

Moderating Role Of Environmental Management Adoption On The Relationship Between Green Innovation And SMES Performance In Kano State Nigeria.

By

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ABSTRACT

The study examined the moderating role of environmental management adoption on the relationship between green innovation (green product innovation, green process innovation, green management innovation) and SMEs performance in Kano state, Nigeria. The study adopting quantitative research design and a sample of 220 SMEs registered with Kano State Chamber of Commerce, Industry, Mines and Agriculture [KACCIMA]. The result shows that the proxy of independent variable green product innovation (GPdI) has no significant effect on the performance of sampled SMEs. It is also found that green process innovation (GPcI) has no significant effect on performance of sampled SMEs, the result indicated that green management innovation (GMI) has a positive significant effect on performance of sampled SMEs. The finding also revealed that moderating variable (environmental management adoption) has a strong positive significant effect on performance of sampled SMEs. It was found that environmental management adoption moderate the relationship between green innovation and SMEs performance. Therefore, it is recommended that SMEs managers should consider adopting and implementing effective environmental management policies in their production and operation processes.

Keywords: SMEs Performance, Green Innovation, Environmental Management Adoption

1.0 Introduction

Sustainable development of developing countries like Nigeria largely depends on the performance of their indigenous micro, small and medium scale enterprises (Suleiman, Aliyu & Bello, 2021) and are also generally considered as the engine of economic growth as a result of their immense contribution towards employment generation, poverty reduction, export earnings and gross domestic product (Suleiman, Aliyu & Bello, 2021).

Small and medium scale enterprises (SMEs) play a vital role in national economies around the world and account for about 90% of enterprises, contributing to 60% of employment and half of GDP worldwide (Abubakar, et al., 2023). According to Tradeup (2021), SMEs make up 34% of U.S. export revenue, employ over 50% of private sector workers, and

represent 99 percent of all US businesses. According to Tahir, Razak, and Rentah (2018) and Hoffman (2017), small and medium-sized enterprises (SMEs) make up 99.2% and 97% of all businesses in Malaysia and China respectively. Moreover, SMEs contribute 32% and 58% of the GDP, 19% and 68% of all exports of these countries. In Peru, SMEs generating 62.6% of total employment (Ministerio de la Producción, 2021). In the case of Colombia, they generate 79.1% of total employment (Heredia Zurita & Dini, 2021; Ministerio, de Comercio, et al., 2022). In Nigeria, SMEs contribute around 48% to the nation's GDP and generating employment to more than 60million individual (NBS 2019). It is clear that SMEs play a crucial role in employment creation, poverty alleviation, and economic growth of any country (Abubakar, et al., 2023). As a result, in recent

decades, numerous nations have placed an emphasis on the growth of SMEs in order to accelerate economic growth (Imran & Aldaas, 2020). They are the economic lifeblood of communities that help fight poverty, create decent jobs, foster entrepreneurship for women, youth and vulnerable groups, safeguard livelihoods and economic growth. All these efforts and achievements of SMEs contribute to the achievement of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) (Abubakar, et al., 2023). However, despite the contribution of SMEs to economic growth of many countries they have been negatively affected by the series of events that have disrupted economies, from the climate catastrophe, the COVID-19 pandemic, and the war in Ukraine (Department of Economic and Social Affairs, 2022; Guterres, 2022; International Council for Small Business, 2022). Furthermore, during the last decades these SMEs obtained the lowest productivity results if compared to other similar developing economies, resulting a GDP of 0.46% in 2000 and 0.88% in 2010–2019 (Paus & Robinson, 2022). The COVID-19 outbreak had an unprecedented impact on the fall of 6.8% of GDP in 2020, a decrease in the value of exportations to 13%, and more than 2.7 million companies that permanently closed their activities, generating an unemployment crisis in Latin America (Economic Commission for Latin America and the Caribbean, 2021). This situation is consequence of the high dependence on international production and its weak regional integration, highlighting the need to determine the capacity of companies to address technological gaps, foster collaborations, generate alliances, create regional value chains that help develop and consolidate scientific and technological

capabilities (Abubakar, et al., 2023). Overcoming these issues would strengthen competitiveness, create high quality employment, and generate a dissemination of new science and technologies that enable SMEs of proposing innovations in products and processes at higher standards (Economic Commission for Latin America and the Caribbean, 2021; OECD et al., 2021).

In spite of their commitment in Nigeria, the latest information shows that around 20% of SMEs bomb in their most memorable year, and half of private companies flop in their fifth year (Abubakar, et al., 2023). This is seen in the drop on their contribution to Nigeria's economy from 50% contribution to GDP in 2021 to 43.3 % in the last quarter of 2022. In addition, a good number of SMEs have remained stagnant in terms of growth, despite the availability of accessible credit which could be used for expansion. With the increasing and rapid change in the external environment in which these SMEs operate, as well as unfavorable macroeconomic indices, it becomes pertinent for SMEs to review their internal activities with a view to creating a shield against negative effects of these externalities. Management systems are to blame for these failures; failure to establish and communicate company goals, lack of financial planning and review, and a lack of vision, purpose, or principles (Onehi, et al., 2017). The sector has continued to witness dwindling performance. Moreover, identifying the inevitable role of green innovation (GI) (i.e. process, product and management) has encouraged businesses to integrate green measures into their business strategies. In recent years, scholars have realised the value of the inclusion of GI in a company's business strategy. Sustainable thinking widely leverages this strategic

