

## **Green Distribution Practices and Environmental Sustainability of Sachet and Bottle Water Producers in Rivers State**

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### **Abstract**

This study examined green distribution practices and environmental sustainability in Nigeria. The study employed the correlation survey research design where data were collected from sachet and bottle water producers in Rivers State. A sample of 200 respondents was drawn from a population of 400 sachet and bottle water producers in Rivers state using simple random sampling technique. The sample size was determined using the Taro Yamen's formula. A structured questionnaire was used as the main instrument for collecting data from the respondents. The data collected were analyzed using the Spearman Rank Order Correlation with the aid of the SPSS 21.0 version. The findings revealed that green transportation has a significant relationship with environmental sustainability. The study also found a significant relationship between green storage and environmental sustainability. A significant relationship was also reported between green packaging and environmental sustainability. The study also found a significant relationship between reverse logistics and environmental sustainability. From the findings, it was concluded that green distribution practices significantly enhance environmental sustainability in Nigeria. Based on the findings and conclusion, it was recommended that sachet and bottle water producing companies in Nigeria especially those in Rivers State should practice green distribution as it would enhance the achievement of environmental sustainability in Nigeria.

**Keywords:** Green distribution, green transportation, green storage, green packaging, reverse logistics, environmental sustainability.

### **1. Introduction**

The issue of how to achieve environmental sustainability in Nigeria has received much attention in recent times in view of the increasing environmental pollution and degradation brought about the activities of industrial companies. The determination to amass wealth has preoccupied the minds of businessmen to the extent that the damages done to the environment as a result of their economic activities have been completely overlooked. However, as the environmental damages begin to take effects on the lives of the citizens, attention has been shifted to the environment with the view to find ways to preserve the natural ecosystems from all forms of pollution and degradation especially in the course of engaging in economic activities. This brought about the issue of sustainability. Environmental sustainability is a responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality (Gillaspy, 2018). It is a balancing act of meeting needs and preserving the environment. Environmental sustainability requires companies to take measures to sustain the environment for future generations in the course of doing business or engaging in economic activities. It emphasized the need to integrate and balance economic needs with environmental protection in such a way that the requirements of human beings and nature are duly recognized. In other words, it requires companies to embark on activities to amass wealth while at the same time preserving the capacity of the environment to support human life of the future generations (Little, Hester & Carey, 2016). This includes integrating sustainability issues into their distribution activities otherwise known as green distribution.

Green distribution actually requires a change from the conventional distribution practices to an environmentally friendly distribution system. It involves integrating environmental concerns into the whole distribution processes from storage and warehousing, order processing and picking, packaging, loadings, transportation, delivery to the purchaser to taking back packaging (Belz & Peattie, 2009). These practices span from reducing the amount of fossil fuels and greenhouse gases used in the distribution process to increased emphasis on the environment during distribution (Mwaura, Letting, Ithinj & Orwa, 2016). Green distribution brings about a change in the way distribution is being practiced by integrating environmental consciousness in the process of moving goods from one point to another. It places emphasis on environmental protection in the process of distributing goods from one place to another (Alshura & Awawdeh, 2016). Such practices range from changing the way distribution is centered and vehicles are powered to implementing greater transparency regarding the environment and distribution practices (Mwaura et al, 2016).

The quest for green distribution emerges as a result of the damages done to the environment in the process of distributing goods and services. Hence, the integration of environment concerns into the distribution processes becomes imperative since it is the only way to achieve environmental sustainability. As Ravet (2013) rightly stated if all companies integrate environmental concerns in their distribution processes, it would help to reduce the amount of greenhouse gases emission, carbon dioxide as well as energy consumption, thereby making the environment safe for both the present and future generations. It is against this backdrop that this paper examined green distribution practices and environmental sustainability in Nigeria using selected sachet and bottle water producers in Rivers State as survey study.

