

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2024, 14(1), 640-650.

Environmental Factors and Adoption of Green Supply Chain Management among SMEs in Nigeria: Moderating Role of Environmental Uncertainty

Babalola Haorayau Bolaji[1,2]*, Mohd Kamarul Irwan Abdul Rahim[1], Salmah Omar[1]

[1]School of Technology Management and Logistics, Universiti Utara Malaysia, 06010UUM Sintok Malaysia, [2]College of Management and Social Sciences, Osun State University, Osogbo, Nigeria. *Email: babalola_haorayau@oyagsb.uum.edu.my

Received: 25 September 2023 **Accepted:** 29 December 2023 **DOI:** https://doi.org/10.32479/ijeep.15456

ABSTRACT

Environmental regulations and policies have been recognised as significant factors influencing the adoption of Green Supply Chain Management. However, the importance of these factors in influencing sustainable practices within supply chains has been emphasized in recent research as global environmental challenges continue to worsen. As a result, adopting Green Supply Chain Management practices is crucial for ensuring sustainable supply chain operations in Nigeria, as SMEs significantly contribute to economic growth and development in the country. Therefore, this study examines the effect of environmental factors on the adoption of GSCM in the Nigerian SMEs. To measure all the variables, validated items were adapted from prior studies. Thus, 412 copies of questionnaires were retrieved from the selected managers/owners of SMEs after testing for the validity and reliability of instruments through a pilot study. The findings of the study indicated that the environmental factor is a very good predictive faction for the GSCM adoption of SMEs business in Nigeria, most especially in the area of customer demand, environmental regulation, environmental uncertainty, and supplier relationships. Furthermore, the introduction of environmental uncertainty as a moderating effect influence the relationship between an environmental factor and the adoption of GSCM practices in the area of environmental regulation and supplier relationship. The study findings are useful for decision-makers in the SMEs sector so they may build methods to enhance the adoption of GSCM. These findings are also useful for academicians' future research endeavors. Managers can use those environmental factors concretely as a reference for the companies that intend to support the United Nation SDG-2030 agenda and to find new business opportunities for the implementation of sustainable development. The findings have a number of managerial implications that could contribute to SMEs for planning and development a GSCM strategy through the internal of the green supply chain perspective. This study's recommendations can help Nigeria's SME sector achieve its sustainable development goals and lead global climate change and environmental protection initiatives.

Keywords: Environmental Uncertainty, GSCM, Environmental Regulation, Stakeholder Pressure, Nigeria
JEL Classifications: Q5, Q56

1. INTRODUCTION

As global environmental challenges continue to worsen, businesses must find ways to account for the environment in their supply chain strategies (Seuring and Müller, 2018). As more and more businesses focus on achieving sustainable development, they are paying more attention to adopting Green Supply Chain Management practices (Zhu et al., 2021). Meanwhile, adopting Green Supply Chain Management practices is crucial for ensuring sustainable supply chain operations in Nigeria, as SMEs significantly contribute to economic growth and development in the country (Akpoyomare and Ikporhie, 2019). Implementing Green Supply Chain Management within SMEs in Nigeria is subject to various environmental factors. However, the importance of these factors in influencing sustainable practices within supply chains has been emphasised in recent research. Environmental

This Journal is licensed under a Creative Commons Attribution 4.0 International License

regulations and policies have been recognised as significant factors influencing the adoption of Green Supply Chain Management (Cheng et al., 2019; Taghavi et al., 2020). These regulations and policies established a legal structure and incentivise businesses to integrate environmental concerns into their operational practices.

Meanwhile, the increasing demand from consumers for sustainable products and services has emerged as a pivotal catalyst in implementing Green Supply Chain Management practices (Kumar et al., 2022). More so, there is a growing consciousness among consumers regarding environmental concerns, leading to a heightened demand for products and services that are environmentally sustainable. As a result, SMEs are compelled to adopt sustainable practices within their supply chains to maintain competitiveness. Moreover, the adoption of Green Supply Chain Management practices among SMEs has been found to be influenced by stakeholder pressures, including those exerted by investors and non-governmental organisations (Cruz et al., 2018; Nair et al., 2021). The active participation of stakeholders in promoting sustainable practices and their impact on the reputation and social status of SMEs play a significant role in facilitating the adoption of Green Supply Chain Management (GSCM) practices.

Nevertheless, the implementation of Green Supply Chain Management among SMEs in Nigeria is not devoid of obstacles. The adoption of Green Supply Chain Management practices is hindered by environmental uncertainty, which encompasses various factors including climate change, resource scarcity, and volatile market conditions (Shahin and Mahadevan, 2018; Meyer and Rowan, 1977). SMEs function within a context characterised by uncertain future environmental circumstances, posing challenges in effectively strategizing and executing sustainable supply chain practices. The existing scholarly literature has extensively examined the various factors that influence the adoption of Green Supply Chain Management. However, there exists a research gap in comprehending the moderating effect of environmental uncertainty on the association between environmental factors and GSCM adoption specifically among Small and Medium Enterprises in Nigeria.

This study aims to address this gap by investigating the relationship between environmental factors and GSCM adoption, considering environmental uncertainty as a moderating effect. Other specific objectives include to:

i. Examine the relationship between environmental factors and the adoption of Green Supply Chain Management practices among SMEs in Nigeria.
ii. Investigate the role of environmental uncertainty on the relationship between environmental factors and GSCM adoption among SMEs in Nigeria.
iii. Assess the overall level of GSCM adoption and environmental uncertainty among SMEs in Nigeria.

2. LITERATURE REVIEW

2.1. Green Supply Chain Management (GSCM)

The integration of environmental considerations into supply chain practices has become a strategic approach known as Green Supply Chain Management (Zhu et al., 2021). Green supply chain management (GSCM) encompasses the integration of ecologically conscious practices across the entirety of the supply chain, with the objective of mitigating environmental harm, promoting sustainability, and establishing a competitive edge (Seuring and Müller, 2018; Pfeffer and Salancik 1978). The scope of this concept includes various activities, namely green procurement, green manufacturing, green logistics, and reverse logistics, as discussed by Kumar et al. (2022). The implementation of Green Supply Chain Management (GSCM) practices has been associated with various advantages for organisations, such as cost reduction, enhanced environmental sustainability, improved corporate image, and heightened customer allegiance (Nair et al., 2021; Taghavi et al., 2020; Lin, 2013). Consequently, Green Supply Chain Management has garnered considerable interest from both academic researchers and industry professionals as a strategy to attain sustainability objectives and adhere to environmental mandates (Cheng et al., 2019).

Numerous scholarly investigations have been conducted to examine the fundamental elements and methodologies of Green Supply Chain Management (GSCM). An example of green procurement entails the deliberate choice of suppliers that prioritise environmentally sustainable practices and the inclusion of environmental factors in the assessment and selection of suppliers (Cheng et al., 2019). Organisations that implement green manufacturing practices aim to minimise waste generation, energy usage, and emissions by adopting cleaner production technologies and processes (Zhu et al., 2021; Zailani et al., 2012). Within the domain of green logistics, enterprises strive to enhance transportation efficiency, diminish carbon emissions, and optimise fuel consumption by employing strategies such as route optimisation, vehicle sharing, and the adoption of environmentally sustainable transportation modes (Kumar et al., 2022). Reverse logistics is a critical component of Green Supply Chain Management (GSCM) that centres on the effective handling and disposition of products at the end of their life cycle. This practice aims to encourage recycling, remanufacturing, and waste reduction (Seuring and Müller, 2018).

