technique was used in which online and self -administered responses were collected. PLS-SEM was used to find the statistical results. The study finds a positive significant impact of reward system on employee environmental performance. This study was carried out in a different economy and different sector, hence the need for this study in the Nigerian context, specifically the selected manufacturing firms in Abuja.

Magaret and Hadir (2023) looked at how reward system impacted performance at Federal Tertiary Institutions in Ogun State, Nigeria. Survey research design was used. A sample size of 303 was taken from the 1441 academic staff members of the Federal Tertiary Institutions in Ogun State, Nigeria, who make up the study's population. Purposive selection technique was utilized to choose the sample. Primary source data for the study were gathered. Component factor analysis and Cronbach Alpha statistics were used to examine the psychometric properties (validity and reliability) of the instrument. The study utilised SPSS software version 26, and developed multiple linear regression to assess the descriptive and inferential statistics of the study's data. Based on the findings, the study concluded that there is a significant positive correlation between green compensation and reward system on employee performance. This study employed multiple linear regression to assess the data, whereas the current study used a distinct analytical tool namely partial least square structure equation modeling.

Eniola et al. (2023) studied the effect of green reward system on performance of banks in South-West geopolitical area of Nigeria. The study adopted quasi-experimental survey research design by looking at the managerial staff of those banks as our population of which we used 330 for the sample. The study tested hypotheses with SEM-AMOS after retrieving those questionnaires administered through simple random sampling method. The study discovered that reward system has a positive significant effect on organizational performance in Nigeria South-West deposit money banks. This study was conducted in South-West geopolitical area of Nigeria within a different sector, which means that its findings may not be directly applicable or effective for making decisions in the study area of Abuja therefore, the call for this current research.

Green Performance Appraisal and Organizational Performance
Ekwochi et al. (2023) examined the effect of performance appraisal on performance of registered hospitality firms in Enugu state, Nigeria. The research method adopted by the study was the survey research method. The sources of data used were primary and secondary sources of data. The population of the study was 512 while the sample size of 225 was determined using the Taro Yamane's formula. The major instrument of data collection was the questionnaire. The data collected were represented in tables using tables, frequencies and percentages. The hypothesis was tested using the t-test statistical tool. The study found out that green performance appraisal has a significant effect on the performance of registered hospitality firms in Enugu State. This study focuses on hospitality firms in Enugu state while the current study focused on manufacturing firms in Abuja Nigeria.

Iyoha et al. (2023) studied the impact of green performance appraisal and how it affects business educators' job motivation in public universities in Delta State. The research design for the study was correlational survey. 58 lecturers in business education at public universities in Delta State made up the study's population. The complete population was used; hence there was no selection or sampling method. A structured questionnaire with questions based on the research questions was the instrument for collecting the data. While Pearson Product Moment Correlation Coefficient was employed for the hypotheses. The findings show that there is a positive significant impact of green performance appraisal on performance of business educators in public institutions in Delta state. The study uses a relatively small sample of 58 lecturers from

a specific academic discipline in one state. This homogeneity may limit the diversity of perspectives and experiences, impacting the broader applicability of the results.

In Pakistan, Yen-Ku et al. (2023) studied the effect of green performance appraisal on environmental performance, the study was Grounded in social learning theory and recourse-based view theory, this study explores environmental performance and its impact on employees and industry outcomes. Drawing on a cross-sectional online survey of 500 full-time employees working in the chemical industry in Lahore, Pakistan. The results revealed a significant positive influence of green performance appraisal on performance. The results may be influenced by the specific cultural and contextual factors present in Lahore, Pakistan, and may not be entirely applicable to Nigeria different cultural settings hence the need for the current study.

Resource-Based Theory (RBV)
This study was anchored on the Resource-Based Theory (RBV) was propounded by Wernerfelt, (1984) According to the Resource-Based Theory, specialized and non-replicable resources create the potential for heterogeneity, which leads to competitive advantage (Wernerfelt, 1984). As a result, business strategy, as well as environmental strategy, is dependent on specific organizational skills, as well as a company's capacity to put them to regular productive use and preserve them over time (Wernerfelt, 1984). When it comes to the environment, an organization's core environmental capabilities, such as pollution control, are a function of its internal environmental competency (Hart, 1995). The ability to maintain these skills is contingent on a company's ability to continuously enhance its internal operations (Russo & Fouts, 1997; Sharma & Vredenburg, 1998) and invest in people rather than capital (Hart, 1995).