### **1.2. Statement of the Problem**

The increasing environmental pollution and degradation has continued to generate much concern to the people of Rivers State. The people of the State have continued to lament over the damages done to the environment as a result of the economic activities embarked upon by business entities. Producers of sachet and bottle water have contributed massively to the environmental pollution in the State as a result of their poor distribution practices. Most of the sachet and bottle water producers in the State do not integrate environmental concerns into their distribution processes rather they are only interested in acquiring wealth and growing to be a larger entities. A large amount of carbon dioxide and greenhouse gases emission have been released into the environment as a result of their continuous use of smoking vehicles in the transportation process. The storage facilities of these companies specifically their warehouse buildings depend largely on dirty energy sources like fossil fuels and gases, thereby increasing energy consumption and greenhouse gas emission, causing climate change and global warming. Even the packaging materials of these sachet water, producers are liting the environment, increasing the amount of waste brought to the landfills while no measure have been put in place by these companies to reclaim waste or used packaging materials. Considering the environmental damages done to Rivers State as a result of the poor distribution practices of sachet and bottle water producers, some marketing experts and environmentalists (e.g. Flint & Gammelgaard, 2008; Mwaura et al, 2016) have called for the adoption of green distribution as a way of addressing the environmental challenges in the State and achieving environmental sustainability. However, ever since these calls were made, it is still not clear whether sachet and bottle water producers in Rivers State have embraced green distribution as empirical studies that examine the relationship between green distribution practices

and environmental sustainability in Nigeria are remarkably absent. This has created a vacuum in empirical literature which the present study is set to fill.

### 1.3. Aim and Objectives of the Study

The aim of this study was to examine green distribution practices and environmental sustainability in Nigeria using selected sachet and bottle water producers in Rivers State as a survey study. In order to achieve this broad aim, the study intends to attain the following objectives:

1. To determine the relationship between green transportation and environmental sustainability.
2. To ascertain the relationship between green storage and environmental sustainability.
3. To examine the relationship between green packaging and environmental sustainability.
4. To determine the relationship between reverse logistics and environmental sustainability.

The above stated objectives are captured in the conceptual framework shown in figure 1 below:

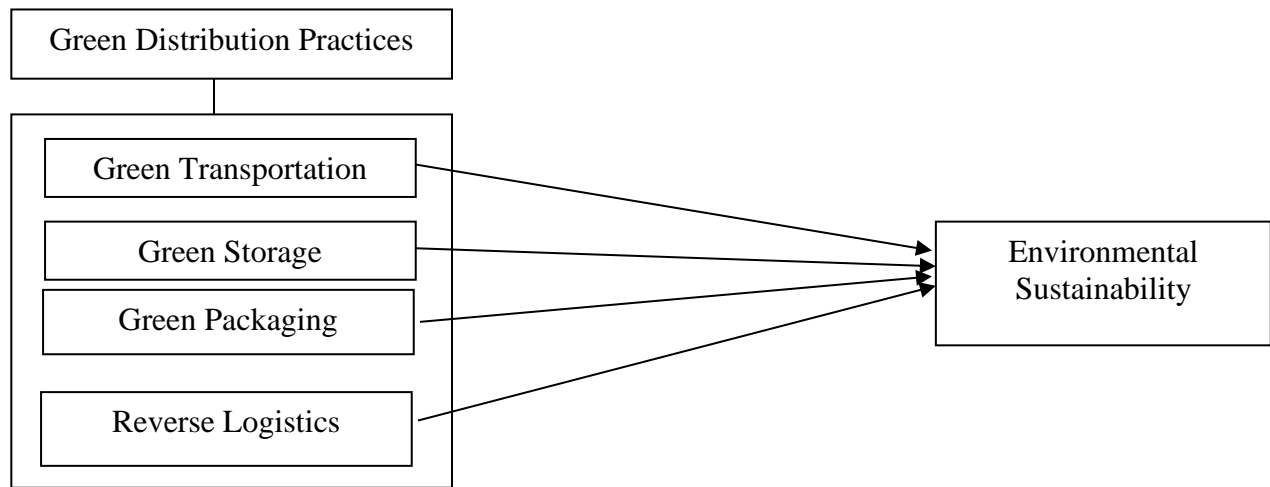


Fig.1 : Operational Framework Construct

### 1.4. Implications of the Study

This study has several implications on sachet and bottle water producers in Nigeria especially those in Rivers State as it would sensitize them on the need to practice green distribution. The study will also broaden the knowledge of sachet and bottle water producers on how green transportation, green storage, green packaging and reverse logistics can help to achieve environmental sustainability. Distributors of bottle and sachet water will benefit from this study as it would encourage them to devise means to take back used plastic bottles from their customers to pave way for recycling. The study will also sensitize managers and marketers on how to preserve their products in their warehouses using energy from clean sources like sunlight. This will enable them reduce the over dependency on dirty energy from fossil fuel, thereby reducing carbon dioxide and gas emission. Individuals and investors who may wish to start a bottle and sachet water producing company will benefit from this study as it would sensitize them on the need to embrace green distribution. The study will educate them on how green distribution practices can help to achieve

environmental sustainability. Above all, students, academicians and researchers especially those who may wish to carry out further research on this topic or related ones will find this study useful as it would serve as a good reference material for their studies.

## **2. Literature Review**

### **2.1 Concept of Green Distribution**

Green distribution is a transition from the conventional distribution practices to an environmental friendly distribution system (Langella & Zanoni, 2011). It is a form of improvement in the way distribution activities are being practiced by integrating sustainability issues into the conventional distribution processes without compromising any of the conventional purposes that distribution has to fulfill (Muma, Nyaoga, Matwere & Nyambega, 2014). Ravet (2013) argued that green distribution emphasized the need for environmental protection in the course of transporting goods, storing goods and packaging products. It requires a system that consumes less energy during the distribution process and reduce the amount of carbon emission released into the air as well as the amount of packing materials (wastes) deposited in the landfills. Green distribution has become paramount in view of the increasing environmental disasters experienced all over the world. Gillaspay (2018) stated that increased environmental disasters has forced governments all around the globe to put pressure on manufacturing companies to integrate sustainability issues in their economic activities as the only way to save the planet from further deterioration, global warming and climate change. This pressure has made many companies in the developed countries to integrate environmental concerns into their distribution processes. Mwaura et al (2016) added that increased environmental awareness has led more companies to adopt sustainable or green distribution. Hutomo, Haizam and Sinaga (2018) posited that green distribution demands that environmental promotion should be of almost priority in a firm's distribution system. They further stated that green distribution is an efficient distribution system with minimum harm on quality of life and has the capacity of achieving environmental sustainability.

Green distribution activities are economically viable and ensure a safe environment for future generations. Such activities including reducing the carbon dioxide released into the environment in the course of moving goods from one location to another, monitoring and improving the ecological impacts of the distribution processes such as physical transportation, storage and warehousing, packaging, labeling and reverse logistics (Belz & Peattie, 2009). Transportation innovations can help to achieve sustainability in the distribution processes by improving fuel-efficiency of engines, optimizing vehicles loads and implementing intelligent transportation management systems (Flint & Gammelgaard, 2008). During storage/warehousing, companies can integrate some sustainable attributes to help reduce energy consumption and the amount of carbon emission released into the environment. For instance, companies can acquire a solar photovoltaic roof panels which generate energy from renewable sources like sunlight, thereby minimizing the need for fossil fuels and reducing over-dependence on electrical grid distribution system. This energy produced from solar or sunlight is free of carbon emissions and this is why is referred to as clean energy (Dheeraj & Vishal, 2012). Also, optimizing the architecture of the warehouse and increasing natural daylight can help to minimize the need for electric bulbs or lights (Foreword, 2008).