Implementing Green Supply Chain Management (GSCM) practices is subject to the influence of multiple factors. The influence of environmental regulations and policies on organisations' environmental initiatives and adoption of Green Supply Chain Management (GSCM) has been identified as significant (Cheng et al., 2019; Zailani et al., 2012). Regulatory frameworks establish a set of guidelines and incentives that encourage businesses to adopt sustainable practices across their supply chains. Adhering to environmental regulations not only serves to prevent legal consequences but also contribute to the advancement of corporate social responsibility (CSR) and reputation (Taghavi et al., 2020). The adoption of Green Supply Chain Management (GSCM) has been found to be significantly influenced by consumer demand for environmentally friendly products and services (Kumar et al., 2022). There is a growing awareness among consumers regarding environmental concerns, leading them to actively seek out products that are in line with their sustainability values. According to Nair et al. (2021), the adoption of Green Supply Chain Management

(GSCM) practices by organisations enable them to effectively address the current demand, thereby enhancing their competitive edge and fostering customer loyalty. The adoption of Green Supply Chain Management (GSCM) is influenced by stakeholder pressures from investors, non-governmental organisations (NGOs), and other societal actors (Cruz et al., 2018). These stakeholders actively promote the adoption of sustainable practices and take into account the environmental performance of organisations when making investment decisions or establishing partnerships. According to Zhu et al. (2021), adopting Green Supply Chain Management practices has the potential to improve the standing of organisations and their interactions with stakeholders, thereby fostering long-term success and sustainability.

Hence, Green Supply Chain Management (GSCM) is a strategic methodology that facilitates the incorporation of environmental factors into the operational aspects of organizations' supply chain. The concept encompasses a range of practices, including green procurement, green manufacturing, green logistics, and reverse logistics. The adoption of Green Supply Chain Management (GSCM) is contingent upon various factors, including but not limited to environmental regulations, consumer demand, and stakeholder pressures. A comprehensive comprehension of the fundamental elements and catalysts of Green Supply Chain Management (GSCM) is imperative for organisations, particularly Small and Medium Enterprises (SMEs) operating in Nigeria, in order to adopt and implement sustainable practices within their supply chain operations.

2.2. SMEs in Nigeria and their Significance

Small and Medium-sized Enterprises (SMEs) play a crucial role in driving economic growth and development in Nigeria. These enterprises contribute significantly to employment generation, poverty reduction, and innovation in the country (Akpoyomare and Ikporhie, 2019). SMEs account for a substantial portion of Nigeria's industrial sector, representing a diverse range of industries such as manufacturing, services, and agriculture (Oladapo et al., 2020). SMEs serve as a catalyst for job creation in Nigeria, employing a significant portion of the workforce. According to the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), SMEs employ over 80% of the Nigerian labor force and contribute approximately 50% to the country's Gross Domestic Product (GDP) (SMEDAN, 2021). The growth and development of SMEs have the potential to reduce unemployment rates and enhance livelihoods, particularly in urban and rural areas.

Furthermore, SMEs foster entrepreneurship and innovation, contributing to the diversification of Nigeria's economy. These enterprises often possess agility and adaptability, allowing them to identify and capitalize on emerging market opportunities (Oladapo et al., 2020). SMEs in Nigeria have demonstrated resilience and ingenuity, driving innovation through the introduction of new products, services, and business models. Despite their significance, SMEs in Nigeria face numerous challenges that hinder their growth and competitiveness. Limited access to finance, inadequate infrastructure, cumbersome regulatory frameworks, and a lack of technological capabilities are some of the common obstacles faced by SMEs (Okechukwu et al., 2019). Additionally, environmental sustainability has gained increasing attention as a challenge for SMEs in Nigeria, as they grapple with the adoption of sustainable practices in their operations. The integration of Green Supply Chain Management (GSCM) practices within SMEs can offer opportunities for enhanced sustainability and competitiveness. By embracing GSCM, SMEs can reduce their environmental impact, improve resource efficiency, and respond to the demands of environmentally conscious consumers (Cruz et al., 2018). However, the adoption of GSCM among SMEs in Nigeria is influenced by various factors, including environmental uncertainty.

Therefore, SMEs in Nigeria play a significant role in driving economic growth, employment generation, and innovation. However, they face various challenges that hinder their growth and competitiveness. The adoption of GSCM practices within SMEs can offer opportunities for enhanced sustainability and address the increasing demand for environmentally friendly practices. Understanding the significance of SMEs in Nigeria and their challenges is crucial for developing strategies to promote their adoption of GSCM and contribute to sustainable development in the country.

2.3. Environmental Factors and GSCM Adoption

The adoption of Green Supply Chain Management (GSCM) practices by organizations is influenced by various environmental factors that shape their sustainability initiatives. Understanding these factors is crucial for assessing the adoption and implementation of GSCM practices among Small and Medium-sized Enterprises (SMEs) in Nigeria. For instance, environmental regulations and policies have been identified as key drivers of GSCM adoption (Cheng et al., 2019; Taghavi et al., 2020), and consumer pressure for sustainable products and services identified by Kumar et al. (2022) has become a crucial factor driving the adoption of GSCM practices. Cruz et al. (2018) and Nair et al. (2021) further identified stakeholder pressures, such as those exerted by investors and non-governmental organizations, as influential factors in the adoption of GSCM practices among SMEs, and supplier collaboration in GSCM involves joint initiatives, information sharing, and mutual efforts to improve environmental performance across the supply chain as identified by Zhu et al. (2021) in their study.

2.3.1. Environmental regulations and GSCM adoption

Environmental regulations and policies play a significant role in shaping organizations' environmental initiatives and driving GSCM adoption. Stringent environmental regulations require organizations to comply with specific standards, such as waste management, pollution control, and energy efficiency (Cheng et al., 2019). Compliance with these regulations not only ensures legal compliance but also contributes to improved environmental performance and enhanced corporate social responsibility (Taghavi et al., 2020). Organizations that adopt GSCM practices align themselves with regulatory requirements, demonstrating their commitment to sustainability. Based on the prior studies indicated above, the study examines the effect of environmental regulations on adoption of GSCM adoption practices in the Nigerian SMEs. Thus, the hypothesis one was formulated as follows:

$H0_1$: There is a significant relationship between environmental

regulations and the adoption of GSCM practices among SMEs in Nigeria.

2.3.2. Consumer demand and preferences and GSCM adoption

Consumer demand for environmentally friendly products and services has become a driving force behind the adoption of GSCM practices. Consumers are increasingly conscious of environmental issues and seek products that align with their sustainability values (Kumar et al., 2022). Organisations that proactively adopt GSCM practices can meet this demand and gain a competitive advantage by differentiating themselves in the market (Nair et al., 2021). Meeting consumer preferences for eco-friendly products and sustainable supply chains not only improves market positioning but also enhances brand reputation and customer loyalty. Based on the previous studies highlighted above, the study examines the effect of customer demand and preferences on the adoption of GSCM adoption practices in Nigerian SMEs. Thus, the hypothesis two was formulated as follows:

H_2: There is a significant relationship between consumer demand and the adoption of GSCM practices among SMEs in Nigeria.