Environmental plans that are implemented without these fundamental competencies are less likely to achieve their strategic objectives (Christmann, 2000). As a result, the outcomes of green HRM at the employee level (employee green attitude, employee green competence, and employee green behaviour) were highlighted in this evaluation in order to improve the organization's overall outcome (environmental performance). Therefore, according to the resource based perspective from an internal standpoint, the green outcomes of the workforce are crucial. As a result, from an internal perspective, this review supports the concept of green HRM outcomes in light of resource-based theory.

This study is supported the theory because it provides a valuable framework for understanding how green HR practices can contribute to performance in manufacturing firms. By focusing on developing valuable, rare, inimitable, and sustainable resources, companies can empower their workforce to drive environmental sustainability while potentially enhancing performance.

METHODOLOGY
This study adopted the survey research design; the population of this study comprises eight hundred and thirty-seven (837) employees of the selected manufacturing firms in Abuja, Nigeria. The study selected eleven (11) manufacturing firms operating in Abuja and the justification for the selection is based on they are registered with Corporate Affairs Commission (CAC), also Manufacturers Association of Nigeria (MAN), they all have employee's strength of more than 50, and have been in operations for more than ten years, also the selected firms were practicing green human resource management practice. These justifications include well established manufacturing firms to enable the researcher arrived at a reliable result. Below is a table showing distribution of manufacturing firms and number of employees.

Distribution of Employees' Population of various Manufacturing firms

S/N	Manufacturing Firms	Employees
1	Afi-fruits Limited	67
2	BFA Foods	55
3	Borno Aluminium Co Limited	97
4	Dangata Industries LTD	102
5	Ginapat Aluminium Products Limited	57
6	Lion Steel Group	75

7	Nochiz Food Limited	76
8	Nadina Ind Limited	83
9	Saclux Paint Limited	65
10	Topper Metal Parts Manufacturing Company Limited	84
11	Zuma Paints & Chemical Company Limited	76
	TOTAL	**837**

Source: Human Resources Department of various Manufacturing Firms (2024)

The minimum sample size for this study was ascertained using the following formula proposed by Taro Yamane for statistically attaining sample size from a given population (Yamane, 1967), which is 837 for this study. Calculations were made at 5% significance level as follows:

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{837}{1 + 837\,(0.05)^2}$$

n = 271

Thus; a minimum sample size of two hundred and seventy-one (271) was required for the study, For the purpose of anticipated non-response bias and non-return of questionnaire, the sample size was increased by 10% which was added to the minimum sample size given by the formula making it two hundred and ninety-eight (298) as the sample size that was used for this study. This takes take care of other unavoidable errors such as incorrect filling and failure of some respondents to return the questionnaire (Israel, 2013).

Simple random sampling technique was use to selected the respondent, since the study intends to ensure some randomness and representativeness in the sample. Data for the study was drawn primarily by the use of a structured questionnaire, the questions were adapted from various studies to suite the objectives of this study, and it was collected through the use of five-point likert scale questionnaire ranging from (Strongly agree = 5, A= Agree = 4, Undecided = 3, Disagree= 4 to Strongly Disagree = 1) as the research instrument. Partial least squares Structural equation model (PLS-SEM) was used to measure the relationship between the independent variable and the dependent variable, the model is represented as thus:
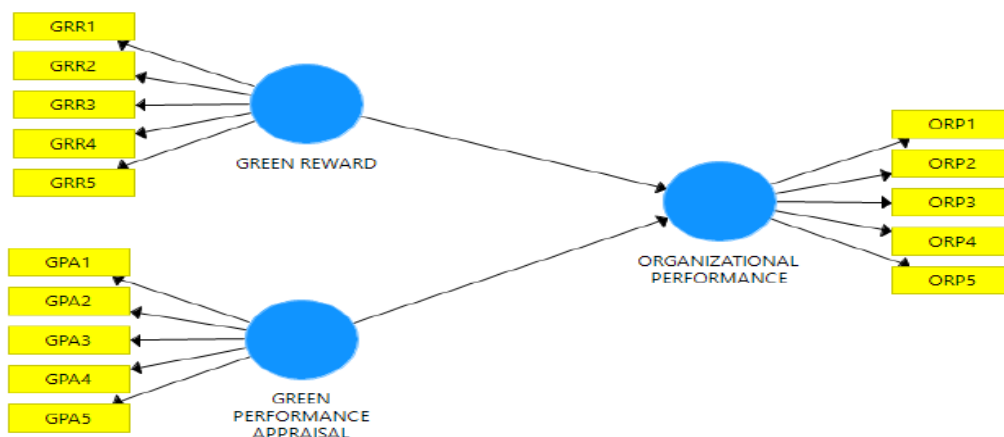

