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GREEN PACKAGING AND ENVIRONMENTAL SUSTAINABILITY (A STUDY OF SELECTED GREEN COMPANIES IN PORT HARCOURT)

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ABSTRACT

This paper explored the relationship between green packaging and environmental sustainability in Nigeria. Data were collected from 112 managers and marketers from 14 green companies that packaged their products in biodegradable and recyclable containers. A structured questionnaire was used to obtain data from the respondents. The data collected were analyzed using Spearman Rank Order Correlation with the aid of SPSS version 21.0. The findings showed that there is positive and significant relationship between biodegradable packaging and environmental sustainability. The study also found a positive and significant relationship between recyclable packaging and environmental sustainability. A positive and significant relationship was equally found between packaging optimization and environmental sustainability. From the findings, it was concluded that green packaging significantly enhance environmental sustainability. The study therefore recommended that manufacturing companies in Nigeria should switch from the conventional packaging system to green packaging as it would enhance environmental sustainability.

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Keywords: Green packaging, biodegradable packaging, recyclable packaging, packing optimization, and environmental sustainability.

INTRODUCTION

The issue of environmental sustainability has attracted much attention in recent times in view of the increasing environmental pollution, climate change, global warming, and degradation brought about by the activities of manufacturing companies. Research has shown that 50 to 60% of environmental degradation occurred as a result of the poor waste management (Pullen, 2014). This constitutes a great threat to human existence and calls for urgent action. As a step towards addressing the issue of environmental degradation, the United Nations in its conference on Environment and Development held in Rio de Janeiro (1992) called for environmental sustainability. Environmental sustainability involves making decisions and taking action that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life (Saxena and Khandelwal, 2010). It demands that society designs activities to meet human needs while indefinitely preserving the life support systems of the planet. Governments all over the world have taken steps to promote environmental sustainability. They have embarked on extensive public campaign to encourage the masses to stop littering the environment with wastes and refuse. Governments have also issued out directives to companies to be environmental conscious in their quest to satisfy human needs and maximize profit. Today, pressures are being mounted on companies particularly those in the industrial sector to take adequate measures to promote environmental sustainability. However, in order to companies to promote environmental sustainability, they need to switch from their conventional packaging system to green packaging.

Green packaging, also known as sustainable packaging, is the use of materials and manufacturing methods for the packaging of goods that has a low impact on both energy consumption and on the environment (Merton, 2016). Green packaging is energy efficient and is designed in an environmentally awareness manner using recycling and biodegradable materials (Merton, 2016).

By embracing green packaging, it is easier for manufacturers to prevent chemicals and contaminations that damage the soil, waters and atmosphere of our environment. This can be achieved by adopting biodegradable and recycling packaging. Apart from using biodegradable and recycling packaging system to protect the environment, green packaging also has lower packaging content (packaging optimization) and used energy from alternative sources such as solar energy, winds and bio-fuels in the production and transportation processes. Some of the materials used in green packaging include biodegradable plastics, plant-based plastics, recycled products, post-consumer recycled polyethylene bags made from recycled waste, recycled molded packaging for eggs and alternative sources of energy.

Green packaging is an effective strategy for achieving environmental sustainability. According to Rokka and Uusitalo (2008), green packaging has the potentials of restoring the environment from degradation and preserving it for future generations. This system of packaging is capable of preventing chemicals and contaminants from damaging the soil, waters and atmosphere through proper implementation of biodegradable and recycling packaging. Green packaging is energy efficient and uses bio-fuels, solar energy, winds in the production and transportation processes. World Packaging Organization, in Wikipedia (2016) stated that companies that switch from conventional packaging to green packaging intend to meet the functional and economic needs of the present generations without compromising the ability of future generations to meet their own needs. It is against this backdrop that this paper examines green packaging and environmental sustainability using selected green companies in Port Harcourt as a survey study.