2.3.3. Stakeholder pressures

Stakeholder pressures exerted by various entities, such as investors, non-governmental organizations (NGOs), and community groups, play a vital role in influencing GSCM adoption. Stakeholders increasingly expect organizations to demonstrate their commitment to sustainable practices and transparency in their supply chain operations (Cruz et al., 2018). Investors and financial institutions are incorporating environmental, social, and governance (ESG) criteria into their decision-making processes, thereby incentivizing organizations to adopt GSCM practices (Zhu et al., 2021). NGOs and community groups, on the other hand, can exert pressure through advocacy campaigns and consumer awareness initiatives, encouraging organizations to adopt sustainable supply chain practices. Based on the evidence highlighted above, the study examines the effect of stakeholder pressure on the adoption of GSCM adoption practices in Nigerian SMEs. Thus, the hypothesis three was formulated as follows:

H_3: There is a significant relationship between stakeholder pressures and the adoption of GSCM practices among SMEs in Nigeria

2.3.4. Supplier relationships and collaboration and GSCM adoption

The relationships and collaborations with suppliers can significantly impact the adoption of GSCM practices. Organizations that prioritize sustainability seek to work with suppliers who share their environmental values and practices (Seuring and Müller, 2018). Supplier collaboration in GSCM involves joint initiatives, information sharing, and mutual efforts to improve environmental performance across the supply chain (Zhu et al., 2021). Developing strong supplier relationships based on sustainability principles can foster the adoption of GSCM practices and facilitate the integration of sustainable practices throughout the supply chain.

Therefore, the adoption of GSCM practices is influenced by several environmental factors. Stringent environmental regulations drive organizations to comply with standards and adopt sustainable practices. Consumer demand for eco-friendly products and services encourages organizations to adopt GSCM to meet market preferences. Stakeholder pressures from investors, NGOs, and community groups emphasize the importance of sustainability and encourage organizations to adopt GSCM practices. Finally, supplier relationships and collaboration play a crucial role in integrating sustainability throughout the supply chain. Based on the evidence highlighted above, the study examines the effect of supplier relationships and collaboration on the adoption of GSCM adoption practices in Nigerian SMEs. Thus, the hypothesis four was formulated as follows:

H_4: There is a significant relationship between supplier relationships and the adoption of GSCM practices among SMEs in Nigeria.

2.4. Environmental Uncertainty as a Moderating Effect

Environmental uncertainty refers to the unpredictability and complexity of the external environment in which organizations operate. In the context of Green Supply Chain Management (GSCM) adoption, environmental uncertainty plays a crucial role in shaping the relationship between environmental factors and the adoption of sustainable practices by Small and Medium-sized Enterprises (SMEs). Some of the environmental uncertainty includes but is not limited to resource constraints, institutional pressure, risk perception, and technological advances. Thus, resource constraints are one aspect of environmental uncertainty that can influence the adoption of GSCM practices. SMEs operating in resource-constrained environments may face challenges in implementing and sustaining green practices due to limited financial resources, access to technology, and expertise (Kumar et al., 2022). The unpredictable nature of resource availability and allocation further exacerbates the impact of environmental uncertainty on GSCM adoption. SMEs operating in uncertain environments may be hesitant to invest in sustainable practices due to the risk of resource scarcity and the potential for financial instability.

Furthermore, the technological advances can both mitigate and exacerbate the influence of environmental uncertainty on GSCM adoption. On one hand, advancements in technology, such as Internet of Things (IoT) devices, data analytics, and cloud computing, enable organizations to gather real-time environmental information and make informed decisions regarding sustainable practices (Nair et al., 2021). These technological capabilities can help SMEs overcome environmental uncertainty by providing timely and accurate information for decision-making. On the other hand, the rapid pace of technological advancements and the uncertainty surrounding emerging technologies can pose challenges for SMEs. The dynamic nature of technology can create uncertainty regarding the selection and implementation of appropriate GSCM practices, particularly for resource-constrained SMEs. Furthermore, the institutional pressures, such as government regulations, industry standards, and social norms, can interact with environmental uncertainty to influence the adoption of GSCM practices. In highly uncertain environments, organizations may face difficulties in anticipating and complying with evolving regulations and industry standards (Seuring and

Müller, 2018). The ambiguous and changing nature of institutional pressures can increase uncertainty regarding the required level of GSCM adoption and the alignment with stakeholder expectations. SMEs operating in uncertain environments may need to navigate complex institutional landscapes and engage in continuous adaptation to meet the expectations of various stakeholders.

The perception of risk associated with GSCM adoption can be influenced by environmental uncertainty. SMEs operating in uncertain environments may perceive the adoption of GSCM practices as risky due to the unpredictable outcomes and potential financial implications (Cruz et al., 2018). The uncertainty surrounding the environmental, economic, and social impacts of sustainable practices can create reluctance and resistance among SMEs. Risk perception acts as a moderating factor that influences the relationship between environmental factors and the adoption of GSCM practices. Therefore, environmental uncertainty plays a crucial role in moderating the relationship between environmental factors and the adoption of GSCM practices by SMEs. Resource constraints, technological advances, institutional pressures, and risk perception interact with environmental uncertainty to shape the adoption and implementation of sustainable practices. Understanding the dynamics of environmental uncertainty is essential for developing strategies to facilitate GSCM adoption among SMEs, particularly in uncertain operating environments. Therefore, the environmental uncertainty used to moderate the relationship between environmental factors and adoption of GSCM practices in the Nigerian SMEs. Thus, the hypothesis five was formulated as follows:

$H_{5:}$ Environmental uncertainty significantly moderates the relationship between environmental factors and the adoption of CM practices among SMEs in Nigeria

H_{5a}: Environmental uncertainty significantly moderates the relationship between environmental regulations and the adoption of GSCM practices among SMEs in Nigeria

H_{5b}: Environmental uncertainty significantly moderates the relationship between customer demand and the adoption of GSCM practices among SMEs in Nigeria

H_{5c}: Environmental uncertainty significantly moderates the relationship between stakeholder pressures and the adoption of GSCM practices among SMEs in Nigeria

H_{5d}: Environmental uncertainty significantly moderates the relationship between suppliers' relationship and the adoption of GSCM practices among SMEs in Nigeria

3. METHODOLOGY

This study employed a quantitative research design to investigate the relationship between environmental factors and the adoption of GSCM among SMEs in Nigeria. The study adopted a descriptive survey research design on the population of SMEs in South-west, Nigeria, comprised of 149,317 registered SMEs (MSME Survey, 2021). The study adopted a Taro Yamane to determine the sample size of 399 for this study, and adopted purposive sampling technique. Primary data were collected through structured questionnaires distributed to a sample of selected SMEs in Southwest, Nigeria. To measure all the variables, validated items were adapted from prior studies in which all variables amounted to 22 items. Specifically, the green supply chain management adoption was measured with 14 items adapted (Yang et al., 2013). Environmental factor with four sub-constructs was assessed with 21 items adapted from Lin and Ho (2011); Lin et al. (2020); Ho and Lin (2014), and Environmental uncertainty with 12 items (Seuring and Müller, 2018; Kumar et al., 2022; Cruz-Cázares et al., 2013). All items used five points likert scale ranging from strongly disagree (SD = 1) to strongly agree (SA = 5). Thus, 412 copies of questionnaires were retrieved from the selected managers/owners of SMEs after testing for the validity and reliability of instruments through a pilot study. Data collected were codified into the SPSS for descriptive and inferential analysis. The descriptive analysis was used to examine the demographical profile of the respondents, average mean gaps and correlation analysis between the variables. While inferential statistics was used to reach conclusions from the data collected via structural equation modelling (SEM). SEM is a multivariate statistical technique that allows the testing of a series of causal relationships between variables (Hair et al., 2019) to provide statistical efficiency that can be measured directly in the research process.

