# Green Distribution Management and Environmental Sustainability of Small and Medium-sized Enterprises (SMEs)

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#### ABSTRACT

Small and Medium Enterprises (SMEs) operating in the market today are underperforming in terms of production (goods/services) and the main delivery period, i.e., time to market. The procurement has also failed to maximize supply chain value while enhancing projected return and reducing expenses. The purpose of this study is to evaluate the green distribution management and environmental sustainability of Small and Mediumsized Enterprises in Nigeria, with specific reference to Oyo State. The methodology used in this study was a survey. Out of the total population of 4,520 small and medium-sized enterprises (SMEs) in Oyo State, a sample size of 10% (455) was drawn using a stratified random sampling technique. The questionnaire was used to gather primary data for the study and analysed using regression analysis with the aid of SPSS 22.0. The result revealed that green distribution influences the environmental sustainability of SMEs ( $r^2 = 0.454 \text{ p} < 0.05$ ). The study concluded that green distribution management practices have a significant influence on the environmental sustainability of SMEs. From the findings, it was recommended that SMEs should embrace green distribution management practices since it has the capacity to the environmental sustainability, improve environmental performance, SMEs should pay utmost attention to green distribution strategy through frequent engagement in production processes free from the emission of harmful substances and uses of environmentally friendly packaging.

KEYWORDS: Green distribution management, Environmental sustainability, SMEs

# Introduction

When people think of being green, the first thing that comes to mind is the fundamental process of recycling, reusing, and reducing. Green manufacturing is primarily concerned with maximizing resource use and putting things where they belong, using inputs with low environmental implications or reducing all that has a negative influence on the environment (Ninlawan *et al.*, 2010).

The natural environment has recently become a significant global issue.

Environmental challenges amplify and spread due to growing human and industrial impacts on the environment. Businesses and the transportation industry are held responsible for a number of environmental issues, including global warming, ozone depletion, solid waste, and air pollution (Patil *et al.*, 2018). International discussion on species diversity and resource degradation is growing. Environmental concerns are becoming more deeply ingrained in global trade, and markets and customers everywhere are calling for more environmentally responsible goods (Anbumozhi and Kanda, 2005). The idea of incorporating environmental considerations into the supply chain is known as "green distribution management," (Thoo *et al.*, 2015). One of the newest buzzwords in business is "green distribution management" (GSCM) which encourages companies to concentrate on environmental issues through the use of green concepts. Governments, societies, and corporate entities all now have very common concerns over the environment (Patil *et al.*, 2018).

Due to the majority of businesses gravitating toward green distribution sourcing, customers demanding timely delivery of high-quality goods, and the ongoing dynamism and unpredictability of global markets, the concept of green management has received a lot of attention over the last two to three decades. Such circumstances necessitate strategic and well-established relationships with suppliers, which contributes to the growing interest among businesses in green distribution management (Mentzer *et al.*, 2001). Both the things being produced and the services being provided are constantly changing in today's world. Customers now have a great deal, more power, knowledge, awareness, and choice. In this situation, organizations must concentrate on strategically leveraging their distribution management in order to remain competitive and survive in the marketplaces. This explains why green distribution management has become more and more prominent as a subject of study and research over the past three decades (Gagendrum, 2017).

Ayuso et al. (2013), Agrawal et al. (2023), and Rashid et al. (2024) state that for the management of green distribution to be successful, it is necessary to identify the important and effective techniques that must be used to extract value from the distribution management that impacts sustainability and creates competitive advantage. Sustainable development is defined as "development that meets the needs of the present without sacrificing the ability of future generations to do the same." Therefore, the effects of corporate activities on the environment must be taken into consideration while evaluating these activities. Integration of environmental considerations into company operations can have a major positive economic impact on corporate organizations in addition to reducing adverse environmental effects. There is mounting evidence that enhancing the environment is beneficial to business. SMEs in the business sector around the world are using green distribution principles to sustain their business (Chin et al., 2015). Before advising small and medium-sized enterprises (SMEs) to use green distribution as a strategic option, it is important to look at how green distribution management relates to SMEs sustainability clusters like financial performance, competitive advantage, resource mobilization, stakeholder satisfaction, and overall goal achievement.