integration to uplift the GI paradigm, combating the progressing environmental vulnerabilities (Wang et al., 2022). The GI approach has enhanced firms' strategic vision towards achieving sustainability (Khan & Johl, 2020). Today, the GI strategy has made organisations realise the growing importance of sustainable performance. As a result, the literature shows that the GI strategy has become a sustainable goal of today's organisations, without which it is hard for them to survive (Wang et al., 2022). Meanwhile, over the years, progressing industrialisation has forced humans to face the severe effect of environmental degradation, which is weakening the world's socio-economic prosperity (Li, et al., 2023). The building ecological burden has caused the earth's biodiversity to experience unprecedented consequences. In particular, today, the dual environmental impact on social and commercial lives has elevated the need to find the solution to the developing socio-ecological problems (Awan et al., 2021; Sarfraz et al., 2020). This accelerating environmental pressure has strongly impacted the world's social foundations, with firms' sustainability having a significant role in combating the emerging ecological challenges (Bombiak et al., 2018). Unsurprisingly, increasing environmental degradation has challenged the world's major industries as they face severe environmental consequences. The ecological decline becoming a global phenomenon has made stakeholders respond to the increasing climatic vulnerability through a sustainable model (Jakhar et al., 2020). In recent years, natural environment protection has received attention internationally. Given the application of environmental measures, regulations have forced firms to protect the natural environment by adopting

sustainable innovation (Naseem et al., 2021; Vallaster et al., 2019). However, the result from previous studies showed inconsistency on the relationship between green innovation and firm performance, for instance Li et al., (2023); Zhang et al. (2019); etc. shows positive relationship. While, Pemayun1, (2016); etc. indicates negative relationship. Fitriani (2015); no significant relationship. Many previous literatures tried to moderate the relationship (i.e. Li, et al., 2023 introduce employee green behavior as moderating variable), but still none of these studies introduce environmental management adoption to moderate the relationship between green innovation and performance. Meanwhile, SMEs in Nigerian context were selected because their contribution to the economic development, poverty alleviation and largest waste producer industry. This study presents a rich body of literature concerning GI practices and firms' sustainable performance. It is a unique contribution to the growing GI literature that incorporates the moderating roles of environmental management adoption on green constructs (i.e. green product innovation, green process innovation and green management innovation) influencing the SMEs' sustainable performance. Previously, studies have illustrated that the manufacturing sector (SMEs included) is the largest waste producer industry, with a drastic negative impact on the world's ecosystem (Li et al., 2023; Mathiyazhagan et al., 2021). Therefore, to balance the rising issue of environmental pollution, this industry requires companies to adopt GI practices to achieve sustainable performance. Hence, in this regard, this study offers an all-purpose innovation model to investigate the GI approaches implemented in the manufacturing industry (i.e. SMEs). This study

includes the potential drivers that help SMEs combat the increasing environmental degradation. Following the resource-based theory, this study presents a pioneering conceptual framework that guides researchers and managers to understand the notion of GI and sustainable performance. The study suggests that managers, employees, researchers, policymakers, and scholars view the study findings as a critical way of boosting firms' sustainable performance. Moreover, the current study findings present significant evidence for incorporating GI strategies as a subsidiary to achieve sustainable performance.

1.1 Research Objectives

- i. To examine the relationship between green product innovation and SMEs performance in Kano state, Nigeria.
- ii. To examine the relationship between green process innovation and SMEs performance in Kano state, Nigeria.
- iii. To examine the relationship between green management innovation and SMEs performance in Kano state, Nigeria.
- iv. To examine the relationship between environmental management adaptation and SMEs performance in Kano state, Nigeria.
- v. To examine the moderating effect of environmental management adaptation on the relationship between green product innovation and SMEs performance in Kano state, Nigeria.
- vi. To examine the moderating effect of environmental management adaptation on the relationship between green process innovation and SMEs performance in Kano state, Nigeria.
- vii. To examine the moderating effect of environmental management adaptation on the relationship

between green management innovation and SMEs performance in Kano state, Nigeria.

2.1 Literature Review

2.1.1 SMEs Performance

As per the World Bank (2013), SMEs are characterized in light of the size of the endeavor with regards to the complete number of workers as well as all out resources esteem. According to Stork and Esselaar (2006), various African nations provide various definitions of SMEs. Small and medium-sized enterprises (SMEs) in Ghana refer to businesses with no more than six to ninety employees and no more than 2.5 billion Ghana Cedi in fixed assets (excluding land and buildings). In South Africa, SMEs are characterized as unmistakable and separate business elements, including helpful endeavors and non-legislative associations that are independent by a solitary proprietor or more which incorporates its branches or auxiliaries, if any. Small and medium-sized enterprises (SMEs) in Cameroon are those with a turnover value of at least 1 billion Cameroon Francs (CFA), accrued investments of no more than 500 million CFA, short-term credit of no more than 200 million CFA, at least 5 percent ownership of the capital, and Cameroonian managers. In Nigeria, SMEs are characterized as firms that utilize less than 200 representatives and have under 500 million Naira (N) worth of complete resources, barring area and building (SMEDAN, 2012). In particular, the term "small enterprise" refers to SMEs with fewer than 50 employees and assets totaling between N5 million and N50 million, excluding land and buildings. The term "medium enterprise" refers to businesses that have between 50 and 199 employees and assets of between N50 million and N500 million, excluding land and buildings. As a result, SMEs are defined as businesses with fewer than 200 employees and assets

totaling between N5 million and N50 million, excluding land and buildings in this research.