4. DATA ANALYSIS

4.1. Survey Response Rate

In this study, a total of 575 questionnaires were distributed to the owners/managers of SMEs particularly in the area of wholesale/retail trade and transport/storage sectors in Nigeria. In an attempt to achieve high response rates, several phone call reminders were sent to respondents who had yet to complete their questionnaires after 2 months via group emails (Silva et al., 2002; Traina et al., 2005). Hence, the outcomes of these attempts yielded 412 returned questionnaires, out of 575 questionnaires that were distributed to the target respondents. This gives a response rate of 71.7% based on Jobber's (1989) definition of response rate. Of these 412 questionnaires, 26 were unusable because a significant part of those questionnaires were not completed by the participants; and the remaining 386 useable questionnaires were used for further analysis. This accounted for a 67.1% valid response rate. Therefore, a response rate of 67.1% is considered adequate for the analysis in this study because Sekaran (2003) suggested that a response rate of 30% is sufficient for surveys as indicated in Table 1.

4.2. Measurement Model

To examine the accuracy of the model, first reliability and validity of the variables were measured as well as convergent validity and discriminant validity were also run. Hence, SmartPLS 4 by Hair et al. (2023) was used to find causal connection among the constructs in these theoretical models. Three exogenous latent variables were considered in this study which include four independent variables of environmental factors (this includes: environmental regulations, customer demand, stakeholder pressures and suppliers' relationship and collaborations) and environmental uncertainty as moderating variable. The endogenous variables in this study are the dependent variable (Green Supply Chain Management Adoption). The result of the measurement model (in terms of reliability, convergent validity and discriminant validity) indicated in the Figure 1 and Table 2.

Table 1: Survey response rates

Details	Frequency	Percentage
Distributed questionnaires	575	100
Returned questionnaires	412	71.7
Rejected questionnaires	26	4.5
Retained questionnaires	386	67.1

Table 2: Measurement model summary (validity and reliability values)

Constructs	Sub-constructs	Items	Loadings	CR	AVE
Environmental factor	Customer demand (ECD)	ECD2	0.736	0.835	0.559
		ECD3	0.728		
		ECD5	0.747		
		ECD6	0.777		
	Environmental regulation	EER1	0.727	0.806	0.512
		EER2	0.768		
		EER3	0.738		
		EER4	0.619		
	Stakeholders pressure	ESP1	0.763	0.861	0.554
		ESP2	0.757		
		ESP3	0.776		
		ESP4	0.752		
		ESP5	0.669		
	Supplier regulations	ESR1	0.768	0.835	0.503
		ESR2	0.664		
		ESR3	0.7		
		ESR4	0.692		
		ESR5	0.719		
GSCM adoption	Eco-design	GED1	0.647	0.822	0.537
		GED2	0.736		
		GED3	0.795		
		GED4	0.746		
	Green distributions	GGD1	0.716	0.788	0.554
		GGD2	0.771		
		GGD3	0.745		
	Green purchasing	GGP1	0.658	0.799	0.572
		GGP2	0.836		
		GGP3	0.765		
	Reverse Logistics	GRL1	0.746	0.848	0.582
		GRL2	0.792		
		GRL3	0.774		
		GRL4	0.738		
Environmental uncertainty	Institutional pressure	UNP1	0.773	0.823	0.608
		UNP2	0.782		
		UNP3	0.784		
	Resources constraints	URC1	0.819	0.799	0.571
		URC2	0.711		
		URC3	0.733		
	Risk perception	URP1	0.774	0.833	0.625
		URP2	0.817		
		URP3	0.78		
	Technology advances	UTA1	0.843	0.809	0.679
		UTA2	0.804		
		UTA3	0.766		

The previous research suggests the researchers to look at the average variance extracted (AVE), indicator loadings, and composite reliability (CR) values to measure the convergent validity (CV). The research first assessed the loadings of the indicators to ensure that they were equal or greater than threshold of 0.6 (Gholami et al., 2013), the CR value should be above 0.7 and above 0.5 for AVE. Therefore, Composite Reliability (CR) which gives a value that indicates reliability and internal consistency were therefore used to determine suitability of the outer model which deals with the measurement of the components. Hence, the validity and reliability of the measures reveal the nature of association among constructs. Furthermore, the degree to which the same constructs are related to each other was checked based on convergent validity indicator average variance extractor threshold of 0.50 and above (Henseler et al., 2016b). Table 2 revealed the composite reliability value (CR) of all constructs is greater than 0.70 (0.799 to 0.861) Henseler et al. (2016). Loading of all items is greater than 0.40 and the Average Variance Extracted (AVE) values of all constructs are also greater than 0.50. The results revealed statistically satisfied convergent validity criteria recommended (Nunnally and Bernstein, 1994). However, from the 47 items of the variables, 3 were deleted because their loadings were below the threshold of 0.40 (Hair et al., 2018).

Furthermore, the average variance extracted (AVE) regarding convergent validity for all the variables has occurred in the range of 0.5 as suggested by Bagozzi and Yi (1988). In a nutshell, the discriminant validity has also been confirmed by assessing Fornell and Larcker (1981), cross-loadings, and Heterotrait–Monotrait ratio. The square root of the AVE must be higher than the corresponding diagonal values of all the constructs while the HTMT ratio can be established when all the values fall under the range of 0.90 (Hair et al., 2017). So, this research achieves the discriminant validity successfully. Measurement model assesses both reflective and formative constructs. The advantage of PLS-SEM is that it combines all the variables in one model and evaluates it. GSCM adoption act as a reflective construct in this model. Hence, this model is termed to be reflective-reflective model. Table 2 shows all the values related to the constructs reliability and validity, while Table 3 presents variables for discriminant validity.

4.3. Structural Model (Testing of Hypotheses)

The hypotheses of the study involved testing the relationship between environmental factor and GSCM adoption of SMEs that specialized on supply chain management in the south-west of Nigeria. The hypotheses were tested using the Smart PLS 4, through bootstrapping method. This study analyzed the overall structural model and hypotheses testing which the R^2 of the GSCM adoption is 0.791. Hence, the constructs have all been explained and the model constructed has substantially strong explanatory power. The path coefficient of the model structure adopted the significant hypothesis test of bootstrapping of 5000 with the standardized path coefficient, t-value and the hypothesis test. one-tailed test was adopted in this study based on the following T-values and P-values; T-value (±1.645) and P-value (0.05). This is summarized in the Table 4 and Figure 2.