Figure 1: Theoretical model on the Effect of Green Human Resource Management Practices on the Performance of Selected Manufacturing Firms in Abuja, Nigeria

RESULT AND DISCUSSIONS

The study administered 298 copies of questionnaire to employees of selected Manufacturing Firms in Abuja out of which 278 were filled and return correctly representing a response rate of 93%. Preliminary check for missing values, outliers and bias test was conducted and the result show there is no missing values, outliers and bias responses.

The Measurement Model

In assessing the measurement model, the outer loadings are assessed first, and as a rule loadings above 0.70 are accepted as they indicate the construct explains more than 50% of the indicators variance, thus providing acceptable item reliability (Hair et al 2019).
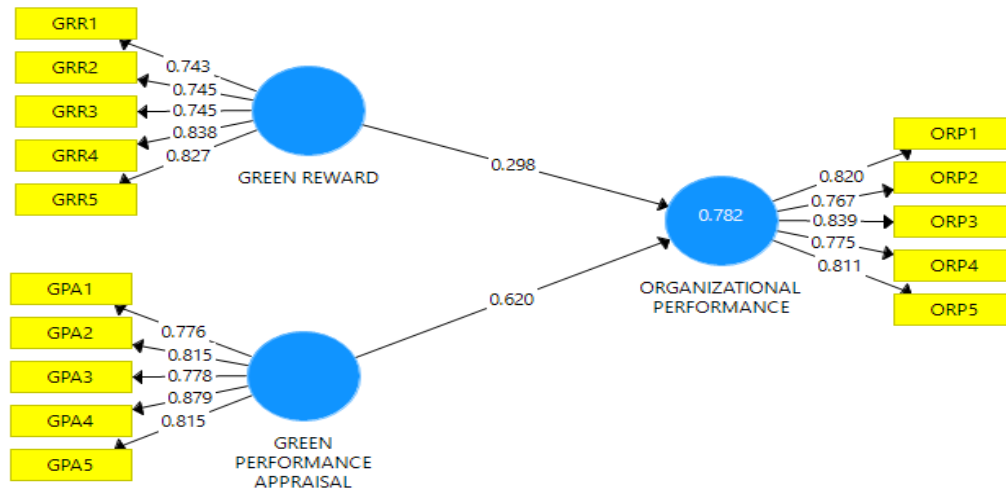

Figure 2: Indicator Outer Loadings

Table 2: Reliability of Study Scale

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Green performance appraisal	0.872	0.877	0.907	0.662
Green Reward	0.839	0.848	0.886	0.610
Organizational Performance	0.862	0.864	0.901	0.645

Source: SmartPLS Output 2024

The table 2 presents the reliability metrics for three constructs in the study: Green Performance Appraisal, Green Reward, and Organizational Performance. Each construct demonstrates strong internal consistency, with Cronbach's Alpha values ranging from 0.839 to 0.872, indicating high reliability. The rho_A values, which are similar to Cronbach's Alpha, further confirm the reliability of the constructs. Composite Reliability scores are all above 0.86, suggesting that the constructs are measured consistently across different items. Additionally, the Average Variance Extracted (AVE) values are all above the 0.50 threshold, ranging from 0.610 to 0.662, indicating that a substantial amount of variance in the items is explained by the constructs. These metrics collectively suggest that the study scales are both reliable and valid.