2.1.2 Green Innovation (GI)

Literatures on Green Innovation (GI) are commonly divided into two types. The first describes GI as a firm's abilities (Gluch, Gustafsson, & Thuvander 2009), whereas the second defines GI as an organization's environmental practices (Lin & Ho, 2008; Ho, Lin, & Chiang, 2009). According to Marchi, (2012) green innovation is also known as eco-innovation or environmental innovation in the literature, is defined as "new or improved techniques, procedures, systems, and products to limit or avoid the use of harmful substances that would cause damage to the environment. When it comes to organizational practices, GI is described as "the software or hardware innovation related to green processes, managements or products" (Song & Yu, 2018); it is proposed that GI comprises management practices and technological advancements that expand the environmental and organizational performance (OP) and provide a competitive edge to the company (Rennings, 2000). Other researchers recommend that GI consists of altered systems or unique, products, processes, and practices that provide an advantage to the environment and subsidize firms' sustainability (Xie, Huo, & Zou, 2019).

2.1.3 Environmental Management Adoption

EMA is "that aspect of an organization's overall management structure that addresses the immediate and long-term impact of its products, services, and processes on the environment" (Low, 2015). It begins fragmented with formation of the British Standard 7750 (BS7750) by the UK and later the Eco-management and Audit System (EMAS) developed by the European Commission (EC) to provide a

standard that could be accepted internationally (Ritchie & Hayes, 1998). However, both of these standards failed the test of harmonizing industries differences in environmental management; as well as providing an effective tool for managers to protect their organizations against potential negative impact on trade and commerce while achieving their environmental objectives (Ritchie & Hayes, 1998). These shortcomings must be address in order to induce organizations to manage their environment responsibly. Hence, the Strategic Advisory Group on the Environment (SAGE) was established by the International Standard of Organization (ISO) to make recommendations for an international environmental standard in 1991. The net result; after much deliberation and difficult international consensual process based on industry experience with EMSs; is the introduction of the ISO 14000 series in 1993, with the dual aims of helping organizations globally to become environmental friendly and sustainable (ISO, 2005).

2.2 Hypothesis Development

2.2.1 Green Innovation and SMEs Performance

Previous studies shows mixed results on the relationship between green innovation and SMEs performanace for instance the results of Helmi, and Widiastuty, (2023); Nsiah et al., (2022); Novitasari and Agustia (2022); Maya, and Tarigan, (2022); Wang et al., (2021); Chandra, Arafah, and Basri, (2021); Asadi, et al., (2020); Zhang et al., (2020a); Zhang et al., (2020b); Zhang et al. (2019); Xie et al., (2019); Tang et al. (2018); Ma et al., (2018); Zhang and Walton (2017); Tang et al., (2017); Ar (2012) indicated that green innovation have positive significance effect on organizational performance. Meanwhile, Jayaraman, et al., (2023); Osei (2022); Pandithasekara, (2022); Wang, et al., (2022);

Chandra, et al., (2021); Berrone et al., (2017); Pemayunl, (2016); Küçükoğlu and Pınar (2015) indicated that green innovation have negative significance effect on organizational performance. Study of Fitriani (2015) shows that there is no significant relationship between green innovation and SMEs performance. However, several attempt have been made to moderate the relationship i.e. Wang, et al., (2022); Alhadid, et al., (2014) moderate the relationship between different independent variables and firm performance but none of these studies used or proposed environment cost as moderating variable. Therefore, the following hypotheses are formulated;

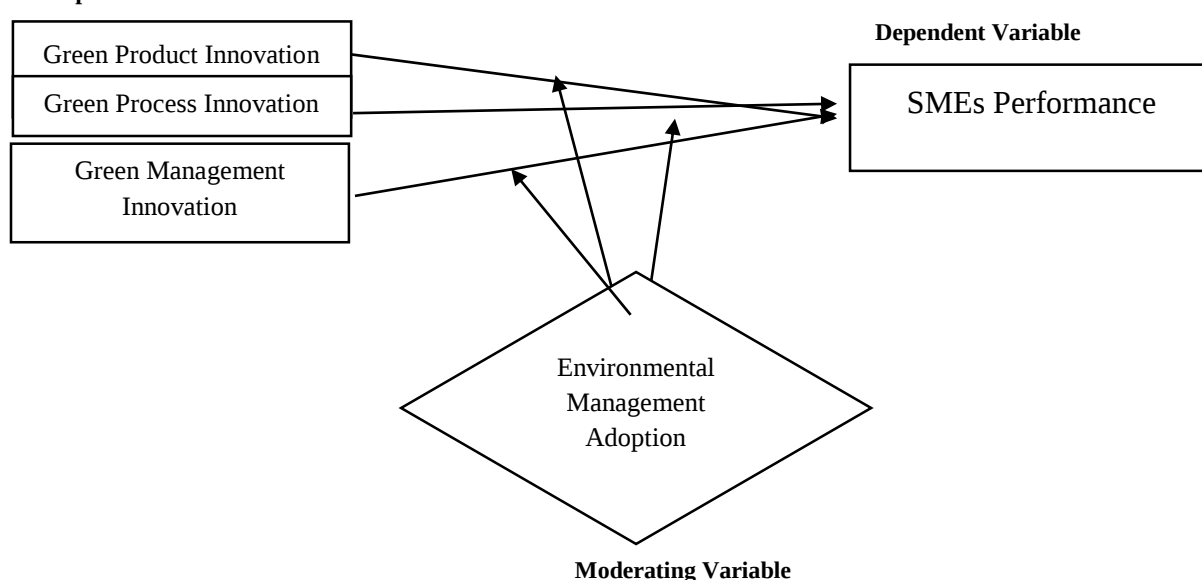
H1: There is significance relationship between green product innovation and SMEs performance in Kano state, Nigeria.