Figure 1: Measurement model (algorithm)

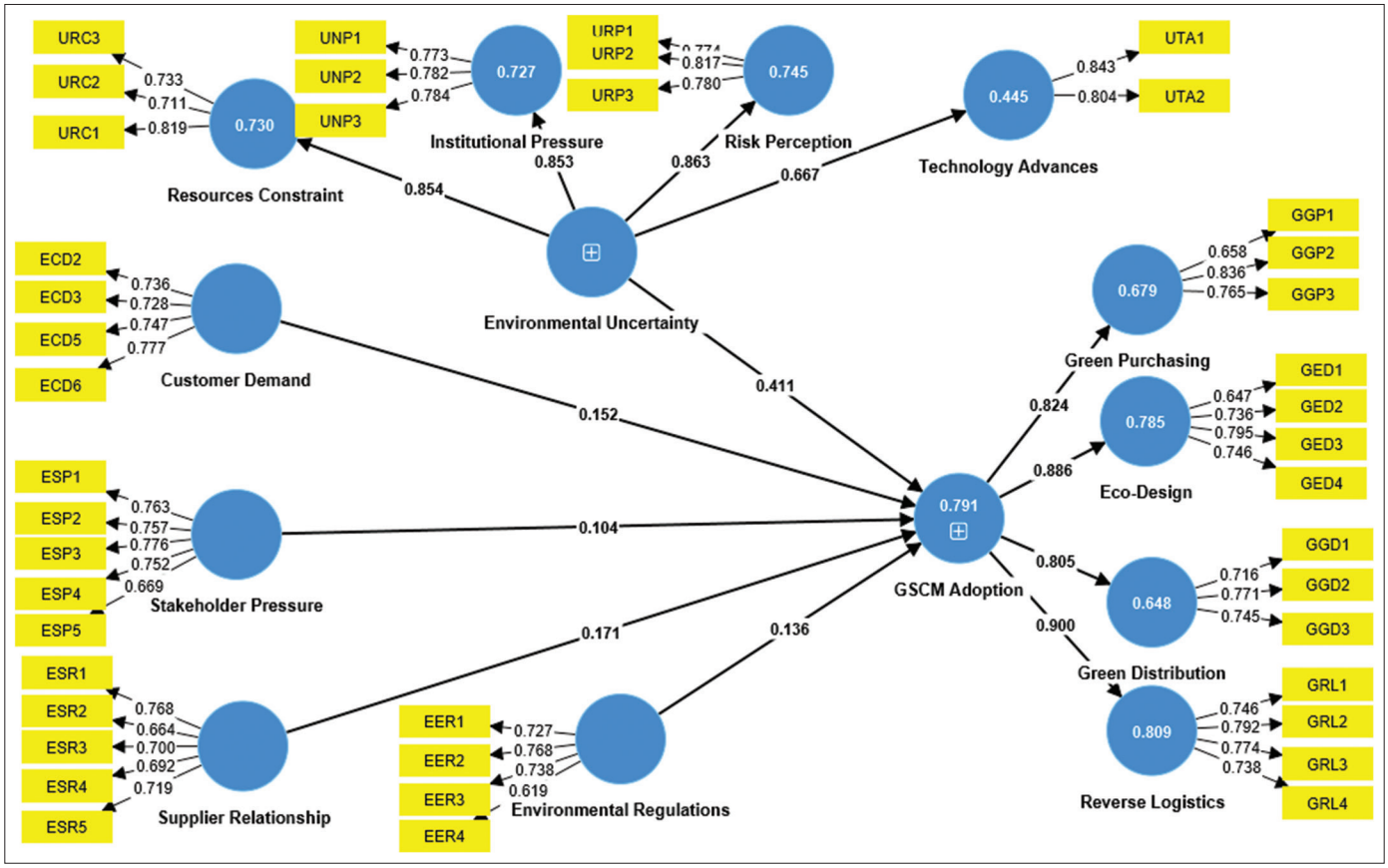


Table 3: Discriminant Validity (Heterotrait–Monotrait ratio)

Constructs	ECD	GED	EER	EU	GSCM	GGD	GGP	UNP	URC	GRL	URP	ESP	ESR	UTA
Customer demand														
Eco-design	0.805													
Environ. regulations	0.488	0.854												
Environ. uncertainty	0.679	0.628	0.548											
GSCM adoption	0.667	0.116	0.352	0.397										
Green distribution	0.992	0.652	0.449	0.258	0.108									
Green purchasing	0.217	0.891	0.661	0.199	0.111	0.427								
Institutional pressure	0.582	0.507	0.545	0.098	0.551	0.742	0.554							
Resources constraint	0.702	0.511	0.014	0.153	0.495	0.009	0.068	0.493						
Reverse logistics	0.499	0.674	0.588	0.95	0.086	0.146	0.947	0.543	0.262					
Risk perception	0.055	0.328	0.645	0.093	0.557	0.229	0.943	0.742	0.199	0.658				
Stakeholder pressure	0.065	0.793	0.749	0.485	0.634	0.334	0.901	0.527	0.059	0.443	0.605			
Supplier relationship	0.598	0.615	0.005	0.006	0.768	0.775	0.922	0.014	0.088	0.592	0.543	0.776		
Technology advances	0.656	0.676	0.596	0.742	0.676	0.656	0.693	0.633	0.697	0.741	0.651	0.748	0.672	

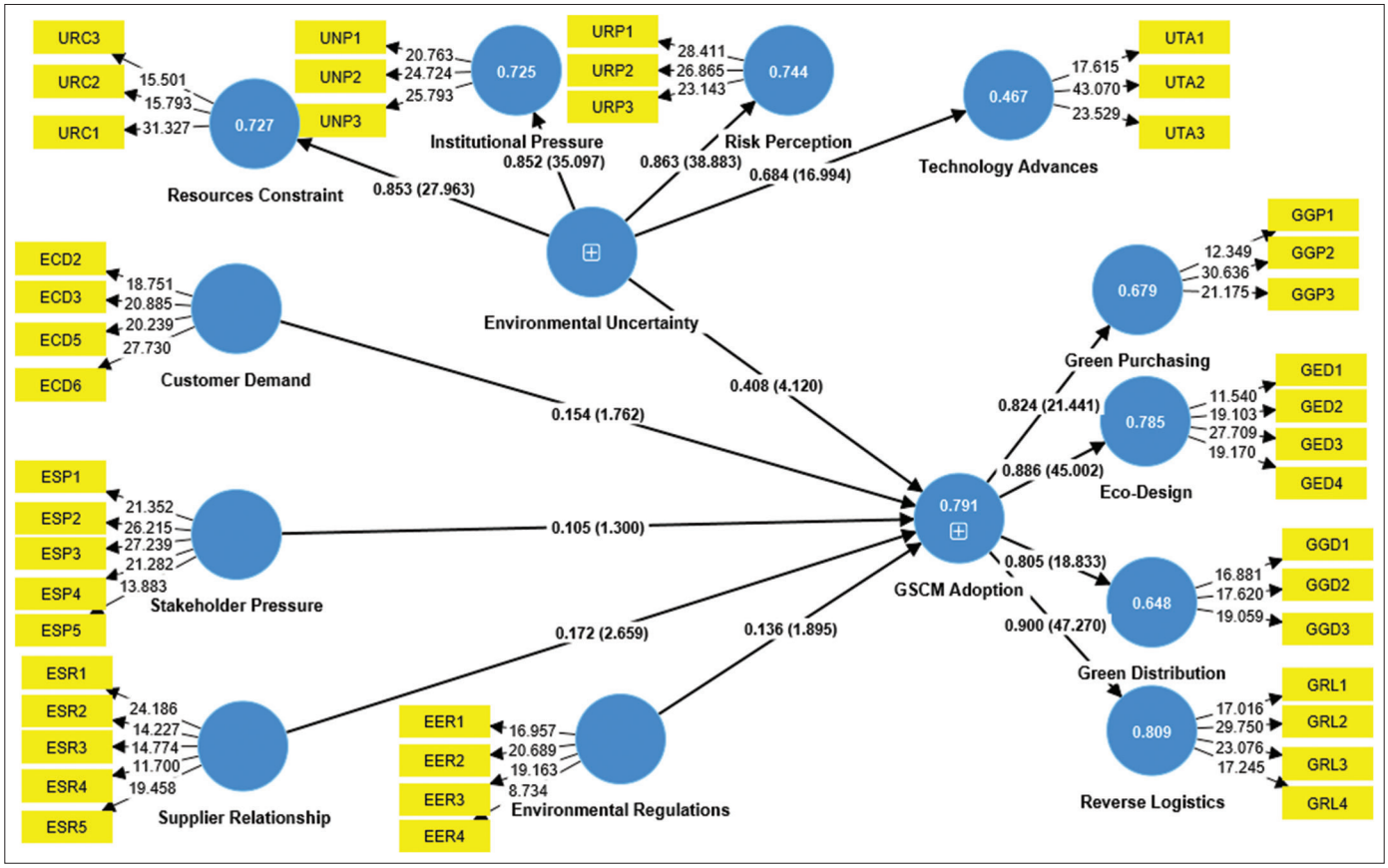
Table 4: The result of the structural model