## **2.2. Concept of Environmental Sustainability**

Environmental sustainability is defined as a long-term maintenance of valued environmental resources in an evolving human context (Ugochukwu, Ertel & Schmidt, 2014). Morelli and Lockwood (2011) defined environmental sustainability as the process of interacting with the environment in such a way that the natural resources are sustained for use to the future generations. It involves taking measures to prevent any form of environmental degradation or depletion that is capable of denying future generations the opportunity of using the natural environment to meet their own needs (Goodland, 2005). Moreli (2011) stated that any deliberate effort or measure taken by an individual or business entity to preserve the natural environment from all forms of pollution, degradation or depletion with the aim of maintaining it for future generations is known as environmental sustainability. Environmental sustainability demands that companies make decisions and take actions that are in the best interest of the environment. Langella and Zanoni (2011) stated that environmental sustainability demands a fundamental change in how companies produce and distribute their goods and services. Such change requires mutual and synchronized efforts from companies to ensure that the environment is preserved and sustained for future generations to use. The importance of environmental sustainability has been emphasized globally by world leaders. Several international conferences have been held to discuss ways to achieve environmental sustainability. For instance, in 1992, the United Nations Conference on Environment and Development (UNCED) was organized in Rio de Janeiro, Brazil where the issue of environmental sustainability was discussed (Moreli, 2011). In 2002, a summit was organized in Johannesburg, South Africa where the issue of environmental sustainability was brought forward and deliberated extensively as way to saving the planet from global warming, climate change, pollution, degradation and other forms of man-made dangers (Little., Hester & Carey, 2016). Back home, Nigeria has put together some conferences recently to discuss ways to achieve environmental sustainability following the increasing rate of environmental pollution which constitutes a great danger to human health and well-being. However, in order to achieve environmental sustainability in Nigeria, companies especially those in the manufacturing industry need to embrace green distribution.

## **2.3. Green Distribution Practices and Environmental Sustainability**

### **2.3.1. Green Transportation and Environmental Sustainability**

Green transportation has the potentials of achieving environmental sustainability in Nigeria. Green transportation is one of the key functions in the green distribution system. Eberle and von Helmolt (2010) defined green transportation as the integration of environmental concerns into the transportation process. Erdogan and Miller-Hooks (2012) described green transportation as any form of transport that does not use or rely on fossil fuels rather it relies on renewable or regenerated energy sources like solar or electricity. Green transportation focuses on solving the pollution routing problems by designing an optimal vehicle route in which routing costs and polluting emissions are jointly minimized (Pelletier, Jabali & Laporte, 2014). However, several factors need to be considered in implementing green transportation. According to Al-Odeh and Smallwood in Mwaura et al (2016), factors such as fuel, modes of transport, infrastructure and operational practice are important factors to consider in developing green transportation. Transporting goods using vehicle that utilizes fuels, diesel or gasoline as its sources of energy produces large amount of carbon emission which causes climate change, global warming and acid rain (Langella &

Zanoni, 2011). The frequent use of vehicles that utilize fossil fuels contributes to environmental pollution which constitutes a threat to human health and existence (Pelletier, Jabali & Laporte, 2014). Companies can integrate sustainable practices in the course of transporting their goods to customers by using vehicles that use alternative source of energy to fuels. For instance, companies may decide to use fleets run by alternative fuels or utilize other alternative means of transportation like rail instead of road, or sea instead of air (Zhang & Zheng, 2010). Companies can also reduce the distance they drive by building several localized distribution centers closer to their customers or end-user of their products. Apart from this, companies can improve their fuel-efficiency of engines and optimize vehicle loads to reduce the amount of carbon emission released into the air during transit (Flint & Gammelgaard, 2008). (Chopra, 2010) argued that green transportation has the potentials of not only protecting the environment from pollution and degradation but also help to achieve environmental sustainability. Based on these arguments, we develop our first hypothesis:

Ho<sub>1</sub>: There is no significant relationship between green transportation and environmental sustainability in Nigeria.

#### **2.4.2 Green Storage and Environmental Sustainability**

Green storage is a strategic tool for achieving environmental sustainability (Hutomo et al, 2018). Green storage is a crucial aspect of green distribution process. The integration of sustainability issues into the storage process is known as green storage (Alshura & Awawdeh, 2016). Dheeraj and Vishal (2012) described green storage as the integration of environmental concern into an organization's storage activities without compromising any of the objectives which storage has to fulfill. In a nut shell, green storage involves keeping goods in a warehouse using a storage facility that is environmental friendly. Zhang and Zheng in Mwaura et al (2016) stated that companies that are determined to improve their environmental image can integrate sustainability issues into their storage activities by designing and constructing a warehouse or storage facility to meet the criteria of non-pollutant environment while strengthening and maintaining good humidity, corrosion, waterproofing in addition to other factors. Considering the fact that electricity increase energy consumption and environmental pollution, companies can improve their environmental performance by powering their storage facilities using hydro, wind or solar energy source instead of electricity. Powering the storage facility using solar energy can help to reduce gas emission, save energy cost and protect the environment from pollution (Langella & Zanoni, 2011). Hutomo et al (2018) stated that companies can restructure their storage process by introducing some green element into their storage practices. When companies integrate the green element into their storage practices, it would help to reduce their environmental footprint and improve their environmental image (Hutomo, Haizam & Sinaga, 2018). Integrating the green element into their storage process involves redesigning and innovating the storage facility to incorporate environmental protection and streamlining the process to reduce energy consumption and green-house gas emission (Ravet, 2013). Based on these reports, we propose our second hypothesis:

Ho<sub>2</sub>: There is no significant relationship between green storage and environmental sustainability in Nigeria.

#### **2.4.3. Green Packaging and Environmental Sustainability**

Achieving environmental sustainability demands that companies in the industrial sector practice green packaging. Green packaging is an important aspect in any green distribution practices. Green packaging is a packaging system that reduces overflowing landfills and global warming, decrease

carbon footprint as well as saving materials (The Media in Nguyen, 2017). It involves the use of less packaging materials (packaging optimization), biodegradable and recycling materials (Nguyen, 2017). Green packaging is less harmful to the environment because it reduces layers of packaging, shrink the size of materials used in packaging and recycle the existing package to reduce excessive wastes in the environment. Through the reduction in packaging size or materials which cut down manufacturing expenses, green packaging promotes environmental protection (Kong, Harun, Sulong & Lily, 2014).

A good green package communicates the environmental benefits of the product to the consumers. Such information will enable environmental conscious consumers to appreciate the product and develop the intention to purchase it. Carlson, Grove and Kangun in Hakansson, Kvarnstrom and Nilsson (2014) stated that environmentally conscious consumers prefer to purchase products whose package materials can be recycled to reduce excessive wastes in the environment. According to them, once these consumers see information relating to the environmental benefits of the product (i.e. in the form of biodegradability or recyclability), they will develop the intention to purchase the products and ignore those competing brands whose packages cannot be recycled. Dellis (2016) confirmed that green packaging has the capacity of achieving environmental sustainability especially during this period where consumers' knowledge on environmental problems has increased. Based on these arguments, we develop our third hypothesis:

Ho<sub>3</sub>: There is no significant relationship between green storage and environmental sustainability in Nigeria.

#### **2.4.4. Reverse Logistics and Environmental Sustainability**

Reverse logistics is one of the most effective ways of achieving environmental sustainability (Alshura & Awawdeh, 2016). Reverse logistics is concerned with reclaiming used packaging as well as unsold and end-of-life products that have to be disposed in order to make materials available for recycling or reuse (Belz & Peattie, 2018). It is the recipient of shipped or distributed products for further manufacturing or recycling (Fortes in Alshura & Awawdeh, 2016). The sub-practices of reverse logistics include product return, packaging material return, material reuse, recycling, disposal of waste and reproduction (Muma et al, in Alshura & Awawdeh, 2016). Reverse logistics is a crucial extension within the green distribution process as it carries a huge potential to achieve a sustainable supply chain process that fulfills both environmental protection and social needs (Langella & Zanoni, 2011). By taking back waste or used package, companies can recycle or reuse them which would help to reduce the amount of waste brought to the landfills (Belz et al, 2009). Pelletier, Jabali and Laporte (2014) stated that companies can optimize vehicle loadings by ensuring that empty trucks returning from distribution trips are filled with waste or used packaging materials. By implementing this measure, companies can substantially improve their environmental performance (Pelletier, Jabali & Laporte, 2014). Apart from the environmental benefits, reverse logistics can help producers to save the costs of reordering for new packaging materials since the waste or used packaging materials returned will be re-used for other newly manufactured products (Eberle & von Helmolt, 2010). Foreword (2008) advised producers to continuously avoid the cost of reproducing or re-ordering new packaging materials by implementing reverse logistics. However, reverse logistics faces some challenges in the course of implementation. As waste or used packages are usually returned in different conditions and have to be picked up in private households, the dimension of take-back systems has to be determined particularly per product and with respect to its value, disassembling costs, and potential

inconvenience inherent for customers (Belz a& Peattie, in Wikipedia, 2018). This challenge can be addressed by banning highly toxic products from being disposed on landfills, increase disposal costs and providing incentives to customers who return their waste or used package materials (Belz & Peattie, 2009). If these measures are taken, it would help to increase return rate and achieve the environmental sustainability (Belz & Peattie, 2009). In line with this postulation, we propose our fourth hypothesis:

Ho<sub>4</sub>: There is no significant relationship between green storage and environmental sustainability in Nigeria.