H2: There is significance relationship between green product innovation and SMEs performance in Kano state, Nigeria.

H3: There is significance relationship between green product innovation and SMEs performance in Kano state, Nigeria.

2.2.2 Moderating Role of Environmental Management Adoption

2.3 Conceptual Framework



Previous studies for example Lawrence and Bernard (2023); Ilelaboye and Alade (2022); Ofurum and Iwunna (2022); Nwaiwu and Oluka (2018); Okafor (2018) shows a significant relationship between environmental management and firm performance. Furthermore, several studies i.e. Wang et al., (2023); used environmental management as moderating variable and concluded that it is a good moderating variable. Thus, based on the above mentioned arguments, this study proposed the following hypotheses:

H4: Environmental management adoption has impact on SMEs performance in Kano state, Nigeria.

H5: Environmental management adoption moderate the relationship between green product innovation and SMEs performance in Kano state, Nigeria.

H6: Environmental management adoption moderate the relationship between green process innovation and SMEs performance in Kano state, Nigeria.

H7: Environmental management adoption moderate the relationship between green management innovation and SMEs performance in Kano state, Nigeria.

Figure 1: Conceptual Framework

2.6 Underpinning Theory

This study underpinned by resource - based view theory as the theory explain the relationship between research variables.

2.6.1 Resource-Based View

Wright, Dunford, and Snell (2001) reported that the resource-based view (RBV) was based on Penrose's (1959) formulation, although its plausible formulation is attributed to Wernerfelt (1984). Wernerfelt (1984) suggests that a firm's resources are its assets and weaknesses. As a result, resources are defined as "those assets (tangible and intangible) owned by the firm on a semi-permanent basis". He also says that a company's ability to gain competitive advantage depends on how it uses its resources, not what it produces; unique resources used to gain short-term and long-term competitive advantage despite an imperfect market environment. In response to Wernerfelt's (1984) argument, Barney (1991) argues that, in the resource scarcity view, a firm can sustainably gain competitive advantage by implementing strategies that use its internal strengths to respond to external opportunities. The company must also be able to discredit external risks by avoiding internal inefficiencies by leveraging its unique assets that competitors do not have.

One factor that will give companies the opportunity to develop the skills they need to be innovative in an environment dominated by large corporations is green innovation. Another factor that can unify and direct all the resources of an organization towards achieving predetermined goals is the environmental management adaptation (Li, et al., 2023). This is because, according to the resource-based view of firm attributes, these are some intangible resources that are

thought to complement some attributes. According to Barney (2001), compared to tangible resources, intangible resources are believed to provide greater competitive advantage.

To this end, green innovation and environmental management adoption can be seen as an extraordinary intangible resource of the association that affects its performance (Lo, 2012). With the help of RBV theory, the main objective of this study is to examine the impact of green innovation and environmental management adoption on organizational performance. The RBV hypothesis is plausible for this review, as other previous studies have shown that it takes specific environmental management adoption (community development and waste management) and specific green innovation (product, process and management) and considers them as assets of ambiguities that can help a company gain an edge and improve performance (Li et al., 2023; Egbadju & Elaigwu 2023).

3.1 Methodology

This study adopted cross-sectional survey research design as data were collected at a single point in time. The population of the study consists of all the 514 registered business with the Kano State Chamber of Commerce, Industry, Mines and Agriculture (KACCIMA) as of the year 2023. A sample size of 220 SMEs was used to represent the entire population, through Krejcie and Morgan's (1970) sampling table. A mixed-method sampling technique was adopted, this involves a stratified sampling technique and simple random sampling, this technique was adopted because the population of the study is heterogeneous, stratified sampling technique was used to obtain a representative sample (stratum),

then simple random sampling was applied for each stratum to get an equal sample size from each stratum. The researchers used primary sources of data, where data was collected by using administered questionnaire. The dependent variable is SMEs performance, the independent variable is green innovation measured by green product innovation, green process innovation and green management innovation and the moderating variable is environmental management adaptation. For the purpose of presentation and discussion of the result of data generated in the course of this research, descriptive statistics, correlation and regression techniques of data analysis were used in SPSS version 22 statistical tools of analysis.

To examine the moderating model, the suggested relationship for the first assumption is as follows:

$$SMEsP_{it} = c + \beta_1 GPdI_{it} + \beta_2 GPcI_{it} + \beta_3 GMI_{it} + U_{it} \quad \text{model 1}$$

The first model evaluates the effect of research independent variable proxies (Green Product Innovation (GPdI), Green Process Innovation (GPcI) and Green Management Innovation (GMI)) on the dependent variable (SMEs Performance)

$$SMEsP_{it} = c + \beta_1 GPdI_{it} * EMA_{it} + \beta_2 GPcI_{it} * EMA_{it} + \beta_3 GMI_{it} * EMA_{it} + U_{it} \quad \text{model 2}$$

The second model evaluates the moderating role of environmental management adaptation on the

Table 1: Descriptive Statistics of the Variables

	N	Mean	Std. Deviation
SMEsP	220	3.1530	.71733
GPdI	220	2.3028	.79026
GPcI	220	2.7495	.79356
GMI	220	2.6580	.79394
EMA	220	2.9472	.54977

Source: Field Survey, 2024

Table 1 shows the descriptive statistics result of the dependent and independent variables. A total of 220 observations were recorded. SMEsP (SMEs

relationship between independent variable proxies (Green Product Innovation (GPdI), Green Process Innovation (GPcI) and Green Management Innovation (GMI)) and the dependent variable (SMEs Performance).