This will give SMEs in Africa, particularly in Nigeria, the impetus they need to fully adopt green distribution as a strategic choice. The biggest sources of pollution include industrial and domestic trash, which indicates a lack of corporate concern for environmental security. A high level of pollution in the region will endanger human life. Therefore, environmental issues have become everybody's concerns that must be addressed immediately.

Previous research (Olorunniwo, 2010; Ojo et al., 2012) on SMEs in Nigeria concentrated on the resource viewpoint while paying little attention to the environment and operational side. Additionally, the majority of the research done in Nigeria focused on evaluating environmental collaboration, logistics, and green manufacturing on manufacturing SMEs with less emphasis paid to the connection between green distribution and SMEs' environmental sustainability. However, it is necessary to look at the connection between green distribution management (GDM) and the sustainability of SME clusters like environmental performance before suggesting GDM as a strategic choice in SMEs. Since green distribution's primary goal is to minimize risk and increase an organization's operational profit. The SMEs operating in the market today are underperforming in terms of output (goods/services) and delivery time, or time to market, in particular. As a result, this study takes an operational approach to investigate how SMEs in Oyo State, Nigeria, manage their green distribution and their environmental sustainability. This study's overarching goal is to assess how green distribution management has affected the environmental sustainability of SMEs in Oyo State.

#### Concept of Green Distribution Management

The flow of a product through the supply chain from the production stage to the customer is referred to as distribution. As distribution directly impacts both the cost of the supply chain and the customer experience, it influences the overall profitability of a company. As consumers become more aware of environmental concerns, more companies are opting for green distribution channels. These strategies range from placing more focus on environmental considerations at each stage of production and distribution refers to the incorporation of environmental considerations into supply chain management inter-organizational activities. The sustainable distribution of goods and services is another way to describe it (Toke *et al.*, 2010).

For distribution strategies to be considered sustainable, they must reduce carbon dioxide emissions, be economically feasible, and ultimately lead to an improved standard of living for future generations. Increasing environmental and distribution practice transparency are just two examples of green distribution approaches that can be implemented. As environmental issues receive more attention, the study of how to incorporate environmental factors into supply chains has become a rapidly growing field in its own right (Sarkis, 2009). According to the studies conducted in the Chinese electronics industry, Zhu and Sarkis (2007) revealed that GSCM deployment does increase corporate performance.

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Some studies have suggested that there should be a compromise between the benefits of economic growth and the costs to the environment (Choi, 2011). The distribution of products and services depends on transportation. Al-Odeh and Smallwood (2012) state that it's crucial to take into account aspects of green transportation development such as fuel, modes of transportation, infrastructure, and operational procedures. Carbon dioxide, which contributes to acid rain and global warming, is released by vehicles running on gasoline and diesel. Furthermore, using fossil fuels contributes to their becoming more and more scarce. Using fleets powered by alternative fuels enables businesses to implement sustainable practices. Additionally, firms have the option of employing rail as an alternative to using their fleets for material transportation. Businesses can also develop new procedures, such as constructing distribution centres close to their delivery locations or partnering with nearby retailers and distributors to cut down on the distance they need to travel.

### **Environmental Sustainability**

One definition of "green" and "environmental sustainability" is a supply chain that uses environmentally friendly inputs and transforms them through change agents into outputs that can be recycled and used at the end of their lifecycles. What's important to keep in mind, is that the primary goal of sustainable development is to lessen financial burdens while at the same time maximizing environmental benefit (Wagner *et al.*, 2001).

Global environmental changes have sparked a movement to pinpoint the root causes of global warming and create remedies to prevent it before it's too late. Many nations are enacting laws and regulations with the express purpose of reducing carbon emissions and the greenhouse gas effect in an effort to achieve this. Environmental change is real and is here. In addition to our issues with the climate, we also face concerns with resource depletion. More people, organizations, and businesses are joining the green movement as it grows. Businesses are making more efforts to green their supply chains as a result of consumers' growing preference for eco-friendly goods. This preference has prompted many to adopt sustainability policies across their operations and business relationships with suppliers. Due to the recent emphasis on sustainability, there is an increasing need to include environmentally sound decisions in green distribution management techniques (Bowen *et al.*, 2001). Therefore, this study researched the interplay between green distribution and environmental sustainability, specifically, the study investigated the influence of green distribution on the environmental sustainability of SMEs in Oyo State, Nigeria.