Statement of the Problem

On a daily basis, millions of packaged items are transported or shipped throughout the world. Each of these items generates waste and many conventional packaging materials cannot be recycled. With the large number of companies transporting goods on a daily basis from production factories to warehouses, and from the warehouses to retailers, a lot of wastes are generated. Wasteful plastics, cardboard, Styrofoam and paper used in the process are being found on the streets and waters. There have been several calls for manufacturers to switch from their conventional packaging system to green packaging for the sake of the environment. Despite, these calls, many manufacturing companies are yet to redesign their packaging system and switch from the convention method to green packaging. A huge amount of energy is utilized for the production of conventional packages such as plastics, corrugated boxes and plastic bags. The energy source for this production is fossil fuels which add millions of metric tons of methane and carbon dioxide into the atmosphere annually (Merton, 2016). The discarded conventional packages eventually end up in the landfills and seas, causing contamination/damage to the environment. This problem has become so worrisome and need to be address urgently. It is in view to address this problem that prompted this study.

Aims and Objectives of the Study

The aim of this study is to examine the relationship between green packaging and environmental sustainability using selected green companies in Port Harcourt as a survey study. The specific objectives of the study are as follows:

1. To determine the relationship between biodegradable packaging and environmental sustainability.
2. To ascertain the relationship between recyclable packaging and environmental sustainability.
3. To examine the relationship between packaging optimization and environmental sustainability.

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

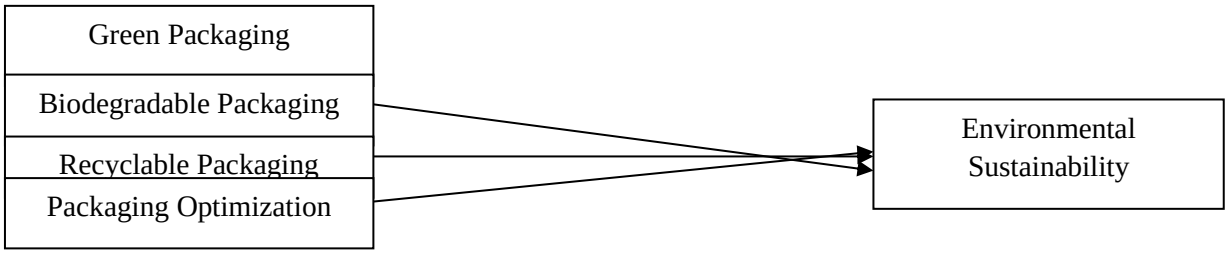

Figure 1: Conceptual Framework
Source: Author's Conceptualization

Implications of the Study

The policy implications of this study is that it will help the Nigerian Government to formulate environmental policy that will prompt manufacturing companies to embrace green packaging so as to achieve environmental sustainability. This study will also be relevance to manufacturing companies in Nigeria as it will encourage them to switch from the conventional packaging that contaminate and damage the environment to green packaging that safeguard and protect the environment for future generations. The study will also be relevance to marketers in Nigeria as it will sensitize them on how green packaging can help them to save cost, materials and energy used in the production and transportation processes. It will educate marketers on how green packaging can help them to lower packaging content. Students and researchers who may wish to carry out further research on this topic or related ones will find this paper useful as it will serve as a good reference materials for their study.

LITERATURE REVIEW

Concept of Green Packaging

48Green packaging is defined as a packaging that can be recycled or made of recycled materials (Goncalves, 2013). The Europe and European Organization in Ramme and Heimann (2015) defines green packaging as a well-designed packaging that meets the requirements of the product while minimizing the economic and environmental impacts of both the product and its package. The Sustainable Packaging Coalition (SPC) in van den Elzen (2016) gives a detailed definition of green packaging. According to SPC, green packaging is defined as:

> a packaging that is beneficial, safe & healthy for individuals and communities throughout its life cycle; meets market criteria for performance and cost; is sourced, manufactured, transported, and recycled using renewable energy; optimizes the use of renewable or recycled source materials ; is manufactured using clean production technologies and best practices; is made from materials healthy throughout the life cycle; is physically designed to optimize materials and energy; is effectively recovered and utilized in biological and/or industrial closed loop cycles" (SPC, in van den Elzen, 2016).