3.1 Validity and Reliability Test

The research instrument designed in this study - before being distributed to 220 respondents - was first tested for the validity and appropriateness of each statement item made in the instrument. For this reason, at this stage, pilot test questionnaires were distributed to 30 respondents, in this case, Small and Medium Enterprises (SMEs). The results of the validity and reliability test of the research instruments in this study obtained that the entire statement items were valid and reliable to be used for the next test.

4.0. Results and Discussion

The section presents the data analysis and interpretation of result of the dependent variable, independent variables and moderating variable. It presents the descriptive statistics, correlation and regression results of the study.

4.1. Descriptive Statistics

The descriptive statistics shows the mean and standard deviation of each independent variable and moderating variable from the mean and standard deviation of the dependent variable.

Performance) which is the dependent variable has an average of 3.1530 and a standard deviation of 0.7173 showing that there are many differences among the

response to the questions on SMEsP. GPdI (Green Product Innovation) has an average of 2.3028 and a standard deviation of 0.79026 showing that there are many differences among the response to the questions on GPdI. GPcI (Green Process Innovation) has an average of 2.7495 and a standard deviation of 0.79356 showing that there are many differences among the response to the questions on GPcI. GMI (Green

Management Innovation) has an average of 2.6580 and a standard deviation of 0.79394 showing that there are many differences among the response to the questions on GMI. Environmental Management Adaptation (EMA) has an average of 2.9472 and a standard deviation of 0.54977 showing that there are many differences among the response to the questions on EMA.

4.2 Diagnostics Testing

4.2.1 Multicollinearity Test

Table 2: Test for Independence

	Collinearity Statistics	
	Tolerance	VIF
GPdI	.452	2.214
GPcI	.189	5.289
GMI	.306	3.271
EMA	.707	1.415

Source: Survey, 2024

Based on the results in Table 2, the variance inflation factor (VIF) is less than 10. Myers (1990) suggested that a variance inflation factor (VIF) value

greater than 10 calls for concern, however, for this study, the VIF values are less than 10.

4.2.2 Homogeneity Test

Table 3: Test of Homogeneity of Variances

	Levene Statistic	Df1	Df2	Sig.
GPdI	1.761	19	194	.178
GPcI	2.633	19	194	.092
GMI	1.034	19	194	.341
EMA	1.672	19	194	.191

Source: Survey, 2024

Table 3, show the data variance is homogeneity. The p-value of EMA (0.191), GPdI (0.178), GPcI (0.092), and GMI (0.341) are all greater than 0.05. Therefore; the responses on green product innovation (GPdI),

green process innovation (GPcI), green management innovation (GMI) and environmental management adaptation (EMA) are homogeneous

4.2.3 Normality Test

Table 4: Normality Test

	Skewness		Kurtosis	
	Statistics	Std. Error	Statistics	Std. Error
SMEsP	.672	.168	.858	.334
GPdI	.945	.168	.374	.334
GPcI	.191	.168	.644	.334
GMI	.225	.168	.913	.334
EMA	.928	.168	.145	.334

Source: Field Survey, 2024

Table 4, show the normality test using skewness and kurtosis. The values of both skewness and kurtosis of EMA (0.191), GPdI (0.178), GPcI (0.092), and GMI (0.341) are all greater than 0.05. Therefore; the

responses on green product innovation (GPdI), green process innovation (GPcI), green management innovation (GMI) and environmental management adaptation (EMA) are homogeneous.

4.3 Correlation Result

Table 4: Correlation Matrix

	SMEsP	EMA	GPdI	GPcI	GMI
SMEsP	1				
EMA	.548**	1			
GPdI	.354**	.346**	1		
GPcI	.470**	.399**	.153**	1	
GMI	.426**	.541**	.594**	.750**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Survey, 2024

Table 4 shows the correlation result of the dependent variable SMEsP and the independent variables GPdI, GPcI and GMI, and moderating variable EMA. The relationship between SMEsP and moderating variable EMA is positive, with a coefficient of 0.548 this means that all things being equal the higher the EMA the higher the SMEsP. The relationship between SMEsP and independent variable GPdI is positive, with a coefficient of 0.354 this means that all things being equal the higher the GPdI the higher the SMEsP. The relationship between SMEsP and independent variable GPcI is positive, with a

coefficient of 0.470 this means that all things being equal the higher the GPcI the higher the SMEsP. The relationship between SMEsP and independent variable GMI is positive, with a coefficient of 0.426 this means that all things being equal the higher the GMI the higher the SMEsP.

4.4 Regression Result

Table 5 a & b below presents the results of the direct and moderating effect which includes all the coefficients of the variables, their standard errors, t-statistics and the probability value. It also reports the R-square value and adjusted R-square.