# Theoretical Framework Resource-Based View

Birger Wernerfelt first presented the resource-based view in his article titled "A Resource-Based View" of the firm in the year (1984), and Jay B. Barney later developed it (1991). The Resource-Based View (RBV) describes how an organization can gain an advantage over its competitors through the strategic use of its available resources, both material and immaterial (together referred to as "capabilities") (Priem and Swink, 2012). Penrose's (1959) early work viewed businesses as a collection of unique assets; subsequent RBV, however, focused on the specific kinds of assets and how they may be positioned to create barriers to entry and economic rents for competitors (Wernerfelt, 1984). Barney (1991) identified the qualities of resources—value, imperfect imitability, rarity, and imperfect substitutability as vital for erecting barriers and gaining a competitive advantage.

According to Lavie (2006), conventional RBV presumed that the organization alone was responsible for securing and managing its resources. The main principles of outsourcing, purchasing, or supply management all revolve around utilizing partners' skills to make up for internal competency deficiencies or to concentrate on core talents. Due to the ' proprietary resource' assumption, traditional RBV may be challenging to apply to collaborative arrangements where shared and non-shared resources are managed to achieve competitive advantage (Lavie, 2006). In its revised form, however, RBV makes use of its explanatory potential in supply chain settings by taking into account the concept of a network resource.

Meanwhile, where RBV's supply chain management solutions excel is in structure analysis (de Oliveira Wilk and Fensterseifer, 2003; Miller and Ross, 2003) and the tagging of supply chain experiences as sources of competitive advantage (Barratt and Oke, 2007; Pearson *et al.*, 2010) It was argued by Halldórsson *et al.* (2007) that RBV is implicit in the vast majority of supply chain management choices. Companies build inter-organizational partnerships so that they can take advantage of resource-position barriers developed by collaboration in order to better deal with uncertainty and change. That's especially true when companies realize that their internal resources aren't enough to give them an edge in a market where competition is stiff and supplies are limited (Jap, 2001).

The resource-based theory is the most appropriate framework for this investigation. For businesses, a long-term competitive advantage can be attained by the strategic use and integration (or "capabilities") of both tangible and intangible assets, as described by the Resource-Based View (RBV). Further, the RBV makes use of its explanatory power in supply chain settings by considering a network resource concept. In today's uncertain business climate, it is recommended that you embrace resource availability and coordination as critical triggers for inter-organizational connection.

#### **Empirical Review**

With an emphasis on the green economy and environmental efficiency, Kasayanond *et al.* (2019) investigated the development of environmental sustainability in Malaysia. The goal of the study was to assess the current level of green economy education in Malaysia. Both primary and secondary sources were used to compile this data. A questionnaire was used to collect primary data, while data from government documents, periodicals, and other secondary sources were used to supplement the primary data. The population of the study included both the main and secondary sectors of the economy. The sample size of the study used a convenience sampling method. Knowledge and understanding of the green economy were found to increase environmental sustainability. Based on these

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results, researchers advise cooperating with other environmentally conscious companies to boost the sustainability of green economy tasks, such as general customer counselling, maintenance services, training, and consumer awareness.



#### Figure 1: Conceptual Framework

Rao (2019) uses empirical research to investigate the extent to which SMEs in the Chennai region of Southern India have embraced green supply chain strategies. A study of environmental management representatives (EMRs) or chief executives of SMEs in the Chennai area was conducted using a questionnaire as a research method. Researchers employed statistical significance testing first, then structural equation modelling, to analyse the resulting database. From the data acquired, it can be shown that while inbound logistics is greatly greening its sourcing component, it is not yet significantly greening its process. The manufacturing side is going green, but the distribution side is not. While great progress has been made in terms of economic performance, substantial progress has not been made in terms of environmental performance. However, if SMEs are serious about environmental performance, they need to improve the outbound logistics they use.

The sustainability and competitiveness of Kenyan food manufacturing firms were studied by Nwaura *et al.* (2016). The Kenya Association of Manufacturers directory was used as a sampling frame for a cross-sectional survey of 130 businesses. Questionnaires were used for the primary data collection. Construct validity was investigated using factor analysis, while criterion validity was investigated using multivariate linear regression. According to the results of the research, technological advancements have had a considerable impact on distribution methods, with more businesses utilising the Internet as a distribution channel. The study concluded that firm managers are willing to accept green distribution strategies by taking control of their distribution patterns, which is in line with the findings. This study also found that Kenyan food manufacturing companies that adopted green distribution strategies had a considerable competitive advantage.