The European Organization for Packaging and the Environment in Goncalves (2013) stated that green packaging is made from responsible sourced materials such as recyclable and sustainable renewable materials and resources and is designed in a way to minimize the negative environmental impact. It further stated that green packaging is produced and using sustainable energy sources such as bio-fuel and solar energy and is recovered conveniently after use. The Sustainable Packaging Alliance (SPA) in Verghese, Lewis and Burritt (2014) posited that for any packaging system to be termed sustainable or green, it must meet four basic criteria which include:

1. The packaging must be effective i.e. it must add social and economic value.
2. The packaging must be efficient i.e. it must minimize consumption of materials, energy and water throughout its lifecycle.
3. The packaging must be recycled i.e. it must eliminate waste by cycling materials through natural or industrial metabolisms for optimal recovery.
4. The packaging must be safe i.e.it must avoid creating wastes or greenhouse gas emission that pose threat to human health and the organisms. In other words, such packaging must not contribute to environmental degradation of our land and seas.

Green packaging is crucial strategy to preserve and protect the environment from degradation and global warming (Ramme and Heimann, 2015). It is economically feasible for manufacturers and a sound environmental choice. It also helps to promote a cleaner and safer environment for the present and future generations. Lindh (2016) enumerated the benefits of green packaging. He noted that green packaging tends to reduce materials by ensuring that all paper materials used in printing utilized limited space and fit into the content. Merton (2016) posited that green packaging increases recycled content by using 100% paper and sourcing recycled plastic tubing. Verghese, Lewis and Burritt (2012) believed that green packaging has the potentials of reducing waste by shredding older paper sheets and cutting up waste to use as packaging material. It also uses thinner plastic packaging and lower weight paper. Kassaye (2001) stated that green packaging tends to increase recycling by redesigning packaging to exclude non-recyclables such as plastic lids. It also provides a cleaner production by ensuring that ingredients used in materials do not contribute to or cause environmental degradation. Above all, green packaging is energy conservative as it uses green power certified material and source production from alternative energy-efficient facilities.

Concept of Environmental Sustainability

Environmental sustainability is defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality (Gillaspy, 2010). It involves making decisions and taking action that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life (Saxena and Khandelwal, 2010). Gillaspy (2010) stated that the practice of environmental sustainability helps to ensure that the needs of today's population are met without jeopardizing the ability of future generations to meet their own needs. McKinnon, Cullinane, Browne and Whiteing (2010) argued that environmental sustainability requires that human activity in this present generation uses only those natural resources that can be replenished naturally so that the future generations can use them.

Environmental sustainability requires the present generation to embark on activities to meet their daily needs while at the same time preserving the environment for future generations to meet their needs. It does not preach the greedy gospel of satisfying their today's needs and destroying the environment for future generations (Gonçalves, 2013). Cheng (2011) stated that environmental sustainability is all about protecting the environment from which today generation use to meet their needs so that future generation can still meet their own needs using the same environment. It discourages all forms of environmental pollution, degradation, climate change and global warming which occurs as a result of human activities. Barber (2010) posited that protecting the environment from degradation and pollution is the gospel of environmental sustainability. He further stated that environmental sustainability demands that the lands, waters and atmosphere must be preserved by the present generation so that future generation to use them to meet their own needs.

RELATIONSHIP BETWEEN GREEN PACKAGING AND ENVIRONMENTAL SUSTAINABILITY

Biodegradable Packaging and Environmental Sustainability

Biodegradable packaging is a crucial green strategy for achieving environmental sustainability. It is the latest method in green packaging design. Many companies producing consumer goods viewed biodegradable packaging as the ultimate solution to the huge wastes generated through conventional packaging. Biodegradable packaging is generated from plant which is known as poly lactic acid (PLA). Szaky (2008) describes biodegradable packaging as a set of polymers that are derived from renewable raw materials like starch (e.g. corn, potato, tapioca, etc), cellulose, soy protein, lactic acid, etc; not hazardous in production and decompose back into carbon dioxide, water, biomass, etc when discarded properly. The first manufacturer to use corn to produce an industrial polymer is NatureWorks. The polymer product according to NatureWorks is derived from 100% annually renewable resources like corn and is the first polymer showing a drastic reduction in greenhouse gas emissions (Pullen, 2014).