Hypotheses	Beta	Se	T-value	P values	Decisions
Customer demand -> GSCM adoption	0.154	0.087	1.762	0.078	Supported
Environmental regulations -> GSCM adoption	0.136	0.072	1.895	0.058	Supported
Environmental uncertainty -> GSCM adoption	0.408	0.099	4.12	0	Supported
Stakeholder pressure -> GSCM adoption	0.105	0.081	1.3	0.194	Not Supported
Supplier relationship -> GSCM adoption	0.172	0.065	2.659	0.008	Supported

GSCM: Green supply chain management adoption

The result from Table 3 indicates that four out of the five direct hypotheses were supported, whereas only one direct hypothesis which is the relationship between stakeholder pressure and GSCM Adoption was not supported. Specifically, customer demand and preferences has a significant relationship with GSCM Adoptio nwith (T = 1.76; P = 0.078). Hence, the hypothesis (H_1) was supported. In addition, the relationship between environmental regulations and GSCM Adoption is

Figure 2: Structural model result (bootstrapping @5000)



significant (T = 1.90; P = 0.058). Hence, the hypothesis (H_2) was supported. Moreover, the environmental uncertainty has significant relationship with GSCM Adoption with (T = 4.12; P = 0.000). Thus, hypothesis (H_3) was supported. Finally, supplier relationship and collaboration has a significant relationship with GSCM Adoption with (T= 2.66; P = 0.008). Hence, the hypothesis (H_5) was supported. The overall result of the objectives indicated that environmental factor is a very good predictive faction for the GSCM adoption of SMEs business in wholesale/retail trade and transport/storage in Nigeria, most especially in the area of customer demand, environmental regulation, environmental uncertainty, and supplier relationship.

4.4. Moderating Effect of Environmental Uncertainty Results

The present study applied a product indicator approach using PLS-SEM to detect and estimate the strength of the moderating effect of environmental uncertainty on the relationship between environmental factors and GSCM adoption (Henseler and Fassott, 2010b). The product term approach is considered appropriate in this study because the moderating variables are continuous (Rigdon et al., 1998). According to Henseler and Fassott (2010a) given that the results of the product term approach are usually equal or superior to those of the group comparison approach, we recommend always using the product term approach. To apply the product indicator approach in testing the moderating effects of environmental uncertainty on the relationship between environmental factor and GSCM adoption, the product terms between the indicators of the independent variable and the indicators of the latent moderator variable need to be created, hence, these product terms would be used as indicators of the interaction term in the structural model (Kenny and Judd, 1984). Also, to ascertain the strength of the moderating effects, the present study applied Cohen's (1988) guidelines for determining the effect size. Figure 3 and Table 5 therefore show the estimates after applying the applied a product indicator approach to examine the moderating effect of environmental uncertainty the relationship between environmental factor and GSCM adoption of SMEs in the South-West of Nigeria.

The results presented in Table 5 and Figure 3 showed the moderating effect of environmental uncertainty on the relationship between environmental factor and GSCM adoption. More specifically, the results show that environmental uncertainty moderates the relationship between environmental factor and GSCM adoption. Similarly, environmental uncertainty moderates the relationship between environmental factor (in terms of environmental regulations and customer demand) and GSCM adoption as indicated in Table 5 (T = 1.68, P = 0.074) and (T = 2.63, P = 0.031) respectively as well as Figure 3. However, environmental uncertaintydoes not moderate relationship between stakeholder pressure and supplier relationship onGSCM adoption of SMEs in Nigeria. Specifically, it could be recalled that Hypothesis H_5 stated that environmental uncertainty moderates the relationship between environmental regulations and GSCM adoption. As expected, the results shown in Table 5 indicated that