### Methodology

Descriptive survey research was used to carry out this research because it allowed the researcher to obtain a general overview of the subject and allow observation without affecting normal behaviour. The study was carried out in Oyo State, in southwestern Nigeria, with Ibadan as the capital. The State is located at its northern border with Kwara State, its eastern border with Osun State, its southern border with Ogun State, and its western border with both Ogun State and the Republic of Benin. The populations for this study were the registered SMEs in Oyo State which comprised a total of 4,520 out of seven thousand seven hundred and eight (7,708) SMEs operating in Oyo State across all the 33 local governments (MSME Survey, 2020). The study focused on the registered SMEs operating within Oyo State which comprises 33 local governments.

A total of 455 were chosen out of four thousand five hundred twenty (4,520) registered SMEs across all the thirty (33) local governments which represent more than 10% of the population through stratified and random sampling techniques. As cited by Asika (2004), the sample size is in agreement with Yamane (1967) model of sample size determination for the population, because using the Yamane model would have given an appropriate sample size of 369, which is lesser than the 10% of the population (4520). By choosing a sample size of 455, this study aimed to provide a more comprehensive and representative analysis of the SMEs in the region. Given that administration of a

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company's resources, including their operation and distribution, falls mostly on the shoulders of its owners and top executives, the researcher restricted the sample size of his sample to these two groups. Approximately 455 surveys were sent out. The questionnaire was the primary means of data collection in this study and was written to be easy to comprehend by the respondents, A content validity test was performed on the research instrument before distribution. Also, the responses from the respondents were analysed using multiple regression analysis with the aid of SPSS Version 22.

# **Results**

### **Test of Hypotheses**

Hypothesis One: Green distribution management does not influence the environmental sustainability of SMEs in Oyo State.

Mode R		R Square	Adjusted R Squ	Std. En nare of th Estim	e	Durbin- Watson	
1	.674ª	0.454	0.421	0.681			
Mo	del	Sum Squar	Df	Mean Square	F	Sig.	
R	egression	33.58	8 10	3.359	7.235	.000	
1 R	esidual	206.12	26 444	0.464			
T	otal	239.7	4 454				

Table 1: Analysis of the Interaction between Green Distribution and Environmental Sustainability of Small and Medium-scale Enterprises

b. Predictors: (Constant), Environmental Sustainability of SMEs

Source: Author's Computation with SPSS 22.0 output, (2022).

Table 1 presents the model summary of the regression analysis of the interaction between green distribution and environmental sustainability of SMEs, and this reveals an (R) value of 0.674. This shows a positive interaction between green distribution and SMEs' environmental sustainability. The R Square value of 0.454 means that, green distribution accounts for about 46% of environmental sustainability among the small and medium enterprises in Oyo State. Although the stochastic error term accounts for the remaining 54% of changes, it does so because it is driven by causes or variables that are not included in this model. The Durbin-Watson statistician's result appeared to be quite close to two (1.904). This proves that there is no autocorrelation in the model.

Table 1 further demonstrated the statistical significance of this model, with F (10,455), 7.235, P value or sig value < 0.05, (Sig 0.000).

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Strong evidence against the null hypothesis; the probability of rejecting it is more than 5%, and it will be rejected. The F-statistic indicates that the overall regression model's goodness of fit is statistically significant because Ftab (10,454) > Fcal (7.235).

Small and Medium Scale Enterp Model		Unstandardized Standardized			Sig.
	Coefficients		Coefficients	Т	8'
	В	Std. Error	Beta	_	
(Constant)	1.852	.344		5.377	.000
Environmentally friendly transportation i.e., well-serviced vehicles which minimize air and noise pollution (GDPEv2)	.011	.045	.015	.247	.805
Using vehicles or transportation modes that carry more load in order to reduce the number of trips made to the customer site (GDPEv3)	051	.037	071	-1.387	.166
Cooperating with the vendor to standardize packaging and Delivering directly to users' sites (GDPEv4)	.056	.038	.075	1.459	.145
Use environmentally friendly packaging materials e.g. biodegradable packaging materials (GDPEv5)	.024	.042	.030	.566	.571
Promoting and adopting returnable packaging methods (GDPEv6)	.044	.039	.061	1.137	.256
Promoting recycling and reuse programs among packaging and distribution employees (GDPEv7)	.029	.045	.039	.652	.515
Active involvement in the reduction of waste (GDPEv9)	065	.041	085	-1.586	.113