Table 5a: Model Summary

Model	R	R square	Adjusted R square	Std. Error of the Estimate
1	.4985 ^a	.4751	.4532	.20542

a. Predictors: (Constant), GPdI, GPcI, GMI, EMA

Source: from the field study 2024

Table 5b: Regression Results

Explanatory Variables	Coefficients	Std.Err.	t-statistics	P-value
GPdI	.0057	.0106	0.54	0.592
GPcI	.0189	.0891	0.21	0.832
GMI	.0316	.0151	2.10	0.036**
EMA	.1315	.0128	10.31	0.000***
GPdI*EMA	.1050	.0794	2.46	0.014**
GPcI*EMA	.3317	.1370	2.42	0.016**
GMI*EMA	.1431	.0139	3.23	0.001***
CONS	.2793	.0496	2.85	0.005***
R-squared	0.4751			
Adjusted R-squared	0.4532			
F- statistics		42.91***		

Note: ***, ** denotes 1% and 5%, level of significance

Source: Survey, 2024

From the results of the multiple regression analysis of SMEs performance in table 5, the overall R^2 revealed that 47.51% of change in performance of SMES in Kano state, Nigeria is explained by the explanatory variables used in the model of the study. Similarly, the F statistics is significant at 1%, showing that the model is fit for the study. The table also indicates that there was a no significant relationship between green product innovation and SMEs performance in Kano state, Nigeria ($\beta = 0.0057$, $t = 0.54$, $p = 0.592$), there was a no significant relationship between green process innovation and SMEs performance in Kano state, Nigeria. The first objective of this study is to examine the effect of green product innovation on SMEs performance in Kano state, Nigeria. The result reveals that there is no significant relationship between green product innovation and SMEs performance in Kano state, Nigeria. The positive insignificance relationship, mean a unit increase in green product innovation will not leads to an increase in the SMEs performance in Kano state, Nigeria and vice versa. relationship, mean a unit increase in green process innovation will not leads to an increase in the SMEs performance in Kano state, Nigeria and vice versa. The finding is in the support of that of Fitriani (2015) and contrary with the findings of Wang, et al., (2022); Chandra, et al., (2021).

The third objective of this study is to examine the effect of green management innovation on the SMEs performance in Kano state, Nigeria. The result reveals that there is significant relationship between green management innovation and SMEs performance in Kano state, Nigeria. The positive significance relationship, mean a unit increase in green management innovation will leads to an increase in

state, Nigeria ($\beta = 0.0189$, $t = 0.21$, $p = 0.832$). The result also shows that there was statistically significant positive relationship between green management innovation and SMEs performance in Kano state, Nigeria ($\beta = 0.0316$, $t = 2.10$, $p = 0.036$), there was also statistically significant positive relationship between environmental management adaptation and SMEs performance in Kano state, Nigeria ($\beta = 0.1315$, $t = 10.31$, $p = 0.000$). Hence, Hypotheses; H1, H2 was rejected while H3 and H4 was fully supported.

4.5 Discussion of Findings

The finding is in the support of that of Fitriani (2015) and contrary with the findings of Jayaraman, et al., (2023); Osei (2022).

The second objective of this study is to examine the effect of green process innovation on SMEs performance in Kano state, Nigeria. The result reveals that there is no significant relationship between green process innovation and SMEs performance in Kano state, Nigeria. The positive insignificance the SMEs performance in Kano state, Nigeria and vice versa. The finding is in the support of that of Helmi, and Widiastuty, (2023); Nsiah et al., (2022); Novitasari and Agustia (2022); Maya, and Tarigan, (2022) and contrary with the findings of Wang, et al., (2022); Chandra, et al., (2021); Fitriani (2015).

The fourth objective of this study is to examine the effect environmental management adaptation on the SMEs performance in Kano state, Nigeria. The result reveals that there is strong positive significant relationship between environmental management adaptation and SMEs performance in Kano state, Nigeria. The positive significance relationship, mean a unit increase in environmental management

adaptation will leads to an increase in the SMEs performance in Kano state, Nigeria and vice versa. The finding is in the support of that of Lawrence and Bernard (2023); Ilelaboye and Alade (2022); Ofurum and Iwunna (2022); Okeke et al. (2021); Oraka (2021); Zhou, et al., (2019).

The fifth, sixth and seven objectives of this study is to examine the moderating role of environmental management adaptation on the relationship between green innovation measures (i.e. green product innovation, green process innovation and green management innovation) and SMEs performance in Kano state, Nigeria. The result reveals that there is strong moderating effect of environmental management adaptation on the relationship between green innovation measures (i.e. green product innovation, green process innovation and green management innovation) and SMEs performance in Kano state, Nigeria. This indicates that environmental management adaptation strengthen the relationship between green innovation measures (i.e. green product innovation, green process innovation and green management innovation) and SMEs performance in Kano state, Nigeria.

5.0 Conclusion, Recommendation Policy Implication

In conclusion, literatures show an inconsistency on the relationship between green innovation and firm performance and also it could be noted that based on the literature there is ample evidence that suggests that environmental management adaptation has a positive impact on firm performance. The finding of this study reveals that there is no significant relationship between two green innovation measures (i.e. green product innovation and green process innovation) and SMEs performance in Kano state,

Nigeria, while green management innovation has significant effect on and SMEs performance in Kano state, Nigeria. The results also indicated that environmental management adaptation has strong positive significant effect on SMEs performance in Kano state, Nigeria and also moderate the relationship between green innovation measures (i.e. green product innovation, green process innovation and green management innovation) and SMEs performance in Kano state, Nigeria. Therefore, the study concluded that environmental management adaptation strengthen the relationship between green innovation measures (i.e. green product innovation, green process innovation and green management innovation) and SMEs performance in Kano state, Nigeria. Study also recommended that the SMEs managers should consider the adaptation of environmental management mechanism in their production and operation process as it effect their performance and strengthen the relationship between firm performance and green innovation measures (i.e. green product innovation, green process innovation and green management innovation).