Table 3: Heterotrait-Monotrait Ratio (HTMT)

	Green Performance Appraisal	Green Reward	Organizational Performance
Green Performance Appraisal			
Green Reward	**0.442**		
Organizational Performance	**0.632**	**0.578**	

Source: SmartPLS Output 2024

Table 3 present the Heterotrait-Monotrait Ratio (HTMT) values for the relationships between three constructs: Green Performance Appraisal, Green Reward, and Organizational Performance. The HTMT value between Green Performance Appraisal and Green Reward is 0.442, indicating a moderate relationship.

The HTMT value between Green Performance Appraisal and Organizational Performance is higher at 0.632, suggesting a stronger relationship between these two constructs. Lastly, the HTMT value between Green Reward and Organizational Performance is 0.578, also indicating a moderate relationship. All HTMT values are below the commonly accepted threshold of 0.85, suggesting good discriminant validity among the constructs, meaning that they are distinct and measure different concepts.

The Structural Model
In assessing the structural model, the standard assessment criteria was consider which include the path coefficient, t-values, p-values and coefficient of determination(R^2), the bootstrapping procedure was conducted using a resample of 5000
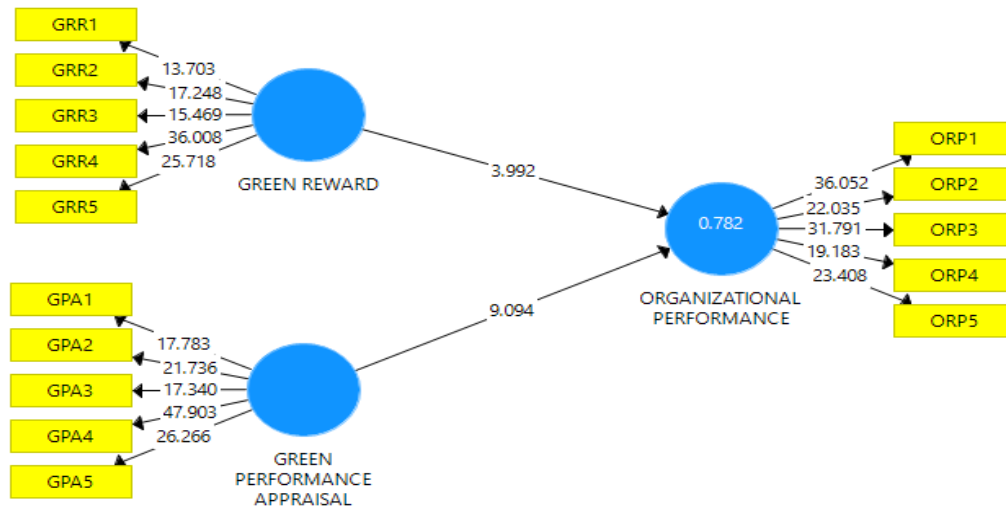

Figure 3: Path coefficient of the regression model

Table 4: R^2 Summary

	R Square	R Square Adjusted
Organizational Performance	0.782	0.780

Source: SmartPLS Output 2024

The R-square value stood at 0.782 indicating that the variation in organizational performance is explain by green human resource dimensions of green training and development, green recruitment and selection to the degree of 78%, the remaining 22% variation could be explained by other factors. The result of the path coefficient is presented in the table below:

Table 5: Path Coefficient

	Path coefficient Beta**	T Statistics	P Values	Decision
GREEN PERFORMANCE APPRAISAL -> ORGANIZATIONAL PERFORMANCE	0.620	9.094	**0.000**	Rejected
GREEN REWARD -> ORGANIZATIONAL PERFORMANCE	0.298	3.992	**0.000**	Rejected

Source: SmartPLS Output 2024

Test of Hypotheses
Table 5 presents the path coefficients, T-values, and P-values for the relationships between green reward and Organizational Performance, and green performance appraisal and Organizational Performance

Ho1: Green reward has no significant effect on the performance of selected manufacturing firms in Abuja, Nigeria.