Table 2: Contribution of Each Predictor Variable to Environmental	Sustainability of			
Small and Medium Scale Enterprises (SMEs)				

Engaging in production processes free from the emission of harmful substances (GDPEv10)	.177	.041	.235	4.297	.000
Use of renewable sources in production and reuse of materials (GDPEv11)	.034	.033	.052	1.039	.300
The organisation's supply chain has the ability to minimise total cost to final consumers due to knowledge sharing (GDPEv15)	.290	.056	.271	5.167	.000

a. Dependent Variable: Environmental Sustainability of Small and Medium Enterprises Source: Author's Computation with SPSS 22.0 output, (2022).

The regression coefficients for each independent variable's contribution to the criterion variable are displayed in Table 2. The findings indicate a standardized beta coefficient of 0.271. This means that the organisation supply chain has the ability to minimize total cost to final consumers due to knowledge sharing and makes a strong unique contribution in explaining green distribution among the SMEs, when all other model variables that contribute to variance are kept under control, 1% increase in the level of the supply chain through knowledge sharing led to 27% increase in the rate of sustainability of the SMEs in Oyo State.

The results of contribution in emission-free industrial processes demonstrate that the standardised beta coefficient is 0.235. This indicates that a 1% increase in the number of emission-free industrial processes resulted in a 24% increase in the performance of SMEs in the Oyo State.

Active involvement in the reduction of waste revealed - 0.085 to SMEs sustainability. A 1% increase in waste reduction led to a 9% reduction in the rate of sustainability of the SMEs. Cooperating with vendors to standardize packaging delivered directly to users' sites indicates 0.075 to SMEs' sustainability. A 1% increase in standardised packaging led to an 8% increase in the rate of sustainability of the SMEs. Using vehicles or transportation modes that carry more load in order to reduce the number of trips made to the customer site revealed 0.071 to SME sustainability. A 1% increase in the cost of transportation led to a 7% reduction in the rate of the sustainable SMEs.

The results of the contribution of promoting and adopting returnable packaging methods show that the standardized beta coefficient is 0.061. This means a 1% increase in the number of returnable packaging led to a 6% increase in the sustainability of the SMEs. The use of renewable sources in the production and reuse of materials shows a standardized beta coefficient of 0.052. This means a 1% increase in the number of

renewable sources of production of reuse materials led to a 5% increase in sustainability of the SMEs in Oyo State.

Promoting recycling and reuse programs among packaging and distribution employees shows that standardized beta coefficient of 0.039. This means a 1% increase in the number of packaging and distribution employees led to a 4% increase in the sustainability of SMEs in Oyo State.

The use of environmentally friendly packaging materials like biodegradable packaging materials revealed 0.030. A 1% increase in environmental packaging of materials periodically led to a 3% increase in the rate of SMEs sustainability. Environment-friendly transportation i.e., well-serviced vehicles which minimize air and noise pollution revealed 0.015. A 1% increase in serviced vehicles led to a 2% increase in the rate of SME performance. The results in Table 2 show that the p-value for 0.000 is less than 5% or 0.05 critical value. Hence, the null hypothesis was thus rejected. The study concluded that green distribution does have an impact on SMEs' environmental sustainability.

### **Discussion of Findings**

Hypothesis one was tested with regression analysis in order to achieve objective one Hypothesis one was tested with regression analysis in order to achieve objective one. Table 1 summarises the regression analysis model for the interplay between green distribution and environmental sustainability of SMEs with an (R) value of 0.674. This indicates a positive nexus between green distribution and SMEs' environmental sustainability. This magnitude of the interaction is also statistically significance at a 5% level of significance. The R Square value of 0.454 means that, green distribution accounts for about 46% of environmental sustainability among the small and medium enterprises in Oyo State. Other factors or variables that are not part of this model but are included in the stochastic error term are responsible for the remaining 54% of the variability. The Durbin-Watson statistician's result appeared to be quite close to two (1.904). This proves that there is no autocorrelation in the model. The result further demonstrated the statistical significance of this model, with F (10,455), 7.235, P value or sig value < 0.05, (Sig 0.000). Strong evidence against the null hypothesis. The F-statistic indicates that the overall regression model's goodness of fit is statistically significant because Ftab (10,454) > Fcal (7.235).