The study's findings have major implications for the advancement of theory. First, the investigation contributes to the advancement of resource base view theory by shedding light on the reasons for green process innovation, green product innovation, green management, environmental management adoption and performance are related. Based on the findings of this paper, the study argue that green process innovation, green product innovation, green management, environmental management adoption are strategic resources that businesses could utilize to impact firm performance. The findings also have important policy implications for a wide variety of

stakeholders due to the central role that green innovation (i.e. green process innovation, green product innovation and green management) and environmental management adoption plays in defining how a SMEs function.

5.1 Limitations and Directions for Future

Research

The study has some limitations and recommendations for further research. The study limited the applicability of the investigation to SMEs in Kano state, Nigeria. Therefore, propose that future study expands the conceptual examination strategy to firms in other developing nations

REFERENCES

- Ai, Y.-H., Peng, D.-Y., & Xiong, H.-H. (2021). Impact of environmental regulation intensity on green technology innovation: From the perspective of political and business connections. *Sustainability*, 13(9), 4862. <https://doi.org/10.3390/su13094862>
- Asadi, S., Pourhashemi, S.O., Nilashi, M., Abdullah, R., Samad, S., Yadegaridehkordi, E., Aljojo, N., Razali, N. S. (2020). Investigating influence of green innovation on sustainability performance: A case on Malaysian hotel industry. *J. Clean. Prod.*, 258, 120860.
- Awan, U., Arnold, M. G., & Geolgeci, I. (2021). Enhancing green product and process innovation: Towards an integrative framework of knowledge acquisition and environmental investment. *Business Strategy and the Environment*, 30(2), 1283–1295. <https://doi.org/10.1002/bse.2684>
- Bombiak, E., & Marciniuk-Kluska, A. (2018). Green human resource management as a tool for the sustainable development of enterprises: Polish young company experience. *Sustainability*, 10(6), 1739. <https://doi.org/10.3390/su10061739>
- Chen, X., Yi, N., Zhang, L., & Li, D. (2018). Does institutional pressure foster corporate green innovation? Evidence from China's top 100 companies. *Journal of Cleaner Production*, 188, 304–311. <https://doi.org/10.1016/j.jclepro.2018.03.257>
- Departamento Administrativo Nacional de Estadística. (2021). Boletín Técnico Encuesta Anual Manufactura (EAM) 2020. (<https://www.dane.gov.co/index.php/estadisticas-por-tema/industria/encuesta-anual-manufacturera-enam>).
- Jakhar, S. K., Bhattacharya, A., Rathore, H., & Mangla, S. K. (2020). Stakeholder pressure for sustainability: Can 'innovative capabilities' explain the idiosyncratic response in the manufacturing firms? *Business Strategy and the Environment*, 29(6), 2635–2653. <https://doi.org/10.1002/bse.2526>
- Jayaraman, K., Jayashree, S., & Dorasamy, M. (2023). The Effects of Green Innovations in Organizations: Influence of Stakeholders. *Sustainability*, 15, 1133. <https://doi.org/10.3390/su15021133>
- Khan, P. A., & Johl, S. K. (2020). Firm performance from the lens of comprehensive green innovation and environmental management system ISO 14001. In *Business and economy recent updates*. VIDE LEAF.
- Larios-Francia, R. P., & Ferasso, M. (2023). The relationship between innovation and performance in MSMEs: The case of the wearing apparel sector in emerging countries *Journal of Open Innovation: Technology, Market, and Complexity*, 9 (2023) 100018
- Li, H., Li, Y., Sarfarz, M., & Ozturk, I., (2023). Enhancing firms' green innovation and sustainable performance through the mediating role of green product innovation and moderating role of employees' green behavior. *Economic Research-Ekonomska Istraživanja*, 36:2, 2142263, DOI: 10.1080/1331677X.2022.2142263
- Ma, Y., Yin, Q., Pan, Y., Cui, W., Xin, B., & Rao, Z. (2018). Green product innovation and firm performance: Assessing the moderating effect of novelty-centered and efficiency-centered business model design. *Sustainability*, 10(6), 1843. <https://doi.org/10.3390/su10061843>
- Maya, N., & Tarigan, Z. J. H. (2022). The role of green innovation in the effect of corporate social responsibility on firm performance. *Economies*, 10: 117. <https://doi.org/10.3390/economies10050117>
- Naseem, S., Mohsin, M., Zia-Ur-Rehman, M., Baig, S. A., & Sarfraz, M. (2021). The influence of energy consumption and economic growth on environmental degradation in BRICS countries: An application of the ARDL model and decoupling index. *Environmental Science and Pollution Research*, 29, 13042–13055.
- ISO. (2005). The ISO Survey 2005, International Organization for