Considering the fact that this polymer shows significant reduction in greenhouse gas emissions, many companies across the world have taken interest in using alternative biodegradable products such as sugar, starch, reeds and corn to produce their packaging (Wisler, 2012). Before now, nearly all food items were packaged in plastics which were oil-based, produced from petroleum. As the cost of oil begun to rise, companies begins to seek for alternative ways to save money. When Wal-Mart, the largest retailer in the world announced that it will begin to sell his goods in PLA containers, the sales of biodegradable packaging increased. Wal-Mart plans to use 114 million PLA containers over a period of one year and it was estimated that this environmental friendly decision will cut down on 800,000 barrels of oil annually.

Today, there is a growing demand for this biodegradable packaging. Davis (2006) observes that the market for biodegradable packaging is growing at the rate of 20% annually. He noted that environmentalists, government and green consumers are the major forces behind this growth apart from the rising cost of crude oil today. The Chairman of Germany's International Biodegrable Polymers Association and Working Group, Harald Kaeb, in Wisler (2012) said that the growing interest in the new biodegradable packaging is motivated by the improved quality of bio-plastics, the growing market share of the products, the cost-competitiveness and more competition as new bio-plastic companies come up around the world. Szaky (2008) observed that the desire for companies to embrace biodegradable packaging is due to its capacity to reduce greenhouse gas emissions and achieve environmental sustainability. Pullen (2014) supported this position stating that biodegradable packaging is capable of achieving environmental sustainability since it reduces wastes and greenhouse gas emission. Based on these arguments, we propose our first hypothesis:

Ho_1: There is no positive and significant relationship between biodegradable packaging and environmental sustainability in Nigeria.

Recyclable Packaging and Environmental Sustainability

Recyclable packaging is green packaging strategy to eliminate waste and achieve environmental sustainability. Giorgos (2016) describes recyclable packaging as a packaging system whereby the container or wrapper used in enclosing a product is put to use again. It is a packaging that is produced with recycled content to arrive at a new product (Hartman, Apoalaza and Forcada, 2005). This packaging system tends to eliminate waste and prevent greenhouse gas emissions. Collins (2008) stated that recyclable packaging is good for both the environment and for business. It remains a philosophy within the green packaging concept. Cekanavicius, Bazyte and Dicmonaite (2014) stated that recyclable packaging tends to reduce the cost, waste and preserve the environment. Many companies are under pressure from the government to design a system that

will protect the environment from hazards, pollution, degradation, global warming and climate change. In response to the environmental concern, many companies have begun to make plans to make their packaging recyclable. For instance, Nestle Company on April 10, 2018 announced its plan to make 100% of its packaging recyclable by the year 2025. Its vision is to ensure that none of its packaging including plastics ends up on the streets, landfill or sea. The company intends to minimize the impact of packaging on the environment. Amazon, the World largest online retailer, has recently introduced some packaging materials that are 100% recyclable and produced with 50% recyclable materials. This is an effort by the company to preserve the environment while satisfying human needs.

Recyclable packaging is the sure way of achieving environmental sustainability. Pullen (2014) argued that if all companies use recyclable packaging, it will lead to zero wastes in our lands and waterways, and environmental sustainability will be achieved. He further stated that companies should be mandated to use of recyclable containers to enclose their products so as to minimize the environmental impact of packaging. Szaky (2008) stated that if food items are enclosed in recycled containers, it will reduce the wastes found on the streets and seas. There is a possibility that recyclable packaging can help to resolve the environmental challenges we faced today if all manufacturing can embraced this form of packaging. Barber (2010) posited that recyclable packaging will put an end to the indiscriminate dumping of wastes on the streets and protect the environment from all forms of littering, degradation and pollution. Gonçalves (2013) believed that recyclable packaging is the most effective way of achieving environmental sustainability. Based on these claims and arguments, we propose our second hypothesis thus:

Ho_2: There is no positive and significant relationship between recyclable packaging and environmental sustainability.