Similarly, Table 2 displays the regression coefficients of each independent variable's contribution to the criterion variable. According to the findings, the standardised beta coefficient shows 0.271. This means that the organisation distribution has the ability to minimise total cost to final consumers due to knowledge sharing makes a strong unique contribution in explaining green distribution among the SMEs, when the variance explained by all other variables in the model is controlled. A 1% increase in the supply chain has the ability to minimise total cost to final consumers through knowledge sharing leading to a 27% increase in the rate of sustainability of the SMEs in Oyo State.

The results of the contribution of engaging in production processes free from the emission of harmful substances show that the standardized beta coefficient is 0.235. This

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means a 1% increase in the number of production-free processes from the emission led to a 24% increase in the sustainability of the SME business in Oyo State. Active involvement in the reduction of waste revealed - 0.085 to SMEs sustainability.

A 1% increase in waste reduction led to a 9% reduction in the rate of sustainability of the SMEs. Cooperating with vendors to standardize packaging delivered directly to users' sites indicates 0.075 to SMEs' sustainability. A 1% increase in standardised packaging led to an 8% increase in the rate of sustainability of the SMEs.

Using vehicles or transportation modes that carry more load in order to reduce the number of trips made to the customer site revealed 0.071 to SME sustainability. A 1% increase in transportation led to a 7% reduction in the rate of the sustainability SMEs. The results of the contribution of promoting and adopting returnable packaging methods show that the standardized beta coefficient is 0.061. This means a 1% increase in the number of returnable packaging led to a 6% increase in the sustainability of the SMEs. The use of renewable sources in the production and reuse of materials shows a standardized beta coefficient of 0.052. This means a 1% increase in sustainability of the SMEs. The SMEs in Oyo State. Promoting recycling and reuse programs among packaging and distribution employees shows that standardized beta coefficient of 0.039. This means a 1% increase in the number of ackaging and distribution employees led to a 4% increase in the environmental sustainability of SMEs in Oyo State.

The use of environmentally friendly packaging materials like biodegradable packaging materials revealed 0.030. A 1% increase in environmental packaging of materials periodically led to a 3% increase in the rate of SMEs sustainability. Environment-friendly transportation i.e., well-serviced vehicles which minimize air and noise pollution revealed 0.015. A 1% increase in serviced vehicles led to a 2% increase in the rate of SME performance. The study found that green distribution does influence the environmental sustainability of small and medium enterprises in Oyo State. This corroborates (Hasan and Ali, 2015; Malesios, *et al.*, 2018).

# **Conclusion and Recommendation**

Findings from this study reiterate the facts that, Green Distribution Management have a positive significant impact on SMEs' environmental sustainability, efficiency and effectiveness. This is predicated on the notion that green distribution and SMEs' environmental sustainability have positive interactions, and the amount of which is statistically significant. Meanwhile, cooperating with a vendor to standardize packaging delivering directly to users' sites indicates that the use of vehicles or transportation modes that carry more load in order to reduce the number of trips made to the customer site was also significant to SMEs' performance. Equally, positive interaction occurred between green procurement and environmental sustainability of Small and Medium Enterprises. Besides, positive interaction occurred between green procurement and the efficiency and effectiveness of small and medium enterprises in Oyo State. Similarly, the aid of Pearson product-moment Correlation (Matrix) shows that there is a significant relationship between green distribution management and SMEs' effectiveness and

efficiency. Green Distribution Management has a significant positive relationship with the efficiency and effectiveness of small and medium enterprises.

This positive association emphasizes the critical role of green distribution management in optimizing the overall environmental impact and operational outcomes of SMEs, affirming that a proactive commitment to green distribution contributes significantly to the overall sustainability of these enterprises.

Based on the research findings, below are the recommendations for the SMEs in Nigeria at large:

Since this study has established that green distribution management among SMEs has the capacity to operational performance, improve environmental performance, therefore SMEs should pay utmost attention to green distribution strategy through frequent engagement in production processes free from the emission of harmful substances and uses of environmentally friendly packaging.

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