- Standardization. [Online] Available: <http://www.iso.org.iso/survey2005.pdf>
- Oyemomi, O., Liu, S., Neaga, I., Chen, H., & Nakpodia, F. (2019). How cultural impact on knowledge sharing contributes to organizational performance: using the fsQCA approach. *Journal of Business Research*, 94, 313–319. <https://doi.org/10.1016/j.jbusres.2018.02.027>
- Pandithasekara, D. (2022). Green innovation practices and its impact on organizational performance: Evidence from apparel industry of Sri Lanka. *International Journal of Research Publication and Reviews*, 3(9), 743–759
- Rehman, S. U., Kraus, S., Shah, S. A., Khanin, D., & Mahto, R. V. (2021). Analyzing the relationship between green innovation and environmental performance in large manufacturing firms. *Technological Forecasting and Social Change*, 163, 120481. <https://doi.org/10.1016/j.techfore.2020.120481>
- Ritchie, I., & Hayes, W. (1998). *A guide to the implementation of the ISO 14000 Series on environmental management*, Upper Saddle River, NJ: Prentice Hall PTR, Prentice-Hall, Inc., 1998
- Sarfraz, M., Shah, S. G. M., Fareed, Z., & Shahzad, F. (2020). Demonstrating the interconnection of hierarchical order disturbances in CEO succession with corporate social responsibility and environmental sustainability. *Corporate Social Responsibility and Environmental Management*, 27(6), 2956–2971. <https://doi.org/10.1002/csr.2014>
- Saudi, M. H. M., Obsatar Sinaga, G., & Zainudin, Z. (2019). The effect of green innovation in influencing sustainable performance: Moderating role of managerial environmental concern. *International Journal of Supply Chain Management*, 8(1), 303.
- Shahid, H.M., Waseem, R., Khan, H., Waseem, F., Hasheem, M.J., & Shi, Y., (2020). Process innovation as a moderator linking sustainable supply chain management with sustainable performance in the manufacturing sector of Pakistan. *Sustainability (Switzerland)*, 12(6). <https://doi.org/10.3390/su12062303>
- Singh, S. K., Giudice, M. D., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150, 119762. <https://doi.org/10.1016/j.techfore.2019.119762>
- Sociedad Nacional de Industrias. (2022). *Perú Regiones al 2031 (1era ed.)*. Sociedad Nacional de Industria.
- Suleiman, A., Aliyu, M. S. & Bello, M. A. (2021). Market Orientation Dimensions and Firm Financial Performance: The Role of Perceived Environmental Dynamism. *Nigeria Journal of Business Administration*, 19 (1)1-21. Available online @ www.njba.uniben.edu.org.ng
- Tang, M., Walsh, G., Lerner, D., Fitza, M. A., & Li, Q. (2018). Green innovation, managerial concern and firm performance: An empirical study. *Business Strategy and the Environment*, 27(1), 39–51. <https://doi.org/10.1002/bse.1981>
- United Nations Industrial Development Organization. (2022a). *International Yearbook of Industrial Statistics*. (https://stat.unido.org/content/publications/-international-yearbook-of-industrial-statistics-2022?_ga=2.79705111.16501745.1666461106-44303666.1666461106).
- United Nations Industrial Development Organization. (2022b). *Progress report on the implementation of SDG 9 in Latin America and the Caribbean*. (<https://stat.unido.org/content/publications/progress-report-on-the-implementation-of-sdg-9-in-latin-america-and-the-caribbean>).
- Vallaster, C., Kraus, S., Kailer, N., & Baldwin, B. (2019). Responsible entrepreneurship: Outlining the contingencies. *International Journal of Entrepreneurial Behavior & Research*, 25(3), 538–553.

- <https://doi.org/10.1108/IJEBR-04-2018-0206>
- Vătămănescu, E. M., Mitan, A., Cotîrleţ, P.C., & Andrei, A. G. (2022). Exploring the Mediating Role of Knowledge Sharing between informal business networks and organizational performance: an insight into SMEs internationalization in CEE. *Sustainability*, 14(7), 3915. <https://doi.org/10.3390/su14073915>
- Wang, H., Khan, M. A. S., Anwar, F., Shahzad, F., Adu, D. & Murad, M. (2021). Green Innovation Practices and Its Impacts on Environmental and Organizational Performance. *Front. Psychol.* 11:553625. doi: 10.3389/fpsyg.2020.553625
- Wang, N., Zhang, J., Zhang, X., & Wang, W. (2022). How to improve green innovation performance: A conditional process analysis. *Sustainability*, 14(5), 2938. <https://doi.org/10.3390/su14052938>
- Xie, X., Huo, J., & Zou, H. (2019). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research*, 101, 697–706. <https://doi.org/10.1016/j.jbusres.2019.01.010>
- Xu, L., Fan, M., Yang, L., & Shao, S. (2021). Heterogeneous green innovations and carbon emission performance: Evidence at China's city level. *Energy Economics*, 99, 105269. <https://doi.org/10.1016/j.eneco.2021.105269>
- Yang, G., & Liu, B. (2021). Research on the impact of managers' green environmental awareness and strategic intelligence on corporate green product innovation strategic performance. *Annals of Operations Research*, 1–21. <https://doi.org/10.1007/s10479-021-04243-5>
- Yousaf, Z. (2021). Go for green: green innovation through green dynamic capabilities: Accessing the mediating role of green practices and green value co-creation. *Environmental Science and Pollution Research International*, 28(39), 54863–54875. <https://doi.org/10.1007/s11356-021-14343-1>
- Zhang, M., Zeng, W., Tse, Y. K., Wang, Y., & Smart, P. (2021). Examining the antecedents and consequences of green product innovation. *Industrial Marketing Management*, 93, 413–427. <https://doi.org/10.1016/j.indmarman.2020.03.028>
- Zhang, L., Zhao, S., Cui, L., & Wu, L. (2020). Exploring green innovation practices: Content analysis of the fortune global 500 companies. *SAGE Open*, 10(1), 215824402091464. <https://doi.org/10.1177/2158244020914640>
- Zhang, F., & Zhu, L. (2019). Enhancing corporate sustainable development: Stakeholder pressures, organizational learning, and green innovation. *Business Strategy and the Environment*, 28(6), 1012–1026. <https://doi.org/10.1002/bse.2298>
- Zhou, Y., Shu, C., Jiang, W., & Gao, S. (2019). Green management, firm innovations, and environmental turbulence. *Business Strategy and the Environment*, 28(4), 567–581. <https://doi.org/10.1002/bse.2265>