### **2.5. Theoretical Framework**

This study is anchored on the environmental economic theory which was developed by Boulding in 1966. The environmental economic theory states that the eco-system and the natural resources may be depleted in the course of pursuing economic development. It explains how human economic activities impact on the environment and its natural resources. The environmental economic theory explains the cost/benefits of man's economic activities. The theory believes that in every human activity embarked upon to earn a living, there is always a cost which has to be bared. In this regards, the pollution of the environment is the cost of engaging in conventional distribution activities (economic activities). This implies that the environment suffers from increased gas emission and carbon footprint when companies continue to rely on fuel-dependent vehicles in transporting the goods.

The environmental economic theory argues that companies can still achieve their economic dreams if they pay adequate attention to the environment in the course of doing business. The theory emphasized the need for companies to strike a balance between achieving their economic objectives and preserving the natural environment (Pearce, in Cheng, 2011). The theory further argued that when companies are able to strike a balance between meeting their economic objectives and preserving the natural environment, the world will be a better place to live and the future generations will be able to use these natural resources to meet their own needs. It was stated that the environmental economic theory believes that economic activities must commensurate with environmental objectives to make the world a better place.

The environmental economic theory is very useful in explaining the relationship between green distribution and environmental sustainability. The theory believes that the environmental sustainability can be achieved through green distribution practices such as green transportation, green storage, green packaging and reverse logistics. It explains the need for manufacturing companies to balance their distribution activities with environmental protection. The environmental economic theory argues that distribution activities can be carried out without doing much damage to the environment. If companies are serious about protecting the environment from all forms of pollution and degradation, they will integrate sustainability issues into their distribution processes. The environmental economic theory believes that there should be a balance between satisfying needs and preserving the environment for future generations. While distribution activities are encouraged to achieve economic development, the environment should also be protected from pollution and degradation by integrating sustainability issues into the distribution processes.



## 2.6. Methodology

This study adopted the correlation survey research design. The target population of this study consisted of all the 400 sachet and bottle water producers registered with the National Agency for Food and Drug Administration and Control (NAFDAC) in Rivers State. Out of the 400 sachet and bottle water producers registered with NAFDAC, 200 of them were selected for the study. The sample size was determined using the Taro Yamen’s formula. The sampling technique used in selecting the sample size for the study was the simple random sampling technique. A structured questionnaire was used as the main instrument for data collection. The questionnaire was validated through face and content analysis. The reliability of the instrument was determined using the test-retest method. A total copy of 200 questionnaires was administered to the respondents and 153 copies were retrieved and used for data analysis. The data collected in the questionnaire were analyzed using the Spearman Rank Order Correlation (rho). The Spearman Rank Order Correlation (rho) was computed using the aid of the SPSS (Statistical Package for Social Sciences) 21.0 version.

## 2.7. Results

The result of the correlation analysis carried out on the study variables are presented and interpreted. The result for each hypothesis is presented below.

**Table 1: Result of correlation analysis between green transportation and environmental sustainability**

			Green Transportation	Environmental Sustainability
Spearman (rho)	Green Transportation	Correlation Coefficient	1.000	.827*
		Sig. (2 tailed)	.	.001
		N	153	153
	Environmental Sustainability	Correlation Coefficient	.827*	1.000
		Sig. (2 tailed)	.001	.
		N	153	153

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

*Source: SPSS-generated Output*

Table 1 presents the result of correlation analysis performed between green transportation and environmental sustainability. The result shows that green transportation is positively correlated to environmental sustainability (rho = .827\*) and this correlation is significant at 0.05 level as indicated by the symbol \*. Based on this result, the null hypothesis (H<sub>01</sub>) was rejected and the alternate hypothesis was accepted. This means that we then accept that there is significant relationship between green transportation and environmental sustainability.