Packaging Optimization and Environmental Sustainability

Packaging optimization is the process of reducing the amount of materials used in packaging a product without compromising on quality (Ramme and Heimann, 2015). Rokka and Uusitalo (2008) stated that optimizing packaging across the supply chain will drastically reduce the amount of footprint on the environment. Many companies have come to realize that optimizing packaging is a win-win situation because it helps to save cost for the company and at the same time protects the environment from all forms of hazards and degradation. Gonçalves (2013) stated that greenhouse emissions which arise as a result of human activities are driving climate change. This has reached the highest level in our history. Manufacturing companies are taking important measures to optimize packaging so as to reduce its environmental impact.

Giorgos (2016) noted that manufacturing firms are making concrete efforts to use optimized packaging to reduce waste, while also reducing costs for the company and consumers. For instance, Cisco Company, a US based manufacturer, recently implemented packaging optimization to reduce waste and transportation footprint. In doing this, the company considered their product, packaging materials and the transportation footprint (McKinnon, Cullinane, Browne and Whiteing, 2010). With its card, the company was able to reduce the amount of foam cushioning used. It was then able to reduce the weight and size of the outer container or corrugated box. This reduction in weight and size alone is expected to save about 180 tons of materials. The company also switched from single pack to multi-packs to optimize transportation footprint. With this method, wood pallets were eliminated and the space savings were often dramatic. Cisco also diverted from individual units to transport the products assembled. For one trip, the aim is to use one single cartoon to replace 13 separate cartoons. The weight of packaging then reduces by 60% (McKinnon et al, 2010).

Packaging optimization is an indispensible tool for achieving environmental sustainability. It helps to reduce waste and transportation footprint in the environment. Blanck (2009) stated that using

less packaging foam reduces petroleum usage and decreases disposal concerns and cost. He further stated that reducing the number of containers and trucks will not only reduce transportation costs but also lower diesel consumption and fewer greenhouse gas emissions. These forms of cost reduction are significant improvement in environmental sustainability. Barber (2010) posited that packaging optimization has the potential of reducing ecological footprint, wastes, transportation costs and greenhouse gas emission. It is a sure way of achieving environmental sustainability. In line with this argument, we propose our third hypothesis thus:

Ho_3: There is no positive and significant relationship between packaging optimization and environmental sustainability.

Theoretical Framework

This paper is anchored on the environmental economic theory which was propounded by Boulding in 1966. The theory states that the eco-system and the natural resources may be depleted in the course of pursuing economic development. The environmental economic theory is based on the principles of cost/benefits. With every cost there are externalities, in this case waste, leading to degradation and depletion of the natural resources and the eco-systems (Cheng, 2011). The environmental economic theory argues that optimal growth can be achieved through an efficient economic system that pays adequate attention to the environment. Pearce in Cheng (2011) observed that our environmental problems have their roots in the failure of the present economic system to maximize our social and human well-being. Environmental economic theory tends to ensure that the eco-systems (environment) are valued as contributors to the human well-being and economic growth. It tends to explain the need for a balance between economic activity and environmental protection.

The environmental economic theory is very useful in explaining the relationship between green packaging and environmental sustainability. The theory explains that the desire to adopt green packaging is to protect the environment from degradation and pollution. The environmental economic theory believes that there should be a balance between satisfying needs and preserving the environment for future generations. It holds the concept that while human economic activities are encouraged to achieve economic development, the environment should also be protected from hazards, pollution and degradation. Since green packaging reduces waste, greenhouse gas emissions, ecological and transportation footprints, it becomes obvious that environmental sustainability can be achieved in line with the environmental economic theory.