The path coefficient for the relationship between Green Reward and Organizational Performance is 0.298, with a T-statistic of 3.992 and a p-value of 0.000. These results indicate a statistically significant positive effect of Green Reward on Organizational Performance. Since the p-value is less than the conventional threshold of 0.05, the null hypothesis (Ho1) was rejected. This finding suggests that Green Reward practices significantly contribute to improving the performance of manufacturing firms in Abuja, Nigeria.

Ho2: Green performance appraisal has no significant effect on the performance of selected manufacturing firms in Abuja, Nigeria.

The path coefficient for the relationship between Green Performance Appraisal and Organizational Performance is 0.620, with a T-statistic of 9.094 and a p-value of 0.000. These results demonstrate a statistically significant and strong positive effect of Green Performance Appraisal on Organizational Performance. Given the p-value is also below 0.05, the null hypothesis (Ho2) is also rejected. This indicates that Green Performance Appraisal practices have a significant impact on enhancing the performance of the manufacturing firms in Abuja, Nigeria.

CONCLUSION AND RECOMMENDATIONS

The study comprehensively examined the impact of Green Reward and Green Performance Appraisal on the organizational performance of selected manufacturing firms in Abuja, Nigeria. The results demonstrate that both green initiatives significantly enhance organizational performance, with Green Performance Appraisal showing a more pronounced effect. This indicates that when employees are evaluated and rewarded based on their contributions to environmental sustainability, their performance, and consequently the performance of the organization, improves. The significant positive relationships suggest that integrating green practices into performance management systems not only fosters a culture of sustainability but also drives better organizational outcomes. These findings highlight the critical role of sustainable HR practices in enhancing overall organizational performance, underscoring the need for manufacturing firms to adopt and strengthen their green reward and appraisal systems to achieve long-term success and environmental stewardship. Based on the study's findings, it is recommended:

i. That manufacturing firms in Abuja should develop robust Green Reward programs that incentivize sustainable practices among employees. Such programs could include monetary rewards, recognition programs, and career advancement opportunities for employees who demonstrate exceptional commitment to green initiatives. By fostering a culture of sustainability through these reward systems, manufacturing firms can drive continuous improvement in environmental performance, which in turn can lead to better organizational outcomes and a stronger competitive advantage in the market

ii. Additionally, manufacturing firms in Abuja should prioritize the implementation of comprehensive Green Performance Appraisal systems. These systems should include regular evaluations that incorporate environmental criteria, thereby ensuring that employees are recognized and rewarded for their contributions to sustainability. By aligning performance appraisals with green objectives, firms can not only improve their environmental footprint but also boost overall organizational performance through enhanced employee engagement and motivation.

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Appendix: Research Questionnaire

Please rate your level of agreement with the following statements 5 = Strongly Agree, 4 = Agree, 3 = Fairly Agree, 2 = Disagree, 1 = Strongly Disagree.

S/N	Statements	Agreement scale				
	Green Reward (GRR)	5	4	3	2	1
1	Employee who champions environmental issues get paid time off					
2	There are numerous green rewards and benefit given in the organization					
3	There are bonuses to employees who completes environmental assignments					
4	There is offering gift to staff members considered environmental champions					
5	The green rewards and compensation provided by the organization make me feel valued for my efforts towards environmental sustainability					
	Green Performance Appraisal (GPA)	5	4	3	2	1
1	The green performance appraisal system at my firm is fair and transparent					
2	Green appraisal process is well communicated to employees					
3	The appraisal process is providing to rewards employees who are environmentally conscious					
4	The firm adopts different green appraisal method to improve environmentally friendly practices					
5	The appraisal system is designed to motivate employees towards environmental sustainability					
	Organizational Performance (ORP)	5	4	3	2	1
1	The organization has clear environmental sustainability goals and target					
2	There is an increase in the return on investment (ROI) in the organization					
3	This organization regularly meets its productivity goals					
4	The firm consistently meets its financial targets and goals					
5	The organization encourage employees to adopt environmentally friendly practices					