**Table 2: Result of correlation analysis between green storage and environmental sustainability**

			Green Storage	Environmental Sustainability
Spearman (rho)	Green Storage	Correlation Coefficient	1.000	.754*
		Sig. (2 tailed)	.	.002
		N	153	153
	Environmental Sustainability	Correlation Coefficient	.754*	1.000
		Sig. (2 tailed)	.002	.
		N	153	153

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

*Source: SPSS-generated Output*

Table 2 presents the result of correlation analysis between green storage and environmental sustainability. The result indicates that green storage has a positive correlation with environmental sustainability ( $\rho = .754^*$ ) and the symbol \* indicates that this correlation is significant at 0.05 level. Consequently, the null hypothesis ( $H_{02}$ ) is rejected and the alternate hypothesis is accepted. This means that we then accept that there is positive and significant relationship between green storage and environmental sustainability in Nigeria.

**Table 3: Result of correlation analysis between green packaging and environmental sustainability**

			Green Packaging	Environmental Sustainability
Spearman (rho)	Green Packaging	Correlation Coefficient	1.000	.956*
		Sig. (2 tailed)	.	.003
		N	153	153
	Environmental Sustainability	Correlation Coefficient	.956*	1.000
		Sig. (2 tailed)	.003	.
		N	153	153

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

*Source: SPSS-generated Output*

Table 3 shows the result of correlation analysis between green packaging and environmental sustainability. The result indicates that green packaging has a positive correlation with and environmental sustainability ( $\rho = .956^*$ ) and this correlation is significant at 0.05 level as indicated by the symbol \*. As a result of this, the null hypothesis ( $H_{03}$ ) is rejected and the alternate hypothesis is accepted. This means that there is positive and significant relationship between green packaging and environmental sustainability.

**Table 4: Result of correlation analysis between reverse logistics and environmental sustainability**

		Reverse Logistics	Environmental Sustainability
Spearman (rho)	Reverse Logistics	Correlation Coefficient	1.000
		Sig. (2 tailed)	.004
		N	153
	Environmental Sustainability	Correlation Coefficient	.883*
		Sig. (2 tailed)	.004
		N	153

\*\*Correlation is significant at 0.01 levels (2 tailed)

\*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS-generated Output

Table 4 presents the result of correlation analysis between reverse logistics and environmental sustainability. The result indicates that there is positive correlation between reverse logistics and environmental sustainability ( $\rho = .883^*$ ) and this correlation is significant at 0.05 level as indicated by the symbol \*. Based on this result, the null hypothesis ( $H_{04}$ ) is rejected and the alternate hypothesis is accepted. This means that we then accept that there is positive and significant relationship between reverse logistics and environmental sustainability.

### 2.8. Discussion of Findings

Based on the result of the analysis carried out, it was discovered that green transportation has a positive and significant relationship with environmental sustainability. This finding was derived from the result of the correlation analysis carried out on the two variables. The result revealed that green transportation is positively correlated to environmental sustainability and that this correlation is significant at 0.05 level (see table 1). Based on this result, the null hypothesis was rejected and the alternate hypothesis was accepted. This implies that there is positive and significant relationship between green transportation and environmental sustainability. The implication of this finding is that if bottle and sachet water producers in Rivers State practice green transportation, it would help to achieve environmental sustainability in Nigeria. This finding is supported by the research conducted by Ravet (2013) and Langella and Zanoni (2011) as both studies found a positive and significant relationship between green transportation and sustainability performance. Zhang and Zheng (2010) also supported this finding when they reported that green transportation significantly enhance the environmental performance of manufacturing firms. This study also found a significant positive relationship between green storage and environmental sustainability. This finding was derived from the result of the correlation analysis carried out on the two variables. The result revealed that green storage positively correlated to environmental sustainability and this correlation is significant at 0.05 level (See table 2). As a result of this, the null hypothesis was rejected and the alternate hypothesis was accepted. This means that there is positive and significant relationship between green storage and environmental sustainability. The implication of this finding is that if sachet and bottle water producing companies in Rivers State practice green storage and do away with other unsustainable methods of storing goods, it would help to achieve environmental sustainability in Nigeria. This finding is in line with the research conducted by Zhang and Zheng (2010) and Ravet (2013) as both studies which found a significant positive relationship between green storage and environmental (sustainability) performance of manufacturing firms.