METHODOLOGY

This study adopted the descriptive survey research design. The population of this study consisted of all the green companies that packaged their products in biodegradable and recyclable containers in Port Harcourt. As at the time of the study, there were no accurate available statistics on the exact number of green companies in Port Harcourt. Hence, the researcher had to work with an estimated population of 25 green companies from which a population of 243 managers and marketers were identified. The simple sampling technique was used to select 120 managers and marketers from fourteen (14) green companies in Port Harcourt. A structured questionnaire was used to elicit data from the respondents after the instrument had been validated through content analysis by two research experts and its reliability determined using the test retest method. The questionnaires were administered to the respondents across the fourteen (14) selected companies. A total of 120 questionnaires were administered to the respondents and 112 copies were retrieved. All the questionnaires retrieved were edited and certified good to be used for analysis. The data collected from the respondents were analyzed using Spearman Rank Order Correlation. The Spearman Rank Order Correlation was computed with the aid of SPSS (Statistical Package for Social Sciences) version 21.0. The descriptive analysis was also done using the SPSS version 21.0. The results are presented and interpreted accordingly.

DESCRIPTIVE AND EMPIRICAL RESULTS

Descriptive Analysis

The descriptive analysis shows the mean, standard deviation, skewness and kurtosis values of the study variables (biodegradable packaging, recyclable packaging, packaging optimization and environmental sustainability).

Table 1: Descriptive Statistics

Variables	N	Mean	Std Dev.	Skewness		Kurtosis	
				Ratio	Std Error	Ratio	Std Error
Biodegradable packaging	112	2.64	0.91	.125	.116	.323	.252
Recyclable packaging	112	2.86	0.98	.120	.116	.327	.252
Packaging optimization	112	2.73	0.89	.119	.116	.320	.252
Environmental sustainability	112	2.81	0.92	.122	.116	.286	.252

Source: SPSS-generated Output

Table 1 presents the results of descriptive statistics on the variables of the study. The results of the descriptive statistics showed that the mean values of all the variables are greater than 2.50. The results of the kurtosis and skewness analysis showed that all the values of skewness and kurtosis fall between ±1.0 which implies that the variables are close to normal distribution. The skewness and kurtosis ratios and standard error were between ±2.52 which implies that the data approximately close to normality.

Correlation Analysis

The results of the correlation analysis carried out on the study variables are presented in tables. Here, the data collected on green packaging (biodegradable packaging, recyclable packaging and packaging optimization) are correlated with those obtained on environmental sustainability using the SPSS version 21.0. The results of the correlation analysis with respect to each hypothesis are presented below:

Table 2: Relationship between biodegradable packaging and environmental sustainability

			Biodegradable Packaging	Environmental Sustainability
Spearman Rank (rho)	Biodegradable Packaging	Correlation Coefficient Sig. (2 tailed) N	1.000 . 112	.852* .001 112
	Environmental Sustainability	Correlation Coefficient Sig. (2 tailed) N	.852* .001 112	1.000 . 112

**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 biodegradable packaging and environmental sustainability. The result indicated that biodegradable packaging has a positive relationship with environmental sustainability (rho = .852*) and the symbol * implies that the relationship between the two variables is significant at 0.05 level. Consequently, the null

hypothesis which states that "there is no positive and significant relationship between biodegradable packaging and environmental sustainability" is rejected. By rejecting the null hypothesis, we therefore accept the alternate hypothesis which states that "there is positive and significant relationship between biodegradable packaging and environmental sustainability."

Table 3: Relationship between recyclable packaging and environmental sustainability

			Recyclable Packaging	Environmental Sustainability
Spearman Rank (rho)	Recyclable Packaging	Correlation Coefficient Sig. (2 tailed) N	1.000 . 112	.893* .002 112
	Environmental Sustainability	Correlation Coefficient Sig. (2 tailed) N	.893* .002 112	1.000 . 112

**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 the correlation analysis between recyclable packaging and environmental sustainability. The result revealed that recyclable packaging is positively and significantly correlated with environmental sustainability (rho = .893*). Hence, the null hypothesis is rejected and the alternate hypothesis is accepted. This implies that we then accept that there is positive and significant relationship between recyclable packaging and environmental sustainability.