Figure 3: Structural model for moderating effect of environmental uncertainty

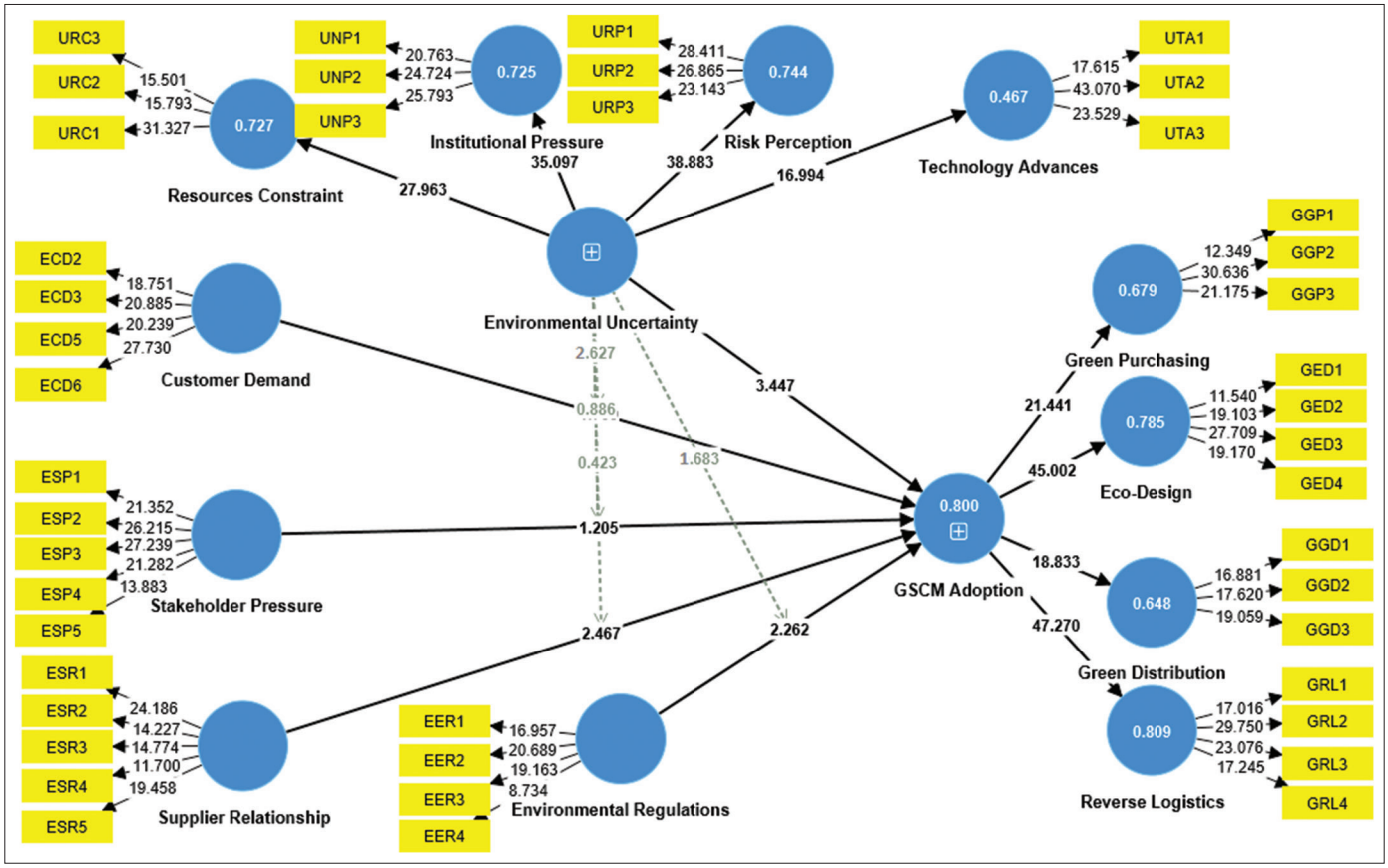


Table 5: Regression analysis (moderating effect of environmental uncertainty)

Hypotheses	Coef.	Se	T-value	P values	Decisions
Customer demand * EU -> GSCM adoption	0.042	0.067	2.627	0.031	Moderated
Stakeholder pressure * EU -> GSCM adoption	−0.085	0.096	0.886	0.376	Not moderated
Supplier relationship * EU -> GSCM adoption	0.025	0.06	0.423	0.673	Not moderated
Environmental regulations * EU -> GSCM adoption	0.047	0.07	1.683	0.074	Moderated

the interaction terms representing environmental regulations × environmental uncertainty (t = 2.291, P = 0.041) was statistically significant. Hence, Hypothesis H_5 was fully supported. This is following the procedures recommended by Aiken and West (1993). Furthermore, it could be recalled that Hypothesis H_7 stated that environmental uncertainty moderates the relationship between customer demand and GSCM adoption. As expected, the results shown in Table 5 indicated that the interaction terms representing environmental factor × innovation capability (t = 1.810, P = 0.071) was statistically significant. Hence, Hypothesis H_7 was fully supported. Information from the path coefficients was used to plot the moderating effect of innovation capability on the relationship between environmental factor and GSCM adoption, following the procedures recommended by Aiken (1991), Dawson and Richter (2006).

4.5. Discussion of Findings

In this research, a model has been formulated and tested to examine the effect of environmental factor that is, environmental regulations, customer demand, and supplier's relationship and collaborations on GSCM adoption of SMEs in Nigeria. The impacts of environmental regulations, customer demand, and suppliers' relationship on GSCM adoption have also been investigated under the moderating effect of environmental uncertainty towards GSCM adoption. The results exhibit a good support for most predicted links. Environmental regulations, customer demand, and supplier's relationship and collaborator show a significant effect on GSCM adoption. As predicted, it has been observed that environmental factors empower SMEs owners to perform better in making their employees creative and innovative. Therefore, SMEs with both environmental factors and environmental uncertainty are quite capable to get their GSCM adoption in South West of Nigeria. In general, this verifies the results from previous studies that support the influence of both environmental factors and environmental uncertainty on the GSCM adoption of SMEs in Nigeria (Lin and Ho, 2011; Lin et al., 2020; Ho and Lin, 2014). Effective environmental factors motivate and encourage the SMEs owners and their managers to develop new ideas and concepts within the organization (Lin et al., 2020). Although, the outcomes of this research show that environmental factors are imperative for SMEs that aspire to adopt the GSCM adoption of SMEs in Nigeria.

5. CONCLUSIONS AND RECOMMENDATIONS

This study examines how environmental factors affect GSCM adoption by Nigerian SMEs, a vital step towards sustainable development and minimising industrial pollution. This study found numerous critical findings that demonstrate the relevance and feasibility of such integration and the hurdles that must be overcome to succeed. The study's findings are useful for owners and managers of Nigerian SMEs to identify ways to encourage environmental factor to improve adoption of GSCM practices in their firms. The findings suggest that SMEs owners and managers should effectively implement environmental factor (like environmental regulations, customer demand and supplier relationship) and environmental uncertainty to strengthen the sustainable performance relationship. The study's findings also confirmed the necessity of technology advances towards environmental uncertainty. The study discovered that environmental factors like regulations, customer demands, suppliers relationship and collaboration are also a crucial predictor of adoption of GSCM. These outcomes are in consistence with the study conducted by Watts et al. (2014). Additionally, the study's findings confirmed the moderating role of environmental uncertainty.

Similar to other empirical studies, this study includes several limitations. Environmental uncertainty as a moderators evaluated this research revealed significant between environmental factor and GSCM adoption. Future research may include mediators in addition to environmental factors and uncertainty in this model. In addition, the proposed approach can also be tried in other African countries to obtain feedback from various geographical regions. This research fills the void left by the lack of studies undertaken in Nigeria to improve adoption of GSCM, specifically in the SMEs sectors. In conclusion, our study findings are useful for decision-makers in the SMEs sector so they may build methods to enhance the adoption of GSCM. These findings are also useful for academicians' future research endeavors. Managers can use those environmental factors concretely as a reference for the companies that intend to support the United Nation SDG-2030 agenda and to find new business opportunities for the implementation of sustainable development. According to this study, the practice of the GSCM however requires integration among green supply chain partners to achieve sustainable performance. The findings have a number of managerial implications that could contribute to SMEs for planning and development a GSCM strategy through the internal of the green supply chain perspective. The SMEs owners and managers should develop a comprehensive environmental strategy, which requires the implementation of environmental factor initiatives and cooperation from both suppliers and customers. To enable SMEs to adopt and sustain green practices, financing, technical help, capacity-building workshops, and governmental incentives are needed. This study's recommendations and problems can help Nigeria's SME sector achieve its sustainable development goals and lead global climate change and environmental protection initiatives.

REFERENCES

Aiken, L.S. (1991), Multiple regression: Testing and interpreting interactions. Sage Publications Google Schola, 2, 513-531.

Akpoyomare, O., Ikporhie, F. (2019), Small and medium-sized enterprises (SMEs) and economic growth in Nigeria. Journal of Management and Strategy, 10(1), 1-10.