This study equally found a positive and significant relationship between green packaging and environmental sustainability. This finding was deduced from the result of the correlation analysis carried out on the two variables. The result revealed that green packaging has a positive correlation with environmental sustainability and this correlation is significant at 0.05 level (see table 3). As a result of this, null hypothesis was rejected and the alternate hypothesis was accepted. This implies that we then accept that there is positive and significant relationship between green packaging and environmental sustainability. The implication of this finding is that if sachet and bottle water producers in Rivers State switch from their conventional packaging to green packaging, environmental sustainability will be attained. This finding is consistent with the research conducted by Muma et al (2014) and Hutomo et al (2018) as both studies found a significant positive relationship between green packaging and sustainability performance.

Finally, it was revealed that a positive and significant relationship exists between reverse logistics and environmental sustainability. This finding was derived from the result of the correlation analysis carried out on the two variables. The result revealed that reverse logistics is positively and significantly correlated to environmental sustainability (See table 4). Based on this result, the fourth hypothesis which was stated in null form was rejected and the alternate hypothesis was accepted. This means that there is positive and significant relationship between reverse logistics and environmental sustainability. The implication of this finding is that if sachet and bottle water producers in Rivers State integrate reverse logistics into their distribution activities, it would help to achieve environmental sustainability in Nigeria. This finding is in line with the research conducted by Zhang and Zheng (2010), Langella and Zanoni (2011), Ravet (2013) and Alshura and Awawdeh (2016) as they all found a significant positive relationship between reverse logistics and sustainability performance of manufacturing firms.

## **2.9. Conclusion**

Given the increased environmental degradation and pollution in Rivers State and its implications on the health status of the people in the State, it becomes imperative for sachet and bottle water producers in the State to practice green distribution since it has the potential of achieving environmental sustainability. This can be done by transporting their goods in a sustainable manner (green transportation), designing or constructing a storage facility that meet the criteria of non-pollutant environment (green storage), packaging their products in reusable or recycling containers (green packaging), and taking back used packaging materials or plastic containers from customers to reduce the amount of wastes disposed on the landfills (reverse logistics). The empirical results of this study have clearly shown that the elements of green distribution (green transportation, green storage, green packaging and reverse logistics) have the potentials of achieving environmental sustainability in Nigeria. The implication of this is that if sachet and bottle water producing companies in Rivers State switch from their unsustainable distribution practices to green distribution system, it would help to achieve environmental sustainability in Nigeria.

## **2.10. Recommendations**

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

1. That, sachet and bottle water producers in Rivers State should switch from their unsustainable distribution practices to green distribution system as it would help to achieve environmental sustainability in Nigeria.

2. That, sachet and bottle water producers in Rivers State should stop transporting their goods using vehicles that rely on fossil fuels, diesel or gasoline because they produce large amount of carbon emissions which causes climate change, global warming and acid rain.
3. That, sachet and bottle water producers should transport their goods using vehicles that rely on renewable energy sources like solar or sunlight as it would not only reduce the amount of carbon emission released into the air but would also enhance the achievement of environmental sustainability.
4. That, sachet and bottle water producers in Rivers State should restructure their storage processes by integrating sustainability issues into their storage activities. This can be done by constructing a storage facility that will meet the criteria of non-pollutant environment.
5. That, sachet and bottle water producers in Rivers State should switch from the conventional methods of packaging to eco-friendly methods. This can be done by packaging their products in reusable and recycling containers to reduce excessive wastes brought into the landfills.
6. Finally, it is recommended that establish a policy of taking back used packaging materials or plastic containers from their customers (reverse logistics) as this would not only reduce the amount of wastes disposed on the landfills but would also improve their environmental performance and achieve environmental sustainability.

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