Table 4: Relationship between packaging optimization and environmental sustainability

			Packaging Optimization	Environmental Sustainability
Spearman Rank (rho)	Packaging Optimization	Correlation Coefficient Sig. (2 tailed) N	1.000 . 112	.923* .003 112
	Environmental Sustainability	Correlation Coefficient Sig. (2 tailed) N	.923* .003 112	1.000 . 112

**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 the relationship analysis between packaging optimization and environmental sustainability. The result revealed that packaging optimization is positively related to environmental sustainability (rho = .923*) and the symbol * indicates that this relationship between the two variables is significant at 0.05 level (95% confidence level). As a result of this, the null hypothesis is rejected and the alternate hypothesis is accepted. This means that we then accept that there is positive and significant relationship between packaging optimization and environmental sustainability.

Discussion of Findings

It was discovered in this study that there is positive and significant relationship between biodegradable packaging and environmental sustainability. This finding was derived from the result of the SPSS correlation analysis carried out on the two variables. The result indicated that biodegradable packaging has a positive relationship with environmental sustainability (rho = .852*) and the symbol * implies that the relationship between the two variables is significant at 0.05 level. Consequently, the null hypothesis was rejected and the alternate hypothesis was accepted. This means that there is positive and significant relationship between biodegradable packaging and environmental sustainability. This finding is supported by Szaky (2008) who noted that the desire for companies to embrace biodegradable packaging is due to its capacity to reduce greenhouse gas emissions and achieve environmental sustainability. Pullen (2014) also supported this finding when he stated that biodegradable packaging is capable of achieving environmental sustainability since it reduces wastes and greenhouse gas emission.

This study also found a positive and significant relationship between recyclable packaging and environmental sustainability.. This finding was derived from the result of the SPSS correlation analysis carried out on the two variables. The result revealed that recyclable packaging is positively and significantly correlated with environmental sustainability (rho = .893*). As a result of this, the null hypothesis was rejected and the alternate hypothesis was accepted. This implies that there is positive and significant relationship between recyclable packaging and environmental sustainability. This finding is consistent with the research conducted by Barber (2010) which reported that recyclable packaging will put an end to the indiscriminate dumping of wastes on the streets and protect the environment from all forms of littering, degradation and pollution. Gonçalves (2013) also supported this finding when he stated that recyclable packaging is the most effective way of achieving environmental sustainability.

Finally, it was discovered that packaging optimization has a positive and significant relationship with environmental sustainability. This finding was derived from the result of the SPSS correlation analysis carried out on the two variables. The empirical result indicated that packaging optimization is positively related to environmental sustainability (rho = .923*) and that this relationship is significant at 0.05 level. 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 packaging optimization and environmental sustainability. This finding is supported by Barber (2010) who noted that packaging optimization has the potentials of reducing ecological footprint, wastes, transportation costs and greenhouse gas emission. It is a sure way of achieving environmental sustainability.

CONCLUSION

From the foregoing analysis, it is clear that green packaging has the potentials of achieving environmental sustainability. The empirical results of this study succinctly demonstrated that within the Nigerian context, biodegradable packaging was found to have a positive and significant relationship with environmental sustainability. The study also found a positive and significant relationship between recyclable packaging and environmental sustainability. A significant positive relationship was equally reported between packaging optimization and environmental sustainability. Based on these findings, it was concluded that green packaging has a positive and significant relationship with environmental sustainability.

RECOMMENDATION

In line with the findings and conclusion, the following recommendations are made:

1. That, manufacturing companies in Nigeria should switch from the conventional packaging system to green packaging as it would enhance environmental sustainability.

2. That, manufacturers in Nigeria should move away from the oil-based packaging system to the plant-based packaging system (biodegradable packaging) as this would help to reduce greenhouse gas emissions and achieve environmental sustainability.
3. That, Nigerian manufacturers should adopt recyclable packaging as it would reduce wastes and protect the environment from all forms of littering, degradation and pollution. This will help to achieve environmental sustainability.
4. Finally, it is recommended that manufacturing companies in Nigeria should optimize their packaging as it would reduce waste, transportation footprint and disposal concerns and costs. The reduction in the number of containers and trucks will not only reduce transportation costs but also reduce diesel consumption and greenhouse gas emissions for the achievement of environmental sustainability.

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