Bagozzi, R.P., Yi, Y. (1988), On the evaluation of structural equation models. Journal of the Academy of Marketing Science, 16, 74-94.

Cheng, T.C.E., Choi, Y., Vachon, S. (2019), Environmental regulation, supplier green process innovation, and supplier performance. International Journal of Production Economics, 209, 1-17.

Cruz, J.L.B., Conceição, S.V., Azevedo, S.G. (2018), Green supply chain management practices and performance outcomes: Evidence from manufacturing SMEs. Journal of Cleaner Production, 205, 195-204.

Cruz-Cázares, C., Bayona-Sáez, C., García-Marco, T. (2013), You can't manage right what you can't measure well: Technological innovation efficiency. Research Policy, 42(6–7), 1239-1250.

Dawson, J.F., Richter, A.W. (2006), Probing three-way interactions in moderated multiple regression: Development and application of a slope difference test. Journal of Applied Psychology, 91(4), 917.

Fornell, C., Larcker, D.F. (1981), Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.

Gholami, R., Sulaiman, A.B., Ramayah, T., Molla, A. (2013), Senior managers' perception on green information systems (IS) adoption and environmental performance: Results from a field survey. Information Management, 50(7), 431-438.

Hair, J., Sabol, M., Cepeda, G., Roldán, J.L., Chong, A.Y.L. (2023), PLS-SEM in information systems: Seizing the opportunity and marching ahead full speed to adopt methodological updates. Industrial Management and Data Systems, 123(12), 2997-3017.

Hair Jr, J.F., Hult, G.T.M., Proksch, D., Sarstedt, M., Pinkwart, A., Ringle, C.M. (2018), Addressing endogeneity in international marketing applications of partial least squares structural equation modeling. Journal of International Marketing, 26(3), 1-21.

Hair Jr, J.F., Sarstedt, M., Ringle, C.M., Gudergan, S.P. (2017), Advanced Issues in Partial Least Squares Structural Equation Modeling. United States: Sage Publications.

Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M. (2019), When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2-24.

Henseler, J., Fassott, G. (2010a), Handbook of Partial Least Squares: Concepts and Methods. Germany: Springer Science and Business Media.

Henseler, J., Fassott, G. (2010b). Testing moderating effects in PLS path models: An illustration of available procedures. Handbook of partial least squares: Concepts, methods and applications, 713-735.

Henseler, J., Hubona, G., Ray, P. A. (2016), Using PLS path modeling in new technology research: Updated guidelines. Industrial Management Data Systems, 116(1), 2-20.

Henseler, J., Ringle, C.M., Sinkovics, R.R. (2016), The use of partial leasts Squares path modeling in international marketing. In: Ghauri, P.N., editor. Advances in International Marketing. Vol. 20. Bingley: Emerald. p. 277-320.

Ho, Y.H., Lin, C.Y., Tsai, J.S. (2014), An empirical study on organizational infusion of green practices in Chinese logistics companies. Journal of Economic and Social Studies, 4, 159-189.

Kenny, D.A., Judd, C.M. (1984), Estimating the nonlinear and interactive effects of latent variables. Psychological Bulletin, 96(1), 201.

Kumar, V., Hasan, H., Singh, S.P., Dwivedi, Y.K. (2022), Green supply chain management adoption: A systematic review and bibliometric analysis. Journal of Cleaner Production, 338, 129642.

Lin, C.Y., Alam, S.S., Ho, Y.H., Al-Shaikh, M.E., Sultan, P. (2020), Adoption of green supply chain management among SMEs in Malaysia. Sustainability, 12(16), 6454.

Lin, R.J. (2013), Using fuzzy DEMATEL to evaluate the green supply chain management practices. Journal of Cleaner Production, 40, 32-39.

Lin, C.Y., Ho, Y.H. (2011), Determinants of green practice adoption for logistics companies in China. Journal of Business Ethics, 98, 67-83.

Meyer, J.W., Rowan, B. (1977), Institutionalized organizations: Formal structure as myth and ceremony. American Journal of Sociology, 83(2), 340-363.

Nair, A., Zhao, X., Banerjee, A. (2021), Green supply chain management adoption among small and medium enterprises in the emerging economy of India. Journal of Cleaner Production, 319, 128571.

Nunnally, J.C., Bernstein, I.H. (1994), Psychometric Theory. 3rd ed. New York: McGraw-Hill.

Okechukwu, S.O., Kehinde, J.O., Irefin, I.A. (2019), Challenges of small and medium-sized enterprises (SMEs) in Nigeria: An empirical investigation. Journal of Small Business and Enterprise Development, 26(1), 2-21.

Oladapo, V., Kehinde, J., Oyekunle, B. (2020), Small and medium enterprises (SMEs) and sustainable development in Nigeria. Journal of Global Entrepreneurship Research, 10(1), 1-19.

Pfeffer, J., Salancik, G.R. (1978), The External Control of Organizations: A Resource Dependence Perspective. United States: Stanford University Press.

Rigdon, E.E., Schumacker, R.E., Wothke, W. (1998), A comparative review of interaction and non-linear modeling. In: Schumacker, R.E., Marcoulides, G.A. Editors, Interaction and Nonlinear Effects in Structural Equation Modeling. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 1-16.

Sekaran, U. (2003), Research Methods for Business: A Skill Building Approach. 4th ed. New York: John Wiley & Sons, Inc.

Seuring, S., Müller, M. (2018), From a literature review to a conceptual framework for sustainable supply chain management. Journal of Cleaner Production, 189, 39-51.

Shahin, A., Mahadevan, B. (2018), Green supply chain management: A review and bibliometric analysis. International Journal of Production Research, 56(1-2), 414-444.

Silva, M.S., Smith, W.T., Bammer, G. (2002), Telephone reminders are a cost effective way to improve responses in postal health surveys. Journal of Epidemiology and Community Health, 56(2), 115-118.

Small and Medium Enterprises Development Agency of Nigeria (SMEDAN). (2021), Nigerian National MSMEs Database. Available from: https://msmedanigeria.org

Taghavi, F., Chatha, K.A., O'Regan, N. (2020), A systematic literature review of green supply chain management practices and performance in manufacturing SMEs. Journal of Cleaner Production, 261, 121113.

Traina, S.B., MacLean, C.H., Park, G.S., Kahn, K.L. (2005), Telephone reminder calls increased response rates to mailed study consent forms. Journal of Clinical Epidemiology, 58(7), 743-746.

Watts, D., Yapa, P.W., Dellaportas, S. (2014), The case of a newly implemented modern management accounting system in a multinational manufacturing company. Australasian Accounting, Business and Finance Journal, 8(2), 121-137.

Yang, C.S., Lu, C.S., Haider, J.J., Marlow, P.B. (2013), The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan. Transportation Research Part E: Logistics and Transportation Review, 55, 55-73.

Zailani, S., Jeyaraman, K., Vengadasan, G., Premkumar, R. (2012), Chain management (SSCM) in Malaysia: A survey. International Journal of Production Economics, 140(1), 330-340.

Zhu, Q., Sarkis, J., Geng, Y. (2021), Green supply chain management and environmental performance in the context of emerging economies: A review of current empirical evidence. Journal of Cleaner Production, 279, 123599.